SPIE. ASTRONOMICAL TELESCOPES + INSTRUMENTATION

CONNECTING MINDS.
ADVANCING LIGHT.

2014

2014 ASTRONOMICAL TELESCOPES + INSTRUMENTATION.

TECHNICAL PROGRAM

EXHIBITION GUIDE

www.spie.org/as

Palais des congrès de Montréal
Montréal, Quebec, Canada

Conferences & Courses: 22–27 June 2014

Exhibition: 25–26 June 2014

Read the industry's LEADING magazines

Because staying informed has never been so critical.

Photonics news from *your* industry and *your* part of the world.

To subscribe, visit: photonics.com/subscribe.

Available in print and digital formats.

To contribute to Photonics Media publications, submit a 100-word abstract to Managing Editor Laura Marshall at laura.marshall@photonics.com for consideration.

PHOTONICS MEDIA

THE PULSE OF THE INDUSTRY

Welcome to Astronomical Telescopes + Instrumentation.

2014 Symposium Chairs:

Gillian S. Wright
UK Astronomy Technology Ctr. (United Kingdom)

Luc Simard
National Research Council Canada (Canada)

2014 Symposium Co-Chairs:

Colin Cunningham
UK Astronomy Technology Ctr. (United Kingdom)

Masanori Iye
National Astronomical Observatory of Japan (Japan)

Cooperating Organizations

American Astronomical Society (AAS)
Australian Astronomical Observatory (AAO)
Association of Universities for Research in Astronomy (AURA)
Canadian Astronomical Society (CASCA)
Canadian Space Agency (CSA)
European Astronomical Society (EAS)
European Organisation for Astronomical Research in the Southern Hemisphere (ESO)
National Radio Astronomy Observatory (NRAO)
Royal Astronomical Society (RAS)
Science & Technology Facilities Council (STFC)

SPIE. ASTRONOMICAL TELESCOPES + INSTRUMENTATION

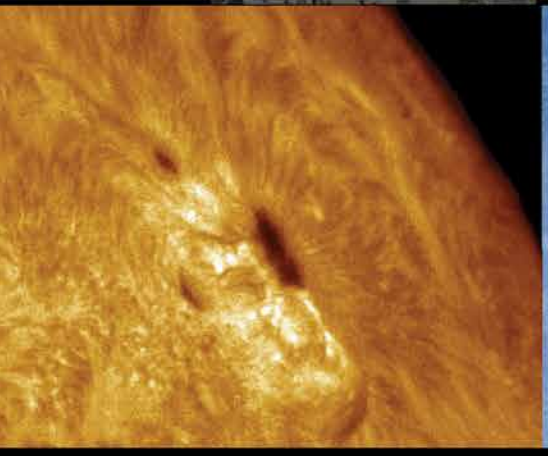
Contents

DAYSTAR FILTERS

The academic standard in Hydrogen Alpha bandpass solar filters and telescopes for over 40 years.

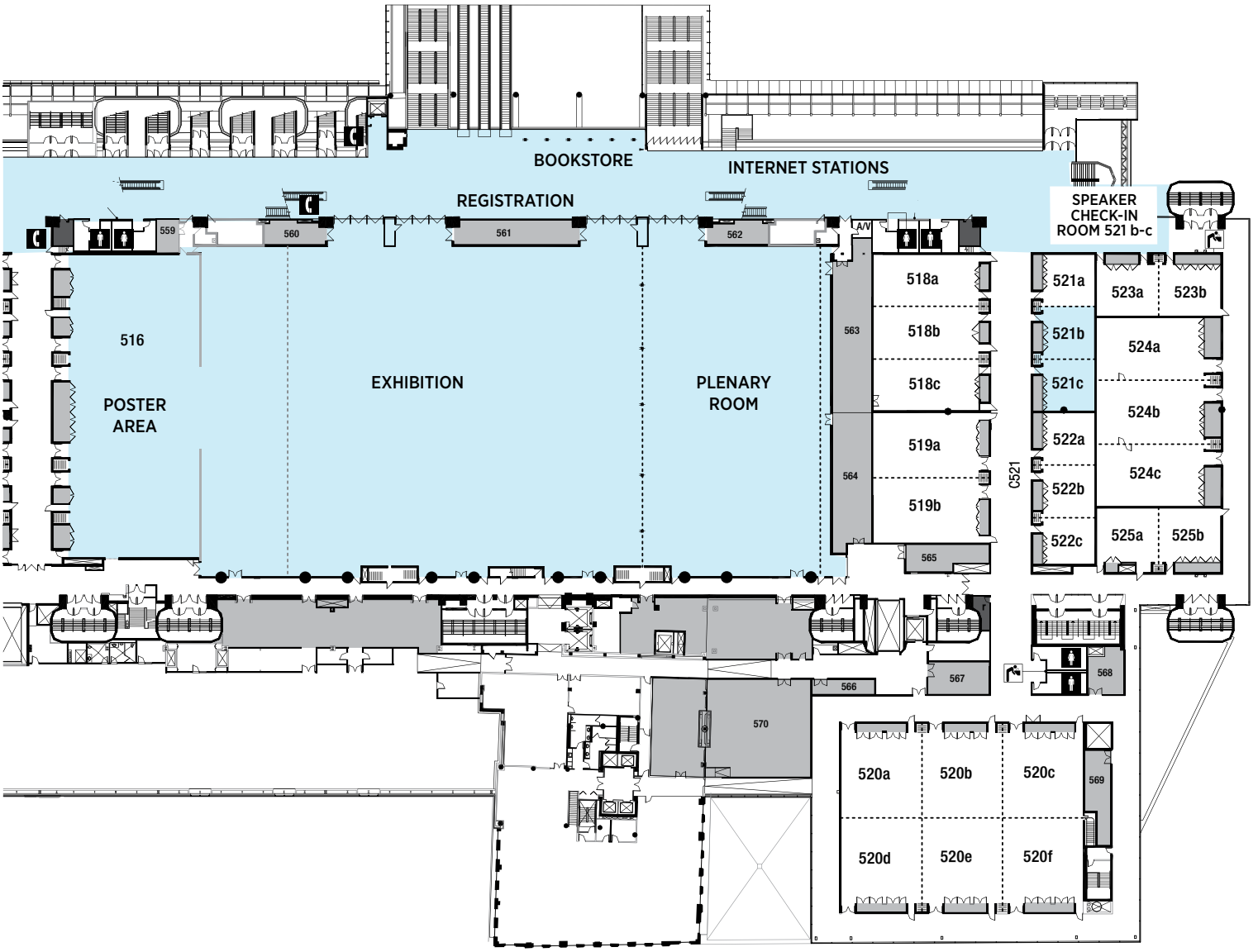
- Bandpass filters from 0.2Å - 5Å FWHM
- Available from 350-700nm
- Available in Standard or Professional Grade
- Clear aperture 19mm - 45mm standard
- Fully electronically controlled and tunable.
- Filter Wheel options available
- H Alpha, Ca II K-Line, Na D Lines, He D3 line, Fe XIV and custom lines on request
- Made in USA

- Outreach Applications
- Undergraduate Studies
- Dedicated Research Applications
- Flown Spaceflight Heritage



www.DaystarFilters.com • 1-866-680-6563 • Warrensburg, MO - USA

FLOOR PLAN
Palais des congrès
Level 5



DAILY SCHEDULES

Networking Events Daily Schedule

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Interactive Poster Sessions (Confs. 9143, 9147, 9148, 9152), 18:00 to 20:00, p. 5	*Plenary Presentation:* **James Webb Space Telescope: The Road to First Science Observations** *(Clampin),* 09:00, p. 7	*Plenary Presentation:* **Gaia: Scientific In-orbit Performance** *(Prusti),* 09:00, p. 8	*Plenary Presentation:* **Highlights from he Multi Unit Spectroscopic Explorer (MUSE), a 2nd generation VLT instrument for the VLT** *(Bacon),* 09:00, p. 9	**Software Hack Day,** *(Kendrew),* All day event, p. 5	
	Plenary Presentation: **The Square Kilometre Array: a physics machine for the 21st Century** *(Diamond),* 09:30, p. 7	*Plenary Presentation:* **ALMA Update** *(Cox),* 09:30, p. 8	*Plenary Presentation:* **Canadian Space Astronomy: Past, Present and Future** *(Hutchings),* 09:30, p.9	*Plenary Presentation:* **Hyper Suprime-Cam for Weak Gravitational Lensing Survey** *(Miyazaki),* 09:00, p. 10	
	Lunch with the Experts—a student networking event, 12:30 to 13:30, p. 5	**All-Conference Dinner and Presentation,** *(Doyon),* 19:00 to 21:30, p. 5	**Interactive Poster Sessions** (Confs. 9145, 9146, 9147, 9148, 9151, 9153), 18:00 to 20:00, p. 5	*Plenary Presentation:* **Transiting Exoplanet Survey Satellite (TESS)** *(Ricker),* 09:30, p. 10	
	Interactive Poster Sessions (Confs. 9144, 9145, 9147, 9148, 9150, 9154), 17:30 to 19:00, p. 5			**Interactive Poster Sessions** (Confs. 9144, 9146, 9147, 9148, 9149, 9151, 9153), 18:00 to 20:00, p. 5	
	All-Conference Welcome Reception, 19:00 to 20:30, p. 5		**EXHIBITION**, p. 13 10:00 to 20:00	10:00 to 20:00	

Conference Daily Schedule

PROGRAM ON TELESCOPES AND SYSTEMS

9143 **Space Telescopes and Instrumentation 2014: Optical, Infrared, and Millimeter Wave** *(Oschmann, Clampin, Fazio, MacEwen, Barto)* p. 42

9144 **Space Telescopes and Instrumentation 2014: Ultraviolet to Gamma Ray** *(Takahashi, den Herder, Bautz)* p. 53

9145 **Ground-based and Airborne Telescopes V** *(Stepp, Gilmozzi, Hall)* p. 67

9146 **Optical and Infrared Interferometry IV** *(Rajagopal, Creech-Eakman, Malbet)* p. 78

9147 **Ground-based and Airborne Instrumentation for Astronomy V** *(Ramsay, McLean, Takami)* p. 86

9148 **Adaptive Optics Systems IV** *(Marchetti, Close, Véran)* p. 106

9150 **Modeling, Systems Engineering, and Project Management for Astronomy VI** *(Angeli, Dierickx)* p. 124

9149 **Observatory Operations: Strategies, Processes, and Systems V** *(Peck, Benn, Seaman)* p. 119

PROGRAM ON TECHNOLOGY ADVANCEMENTS

9151 **Advances in Optical and Mechanical Technologies for Telescopes and Instrumentation** *(Navarro, Cunningham, Barto)* p. 128

9152 **Software and Cyberinfrastructure for Astronomy III** *(Chiozzi, Radziwill)* p. 137

9153 **Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy VII** *(Holland, Zmuidzinas)* p. 143

9154 **High Energy, Optical, and Infrared Detectors for Astronomy VI** *(Holland, Beletic)* p. 152

Courses Daily Schedule

MONDAY	TUESDAY	WEDNESDAY	THURSDAY
NEW SC1139 **Systems Engineering and Large Telescope Observatories** *(Lightsey/Arenberg)* 08:30 to 17:30	SC906 **Introduction to Visible and NIR Spectrograph Design and Development for Astronomy** *(Sheinis)* 08:30 to 17:30 SC1078 **Advanced Composite Materials for Astronomical Telescopes and Optomechanical Instruments** *(Zweben)* 08:30 to 17:30	***NEW*** SC1120 **Finite Element Analysis of Optics** *(Doyle, Genberg)* 08:30 to 17:30	SC1001 **Systems Engineering for Astronomy Projects** *(Schnetler)* 08:30 to 17:30

See Course descriptions p. 30–33

NETWORKING EVENTS.

Enjoy in-depth conversations with your peers at these social, technical, and networking events.

Interactive Poster Sessions

Location: Room 516

Sunday 22 June from 18:00 to 20:00
(Conference 9143, 9147, 9148, 9152)

Monday 23 June from 17:30 to 19:00
(Conferences 9144, 9145, 9147, 9148, 9150, 9154) followed by the Welcome Reception

Wednesday 25 June from 18:00 to 20:00
(Conferences 9145, 9146, 9147, 9148, 9151, 9153)

Thursday 26 June from 18:00 to 20:00
(Conferences 9144, 9146, 9147, 9148, 9149, 9151, 9153)

Conference attendees are invited to attend the poster sessions. See conference program for a list of the posters in the session. Each poster session will include a different set of conference poster presentations. Come view the posters, ask questions, and enjoy light refreshments. Authors of poster papers will be present during the Interactive Poster Session to answer questions concerning their papers. As part of the technical program, poster sessions are for paid registrants only. Attendees are required to wear their conference registration badges to the poster sessions.

Lunch with the Experts—a student networking event

Monday 23 June 2014 · 12:30 to 13:30
Location: Room 524

Open to Student Attendees.

Enjoy a casual meal with colleagues at this engaging networking opportunity. Hosted by SPIE Student Services, this event features experts willing to share their experience and wisdom on career paths in optics and photonics. Seating is limited and will be granted on a first-come, first-served basis.

All-Conference Welcome Reception

Monday 23 June 2014 · 19:00 to 20:30
Location: Room 710

Relax, socialize, and enjoy the refreshments and all that this unique venue has to offer. Please remember to wear your registration badges. Dress is casual. Guest tickets are available for purchase online or at the Cashier.

All-Conference Dinner and Presentation

Tuesday 24 June 2014 · 19:00 to 21:30
Location: Le Westin Montréal, Fortifications Ballroom

All attendees are invited to attend the All-Conference Dinner and Presentation on Tuesday at the Fortifications Ballroom, Westin Le Montréal. Tickets for the dinner are sold separately. Space is limited. Preregister by Sunday 22 June to guarantee your place. Le Westin Montréal is located directly across the street from the congress center within walking distance.

THE QUEST FOR LIFE OUTSIDE THE SOLAR SYSTEM

René Doyon, University of Montréal (Canada)

More than a thousand exoplanets have been confirmed so far including an increasing number of Earth-size planets and super-Earths. The astronomical community is actively engaged in developing new powerful ground-based instruments and dedicated space missions with the goal of finding rocky, temperate planets, especially around low-mass stars. One can anticipate that, within a decade, a significant population of transiting planetary systems harboring potentially habitable worlds will have been identified. This will set the stage for the James Webb Space Telescope and the next generation of giant ground-based telescopes, later in the next decade, to probe their atmosphere, searching for water and even biomarkers. In this presentation, I will highlight the main discoveries that have marked the last 20 years of exoplanet research, emphasizing the technologies and innovations that made these major advances possible. I will also present an overview of on-going and future projects aiming the detection and characterization of habitable worlds. We live in an exciting time where humanity is on the verge of reaching the technological maturity for detecting life outside the Solar system.

René Doyon is a professor at the physics department of the Université de Montréal and Director of the Mont-Mégantic Observatory. His science interests focus on the search and study of exoplanets, young stars and the development of infrared astronomical instrumentation. He and his students led the development of differential imaging techniques that contributed to obtain the first images of a multiple planetary system outside our Solar system in 2008. He is principal investigator of FGS/NIRISS, the Canadian-built science instrument onboard the James Webb Space Telescope, co-investigator of the Gemini Planet Imager and co-PI of SPIRou, an instrument optimized for the detection of Earth-like planets through infrared precision radial velocity.

Software Hack Day

Thursday 26 June 2014 · All day event
Location: Room 520e

Session Chair: **Sarah Kendrew,** Univ. of Oxford (United Kingdom)

The SPIE Astronomical Telescopes + Instrumentation meeting will host its first Hack Day in 2014. This will be an all-day open event in conjunction with conference 9152, without formal presentations. The goal is to bring creative minds and talented developers together to share ideas, experiment, solve problems, explore or create new data in innovative ways. Software is an area where the right combination of ideas and skills can lead to rapid results, so we hope that many budding and experienced developers will join this inaugural event, collaborate, write code, and make history.

Sarah Kendrew is an Astrophysicist at the University of Oxford, where she works on instrumentation projects for the European Extremely Large Telescope and the James Webb Space Telescope, with an interest in star formation studies from the Milky Way Galaxy to high redshifts. She is co-organiser of the .Astronomy conference series, which has hosted astronomy Hack Days annually since 2009.

OPTICS & PHOTONICS International Exhibition

OPIE '15

Space & Astronomical Optics EXPO

Organizer: Japan Photonics Council

- LASER EXPO
- LENS EXPO
- POSITIONING EXPO
- Medical&Imaging EXPO
- IR + UV EXPO

Co-located with

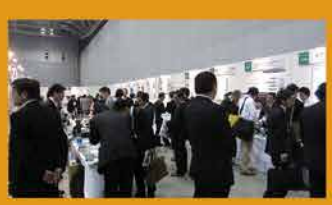
Congress OPIC2015 | nanomicro biz / ROBOTECH

22-24 April, 2015

Pacifico Yokohama, Japan

Showcase your products at this premiere event!

Total Projected Participation - Exhibitors 400 - Attendees 20,000

For further information http://www.opie.jp/en/

The Optronics Co., Ltd. International Dept. E-mail: intl@optronics.co.jp

Monday 23 June.

Monday 23 June · 08:50 to 10:00
Location: Room 517d

08:50

WELCOME

Luc Simard
National Research Council Canada (Canada)

09:00

JAMES WEBB SPACE TELESCOPE: THE ROAD TO FIRST SCIENCE OBSERVATIONS

Paper Number 9143-501

Mark Clampin
NASA Goddard Space Flight Ctr. (USA)

The James Webb Space Telescope (JWST) is a large aperture, infrared telescope planned for launch in 2018. JWST is a facility observatory that will address a broad range of science goals covering four major themes: First light and Re-Ionization, the Assembly of Galaxies, the Birth of Stars and Protoplanetary Systems, and Planetary Systems and the Origins of Life. JWST embodies several major technical challenges. With a 6.5 meter diameter mirror it will be the largest space telescope ever flown. It is the first cryogenic telescope to incorporate passive cooling, achieved by means of a large sunshade, to reach its ~40 K operating temperature. Due to the size of the Observatory, it must be stowed for launch, and then deployed to its operational configuration on its way to an orbit around the second Lagrange point.

JWST is well on its way from drawing board to sky. Much of the flight hardware is already built and tested at the sub-system level. In this talk we will focus on the remaining tasks on the road to JWST's first science observations on the sky. Prior to the launch, the remaining work to integrate the observatory elements centers around four major activities:

- Cryo-optical testing of the instrument complement
- Cryo-optical testing of the assembled telescope and instrument complement;
- Integration of the observatory
- Full-scale testing of the observatory deployments.

We will discuss the design and philosophy underlying the cryo-optical test program for the Observatory. Cryo-optical testing begins with the instrument complement at the Goddard Space Flight Center, and finishes with an end-to-end test of the assembled telescope in the world's largest cryogenic vacuum chamber at the Johnson Space Flight Center. In the context of a detailed overview of JWST's deployment steps after launch, we will describe the final stages of Observatory integration and the testing to verify these deployments, ready for launch. Finally, we will discuss the post-launch timeline to transition the stowed Observatory to the start of science operations.

Mark Clampin is currently the James Webb Space Telescope (JWST) Observatory Project Scientist at GSFC. He also advises the Physics of the Cosmos (PCOS)/Cosmic Origins (COR) Program Offices as Chief Technologist. He will serve as Editor in Chief of SPIE's New Journal of Astronomical Telescopes, Instruments and Systems. Previously, Dr Clampin was ACS Group manager at the Space Telescope Science Institute (STScI), where he supported three Hubble Space Telescope (HST) Servicing Missions. Dr Clampin is a Co-Investigator on the Transiting Exoplanet Survey Satellite (TESS), and the Advanced Camera for Surveys (ACS) science team where he served as the Detector Scientist. He is currently working on the formation and evolution of planetary systems by means of ACS coronagraphic observations of debris disks. Dr Clampin has also designed ground-based telescope instruments including adaptive optics systems, coronagraphs and detectors.

09:30

THE SQUARE KILOMETRE ARRAY: A PHYSICS MACHINE FOR THE 21ST CENTURY

Paper Number 9143-502

Philip Diamond
SKA Organisation (United Kingdom)

The Square Kilometre Array is the next-generation radio-telescope. It will be a true mega-science facility. It is being designed and will be built by a global consortium, headquartered in the UK. The consortium currently has 11 member countries but is open for additional members at any time.

The SKA Observatory will have sites in Australia and South Africa, and will build on the two precursor telescopes, ASKAP and MeerKAT, currently under construction on the sites. The SKA is being designed as a physics machine for the 21st Century and will address scientific questions such as the nature of gravity, the origins of the Universe and the origins of life. I will describe the scientific rationale for the SKA; the technologies selected to deliver that science and the challenges posed in handling the massive data volumes to be generated by the observatory.

The SKA is now in the detailed design phase. Funding exceeding €120M has been committed by the partner nations to deliver that design. The design will be complete at the end of 2016 and, assuming construction funding is secured, the procurement process will begin in 2017 and construction in early 2018. The SKA will deliver early science by 2020.

Philip Diamond is the Director-General of the SKA. He was appointed in October 2012, and leads the team designing and ultimately constructing the SKA. He received his PhD in 1982 from the University of Manchester. He worked at Onsala, Sweden and MPIfR, Germany before moving to NRAO, USA for 12 years. He was Deputy Director of the VLA/VLBA before moving to Jodrell Bank in 1999 as the Director of MERLIN. In 2006 he was appointed Director of the Jodrell Bank Centre for Astrophysics. From 2010-2012 he was the Chief of CSIRO Astronomy and Space Science (CASS), which operates all of the major radio astronomy facilities in Australia. He has published ~300 research papers in astronomy.

Tuesday 24 June.

Tuesday 24 June · 08:50 to 10:00
Location: Room 517d

08:50

SPIE FELLOWS AWARDS

presented by **H. Philip Stahl**

The following individuals will be recognized for their contributions to SPIE and the scientific community.

Mark Clampin, NASA Goddard Space Flight Center (United States) for achievements in astronomical optics.

Gary Matthews, Exelis Inc. (United States) for achievements in large optics and optical systems for ground and spaced-based applications.

Larry Stepp, Thirty Meter Telescope Observatory Corp. (United States) for achievements in large astronomical optics, telescopes, and active optics.

09:00

GAIA: SCIENTIFIC IN-ORBIT PERFORMANCE

Paper Number 9143-503

Timo Prusti

European Space Agency (The Netherlands)

Gaia is a European Space Agency cornerstone mission launched 19 December 2013 from French Guyana. Gaia will map the sky down to the 20th magnitude for point sources. Astrometry and photometry is done for all detected objects and spectroscopy down to magnitude limit 16. At the moment of writing this abstract Gaia is being commissioned. All subsystems have been successfully operated. Gaia is in its operational orbit around L2 point. The attitude control with use of the stars from the science instrument has been successfully executed. The alignment of optical elements is on-going with an iterative process involving focusing and spin speed adjustments as well. The Focal Plane Assembly is fully functional with all 106 CCDs operational and the Phased Array Antenna can transmit all science data down. The commissioning phase is anticipated to last till May 2014. The nominal operations are scheduled for 5 years. The scientific yield is expected to contain a billion stars with positions, distances and proper motions based on astrometry. With photometry the stellar properties of this sample can be deduced. Finally from the spectroscopy Gaia allows extraction of some 150 million radial velocities for the brightest stars. This information will allow addressing the main scientific goals of Gaia concerning the structure, history and evolution of our Milky Way Galaxy. In addition to Galactic structure, Gaia will allow addressing various other science areas. For stellar astrophysics Gaia will provide the long awaited distances and census of multiple star systems. Gaia is expected to discover few thousand exo-planets. The main belt asteroid orbits will be improved significantly. Eventually even fundamental physics can be done with tests on general relativity. The presentation will summarize the status of the spacecraft and provide updated scientific performance estimates based on the in-orbit data from the commissioning phase.

Timo Prusti is since 2007 the Gaia Project Scientist at the European Space Agency. He graduated at the University of Helsinki 1987 and defended his Ph.D. 1992 at the University of Groningen. He worked as a postdoc at the Observatory of Arcetri, Florence before joining ESA. In ESA he worked with the Infrared Space Observatory and Herschel before taking up the Gaia duties. His scientific interests are related to young stars especially in close-by clusters and with disks.

09:30

ALMA UPDATE

Paper Number 9143-504

Pierre Cox

Stuartt Corder, Joint ALMA Observatory (Chile)

The Atacama Large Millimeter/submillimeter Array is transitioning from construction to operations. This connected element array currently operates from wavelengths of 3-mm to 350-microns with up to 66 array elements, 54 of 12-m diameter and 12 of 7-m diameter. While the antennas and most of the hardware for the receivers are on site, array capabilities are still expanding rapidly. In parallel with construction activities, early science observations have been going on since October 2011. At the time of the meeting, ALMA will be starting the third cycle of observing with many exciting, fundamental results already obtained. We will present the current status of the project and give an overview of the trailblazing science results obtained so far. The potential of the fully operational ALMA will be outlined as well as some of the development projects that are considered. In summary, this talk will address the past, present and future of ALMA, describe the transformational science that is and will be produced with ALMA.

Pierre Cox is well known scientifically in the area of millimeter and infrared observations of star-forming regions, evolved stars and high-redshift galaxies, and has published over 200 papers with more than 10,000 citations in total. Before taking his position as ALMA Director in April 2013, he was previously working as Director of IRAM (Institut de Radioastronomie Millimétrique). In the late 1990s, Pierre Cox was one of the founding ALMA Scientific Advisory Committee and European Scientific Advisory Committee members, who supported and promoted the project both with scientists and funding agencies. Since then he has stayed in close contact with ALMA through various committees. In 2007, he chaired the review committee of the ALMA operations plan.

Wednesday 25 June.

Wednesday 25 June · 09:00 to 10:00
Location: Room 517d

09:00

HIGHLIGHTS FROM THE MULTI UNIT SPECTROSCOPIC EXPLORER (MUSE), A 2ND GENERATION VLT INSTRUMENT FOR THE VLT

Paper Number 9147-506

Roland Bacon
Observatoire de Lyon (France) and the MUSE consortium

The Multi Unit Spectroscopic Explorer (MUSE) is a second-generation VLT panoramic integral-field spectrograph. The instrument has been designed to take advantage of the VLT ground layer adaptive optics ESO facility using four laser guide stars. MUSE couples the discovery potential of a large imaging device to the measuring capabilities of a high-quality spectrograph, while taking advantage of the increased spatial resolution provided by adaptive optics. The MUSE hardware is composed of 24 identical modules, each one consisting of an advanced slicer, a spectrograph and a $(4k)^2$ detector. A series of fore-optics and splitting and relay optics is in charge of derotating and partitioning the square field of view into 24 sub-fields. With its almost 7 tons of opto-mechanics, MUSE is one of the biggest integral field unit ever built.

After a successful preliminary acceptance in Europe in fall 2013, MUSE has been dismounted, shipped to Chile and re-integrated in the Paranal new integration hall and finally installed on the Nasmyth platform of UT4 late January this year. During the 2 commissioning runs, hundreds of millions of spectra have been obtained in order to validate the instrument and measured its achieved performance. To demonstrate its power, a number of show-case and spectacular observations have also been obtained. Preliminary results demonstrate that MUSE is likely to become a new reference in the field of integral field spectroscopy thanks to its large field of view, very high throughput, excellent image quality, good spectral resolution, wide simultaneous spectral range and state-of-the art control and data reduction software.

I will review this success story, from the call of idea to the deployment on the VLT, including the latest performances and showcase observations.

Roland Bacon is directeur de recherche au CNRS. He has been for ten years the director of the Centre de Recherche Astrophysique de Lyon. He is an extragalactic astronomer and an instrumentalist. In 1987, he realized with G. Courtès and G. Monnet the first ever integral field spectrograph named TIGER for CFHT. He has then led many developments in that field, including the very successful SAURON integral field unit mounted at WHT which he co-led with T. de Zeeuw and R. Davies. Since 2001 he is the principal investigator of MUSE, the 2nd generation panoramic integral-field spectrograph for the VLT.

09:30

CANADIAN SPACE ASTRONOMY: PAST, PRESENT AND FUTURE

Paper Number 9143-505

John B. Hutchings
NRC - Herzberg Institute of Astrophysics (Canada)

Canadian astronomers have participated in space astronomy since the first OAO missions in the 1960s and 1970s. Individual Canadian scientists have been members of HST instrument teams, and advisory groups for IUE and HEAO missions, as well as competing successfully for observing time on NASA, ESA, and Japanese astronomy satellites. With the formation of the Canadian Space Agency, Canada became partner in the FUSE mission, the ISRO Astrosat, and the JWST, providing hardware and science team membership. The Canadian Astronomy Data centre was one of the three original world-wide archive distribution centres for HST, and now is involved in many space and ground-based data services. The MOST observatory is an all-Canadian microsat that has operated for nearly a decade. Canada is currently involved in partnership in a number of imminent space facilities, as well as participating in teams defining future missions. I will describe this history, and review the technical and scientific capability that exist in Canada now. I will outline prospects for the future, including a concept for a high resolution orbiting telescope that will fill the gap in high resolution UV astronomy when HST operations cease.

John Hutchings has worked as a research scientist at the DAO since 1967. His involvement in space astronomy includes Copernicus, IUE, two HST instruments, the Einstein observatory, the FUSE mission, Astrosat, and JWST. He has served on advisory panels for NASA, ESA, ISRO, and has published extensive research based on space observations. He has served as Canadian project scientist for FUSE, UVIT, and JWST, and is on several teams for new projects and partnerships.

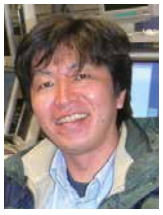
Thursday 26 June.

Thursday 26 June · 09:00 to 10:00
Location: Room 517d

09:00

HYPER SUPRIME-CAM FOR WEAK GRAVITATIONAL LENSING SURVEY

Paper Number 9143-507



Satoshi Miyazaki
National Astronomical Observatory of Japan (Japan)

Hyper Suprime-Cam (HSC) is a next generation wide field optical imaging camera built for 8.2 m Subaru telescope. The field of view is 1.5 degree in diameter and the nearly 50 cm image circle was paved by 116 fully depleted CCDs (2k x 4k 15 micron square pixels). To realize a seeing limit imaging at Mauna Kea, the specification on the overall instrument PSF is set as 0.32 arc-second (FWHM). This is crucial for our primary scientific objectives: weak gravitational weak lensing survey to probe dark matter distribution. We started building the camera in 2006, had a first light in 2012 and now in the final phase of the commissioning. The delivered image quality is mostly seeing limit as designed and we once observed the seeing size of 0.43 arc-second (median value over the field of view) in Y-band with 300 seconds exposure. Our 300 nights observing proposal has been already accepted. The program starts in March 2014 and continues over 5 years.

Satoshi Miyazaki was awarded doctor of science in 1993 from University of Tokyo. From 1994 to 1996 he worked with Gerry Luppino at University of Hawaii to build UH 8K mosaic camera. In 1996 he joined NAOJ and has been working on optical instrumentations (Suprime-Cam, HSC) and observational cosmology.

09:30

TRANSITING EXOPLANET SURVEY SATELLITE (TESS)

Paper Number 9143-508

George R. Ricker, Jr.
Massachusetts Institute of Technology (USA)

The Transiting Exoplanet Survey Satellite (TESS) will discover thousands of exoplanets in orbit around the brightest stars in the sky. In a two-year survey of the solar neighborhood, TESS will monitor more than 200,000 stars for temporary drops in brightness caused by planetary transits. This first-ever spaceborne all-sky transit survey will identify planets ranging from Earth-sized to gas giants, around a wide range of stellar types and orbital distances.

TESS stars will typically be 30-100 times brighter than those surveyed by the Kepler satellite; thus, TESS planets will be far easier to characterize with follow-up observations. For the first time it will be possible to study the masses, sizes, densities, orbits, and atmospheres of a large cohort of small planets, including a sample of rocky worlds in the habitable zones of their host stars. Full frame images with a cadence of 30 minutes or less will provide precise photometric information for several million stars during observation sessions of several weeks. The brighter TESS stars will potentially yield valuable asteroseismic information as a result of monitoring at a rapid cadence of 1 minute or less. An extended survey by TESS of the Ecliptic caps will provide prime exoplanet targets for characterization with the James Webb Space Telescope (JWST), as well as other large ground-based and space-based telescopes of the future.

TESS will serve as the 'People's Telescope,' with data releases every 4 months, inviting immediate community-wide efforts to study the new planets. The TESS legacy will be a catalog of the nearest and brightest main-sequence stars hosting transiting exoplanets, which will endure as the most favorable targets for detailed future investigations.

TESS has been selected by NASA for launch in 2017 as an Astrophysics Explorer mission.

George R. Ricker's research interests are focused on the development of state-of-the-art photon detectors for astronomical satellite missions. He is Director of the CCD Laboratory at the MIT Kavli Institute. Dr. Ricker was the PI for the international High Energy Transient Explorer (HETE) mission, a small satellite incorporating instruments from France, Japan and the United States which launched in October 2000. Built and integrated at MIT, HETE was the first satellite mission entirely devoted to the study of gamma-ray bursts. Dr. Ricker was also the PI for the CCD X-ray camera on the Japan-US ASCA mission (launched in 1993), is Deputy-PI for the Chandra ACIS instrument (launched in 1999), and was the US PI for the X-ray CCD Camera on the Japan-US Astro-E1 mission. Dr. Ricker is the PI for the Transiting Exoplanet Sky Survey (TESS) mission, selected by NASA for launch in 2017.

ADVERTISERS INDEX

SPIE thanks the following Sponsors for their generous support

CONFERENCE BAG INSERT

TMT

Booth #223 · www.tmt.org

CONFERENCE BAG PEN

FIRST LIGHT ADVANCED IMAGERY

Booth #215 · www.firstlight.fr

FLOOR PLAN

OFFICINASTELLARE

Booth #124 · www.officinastellare.com

LANYARDS

Ball Aerospace & Technologies Corp.

www.ballaerospace.com

WELCOME RECEPTION

COM DEV

www.comdev.ca

WI-FI

Spectral Instruments

Booth #314 · www.specinst.com

GENERAL REFRESHMENT SPONSORS

Richardson Gratings, Booth #518
Printech Circuit Labs, Ltd., Booth #126

PROMOTIONAL PARTNERS

Optics.org
Photonics Media
The Optronics Co., Ltd.

E.
EXHIBITION

Visit the Exhibition.

Wednesday 25 June
Exhibition/Poster Reception · 18:00 to 20:00

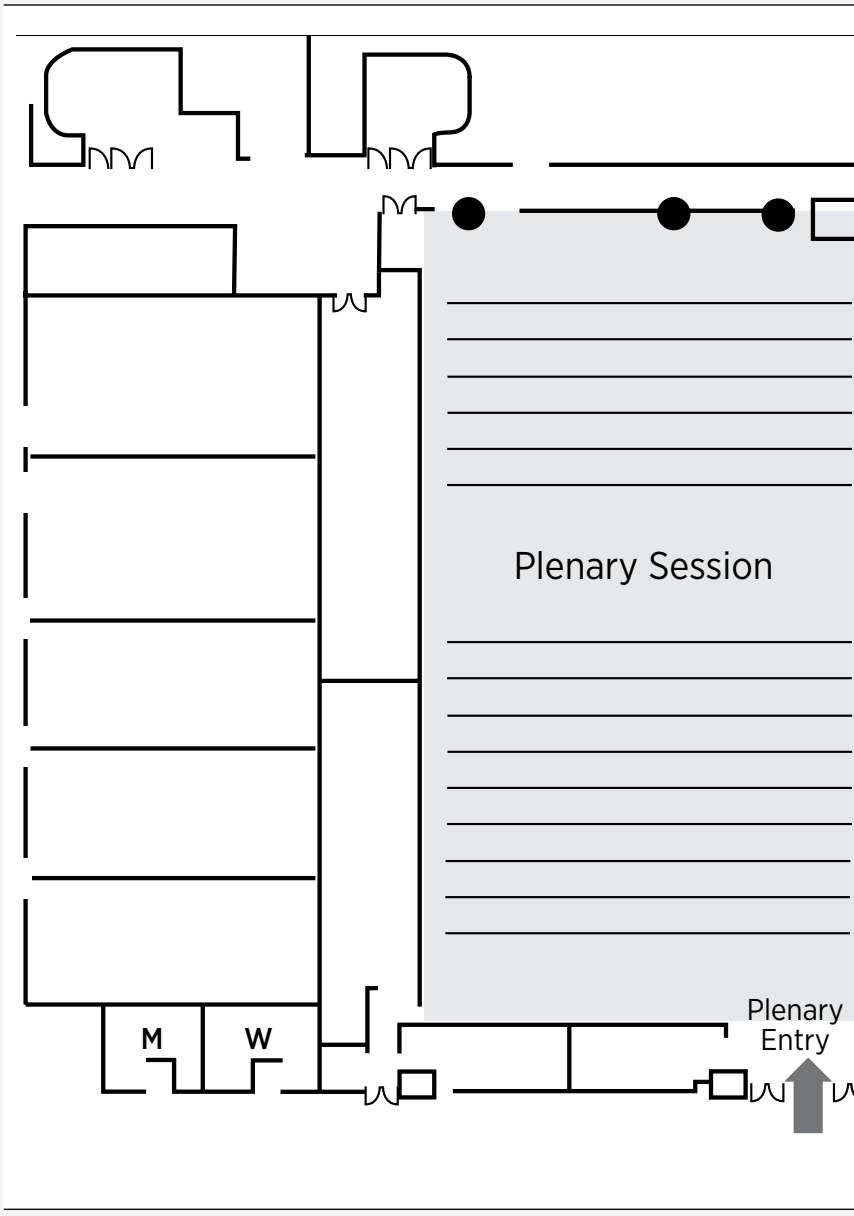
Thursday 26 June
Exhibition/Poster Reception · 18:00 to 20:00

See the latest in:

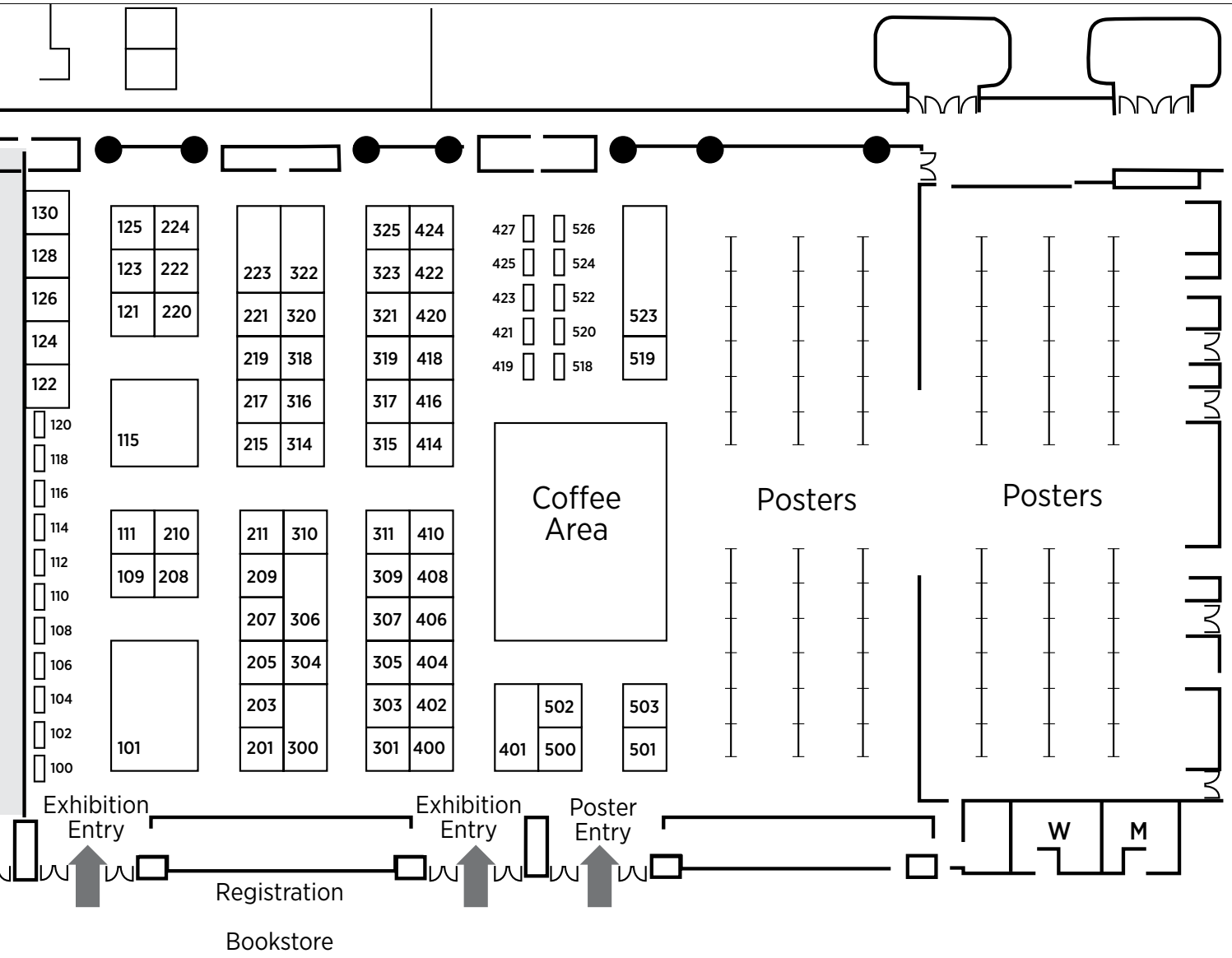
- Devices and components for large ground-based telescopes
- Ground instruments
- Astronomy information technologies
- Space telescopes and instruments
- Detectors
- Specialized optics materials and systems

EXHIBITOR BOOTH INDEX

Booth #	Exhibitor
1L	Photonics Media
100	National Instruments
101	AVS - Added Value Industrial Engineering Solutions, S.L.U.
101	Compañia Española de Sistemas Aeronauticos, S.A. (CESA)
101	ICEX Spain Trade and Investment
101	Instituto de Astrofísica de Canarias
101	LIDAX
101	SENER Ingenería y Sistemas, S.A.
101	TTI
102	Hofstadter Analytical Services, LLC
104	Solmirus Corporation
106	Iris AO, Inc.
108	Alluxa Inc
109	CILAS
110	Media Lario Technologies
111	Sagem REOSC
114	Vertex Antennentechnik GmbH
115	Cosine
115	NOVA
115	Janssen Precision Engineering Technology of Sens B.V.
115	SRON
115	Technology of Sense, b.v.
115	TNO
115	VDL-ETG Research
116	Optocraft GmbH
121	LZOS, JSC
122	ANU Advanced Instrumentation and Technology Centre
124	Officina Stellare SRL
124	Software Bisque, Inc.
126	Printech Circuit Laboratories Ltd.
128	ASA Astrosysteme GmbH
201	Fiberguide Industries, Inc.
203	Thales SESO
205	Nüvü Caméras Inc.
207	Apogee Imaging Systems
208	ESDI
209	Phytron Inc.
210	HORIBA Jobin Yvon
211	EIE Group s.r.l.
215	First Light Imaging
217	Large Synoptic Survey Telescope
219	Kogakugiken Corp.
220	Cryoconnect, a division of Tekdata Interconnections Limited
221	DynaVac
222	Imagine Optic Inc.
223	TMT Observatory
224	Astro Haven Enterprises
300	PI
301	Kaiser Optical Systems, Inc.
303	Infrared Laboratories



304	GMTO Corporation
305	CeramOptec Ind. Inc.
306	MT Mechatronics GmbH
307	KiwiStar Optics
309	Rayleigh Optical Corporation
310	e2v
311	Thorlabs
314	Spectral Instruments
315	AMOS
316	Fibertech Optica
317	Iridian Spectral Technologies
318	New England Optical Systems, Inc.
319	Zygo Corporation
320	Sunpower
321	AdTech Ceramics
322	SCHOTT North America
323	New Scale Technologies



325 Astronomical Consultants & Equipment Inc.
400 Ohara Corporation
401 IDOM
402 HEIDENHAIN Corporation
404 Hellma Materials GmbH
406 Polymicro Technologies, A Subsidiary of Molex
408 Sigmadyne
410 Asahi Spectra USA Inc.
414 Winlight System
416 4D Technology Corporation
418 ASTELCO Systems GmbH
419 Boston Micromachines Corp.
420 Integrated Detector Electronics AS
421 Observatory Sciences Ltd.
422 Applied Surface Technologies
423 Energetiq Technology, Inc.
424 Finger Lakes Instrumentation
425 Andover Corporation
427 redlogix GmbH
500 Photonic Cleaning Technologies
501 Teledyne Imaging Sensors
502 Luxel Corporation
503 MPB Communications Inc.
503 TOPTICA Photonics, Inc.
518 Richardson Gratings
519 ALPAO
520 CEDRAT TECHNOLOGIES
522 ISP Optics Corp.
523 SKA Organisation
524 Symetrie
526 The Optronics Co., Ltd.

Dutch Eyes on the Skies

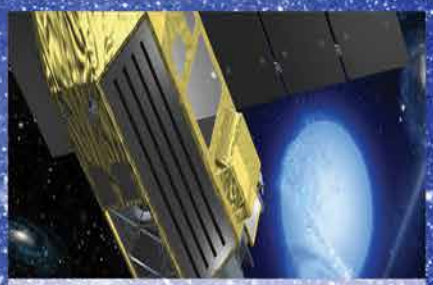
Cosine

Marco Beijersbergen
Management Team
J.H.Oortweg 19, 2333 CH Leiden
T: +31 71 5284962
E: m.beyersbergen@cosine.nl
www.cosine.nl

cosine | measurement systems

NOVA

Ramon Navarro, Department Head
Niels Bohrweg 2
2333 CA Leiden
T: +31 715275835
E: navarro@astron.nl
www.nova-astronomy.nl



SRON

Frans Stravers
Communications manager
Sarbonnelaan 2
3584 CA Utrecht
T: +31 887775600
E: F.Stravers@sron.nl

SRON Netherlands Institute for Space Research

Holland High Tech

High Tech Solutions for Global Challenges

Janssen Precision Engineering

Huub Janssen
Director
Azielaan 12
6199 AG Maastricht-Airport
T: +31 433585777
E: huub.janssen@JPE.nl

Holland
Pioneers in international business

Technology of Sense B.V.

Jan Gerbrands, CEO
Capitool 26, 7521 PL Enschede
T: +31 53 737 02 92
E: jan.gerbrands@technologyofsense.com
http://www.sensetech.nl

Technology of Sense

TNO

Matthew Maniscalco, Proposal Manager and Systems Engineer
Stieltjesweg 1, 2628 CK Delft
T: +31 152 69 21 80
E: matthew.maniscalco@tno.nl
www.tno.nl

TNO TAP zTO
www.tapinto.nl

VDL-ETG Research

Mathieu Breukers,
Business Manager Science & Technology
Hurksestraat 13, 5652 AH Eindhoven
T: +31 653126709
E: mathieu.breukers@vdletg.com
www.vdletg.com

VDL

4D Technology Corporation #416

SPIE Corporate Member

3280 E Hemisphere Loop Ste 146, Tucson, AZ, 85706-5024 United States
+1 520 294 5600; fax +1 520 294 5601
info@4dtechnology.com
www.4dtechnology.com

Featured Product: PhaseCam 6000 compact dynamic interferometer for shape measurement of large focal & aspheric optics

4D Technology designs and manufactures dynamic laser interferometers for non-contact metrology of optical quality surfaces, even in the presence of vibration and turbulence. 4D systems provide high resolution acquisition of phase data in as little as 1microsec, at wavelengths from DUV through NIR. Applications include astronomy, aerospace, general optics, directed energy and more. Contact: Stephen J. Martinek, Director of Worldwide Sales, steve.martinek@4dtechnology.com; Don Roberts, Eastern US Regional Manager, don.roberts@4dtechnology.com

AdTech Ceramics #321

SPIE Corporate Member

511 Manufacturers Way, Chattanooga, TN, 37405 United States
+1 423 755 5400; fax +1 423 755 5438
sales.department@adtechceramics.com
www.adtechceramics.com

Featured Product: Alumina and aluminum nitride multi-layer ceramic packages, precision injection molded ceramics.

AdTech Ceramics produces custom multilayer co-fire microelectronic ceramic and metal packages utilizing HTCC and AlN. HD alumina is also available with 0.12µm surface for thin film applications. Applications include Medical, Aerospace, Optoelectronics and High Frequency. Capabilities include Design Assistance and Microwave Modeling for high frequency performance to 30GHz. Ceramic injection molded and etched metal products also available. Contact: Douglas Brown, Director of Sales and Marketing, douglas.brown@adtechceramics.com; Brian Bukovitz, Sales Manager, brian.bukovitz@adtechceramics.com

Alluxa Inc #108

SPIE Corporate Member

3660 N Laughlin Rd, Santa Rosa, CA, 95403 United States
+1 707 331 6251
info@alluxa.com; www.alluxa.com

Featured Product: IR Narrowband & Dualband Filters w/Low OH-Band Absorption; Flat Top, Ultra-Narrow bandpass filters.

Alluxa produces hard coated optical filters with custom thin film coating equipment designed and built by our team. The combination of our state of the art automation, proprietary control algorithms, and a patented plasma thin film deposition process allows the world's most difficult filters to be created in a fraction of the time required by other hard coating methods. Contact: Ruth Gorham Houle, Director of Sales and Marketing, r.gorham-houle@alluxa.com

ALPAO #519

SPIE Corporate Member

345 rue Lavoisier, Inovallee, Mont Bonnot, 38330 France
+33 4 76 89 09 65
contact@alpao.com; www.alpao.com

Featured Product: Deformable mirrors, adaptive optics systems, wavefront sensors.

As a manufacturer of adaptive optics for the research and the industry, ALPAO offers you a complete range of adaptive optics products: very rapid deformable mirrors with large strokes and complete adaptive optics loops. All of these products have been designed and adapted according to the astronomy application: wireless optical communications and laser. Thanks to the unrivalled performance of these products, users can recover very large resolution images. Contact: Vincent Hardy, Sales manager, vincent.hardy@alpao.fr

AMOS #315

Rue des Chasseurs Ardennais 2, Liege Science Park, Angleur Liege, 4031 Belgium
+32 4 361 4040; fax +32 4 367 2007
info@amos.be; www.amos.be

Contact: Jean Pierre CHISOGNE, Sales & Marketing Manager, jp.chisogne@amos.be; Laetitia LABADIA, Project Assistant, laetitia.labadia@amos.be

Andover Corporation #425

SPIE Corporate Member

4 Commercial Dr, Salem, NH, 03079-2800 United States
+1 603 893 6888; fax +1 603 893 6508
info@andovercorp.com
www.andovercorp.com

Andover manufactures high-quality optical filters and coatings in the UV to Mid IR range. We specialize in narrowband, image-quality and space-qualified filters. We have over 1000 standard items in stock and can provide custom parts in as little as one week. We are ITAR and AS9100 registered. Contact: Rob Pursel, Sr. Optical Coating Engineer, rpursel@andovercorp.com; Phil Clark, Technical Sales, pclark@andovercorp.com.

ANU Advanced Instrumentation and Technology Centre #122

SPIE Corporate Member

Mount Stromlo Observatory Cotter Rd, Research School of Astronomy and Astrophysics, Weston Creek, ACT, 2611 Australia
+61 2 6125 0230; fax +61 2 6125 0233
aitc@mso.anu.edu.au; www.rsaa.anu.edu.au

Featured Product: ANU specialises in the design, integration and test of astronomical instruments and adaptive optics.

The Advanced Instrumentation and Technology Centre (AITC) is a national facility in Canberra, Australia. It was established to support the development of the next generation of instruments for astronomy, including a first-light instrument and adaptive optics sub-system for the Giant Magellan Telescope. The AITC offers an end-to-end capability with expertise in the design, manufacture, integration and test of precision instrumentation and complex systems for astronomy and space. Contact: Roger Franzen, GMT Program Manager, roger.franzen@anu.edu.au; Naomi Mathers, Industry Liaison Engineer, naomi.mathers@anu.edu.au

Apogee Imaging Systems #207

425 Sullivan Ave. Suite 3, South Windsor, CT, 06074 United States
+1 860 290 9211; fax +1 860 290 9566
sales@ccd.com; www.ccd.com

Apogee has been manufacturing and supplying cooled CCD cameras to astronomers around the world since it was founded in 1993. Apogee's Alta camera series is designed to offer a broad range of sensor options attractive to the Astronomy community. The Aspen and Ascent cameras further extends the Apogee portfolio providing higher performance and better affordability. In 2013 Apogee was acquired by Andor Technology, adding further expertise in camera development, manufacturing and customer support. Contact: Tim Puckett, Sales Engineer, t.puckett@andor.com; Megan Fish, Marketing Coordinator, m.fish@andor.com

EXHIBITOR DIRECTORY

Applied Surface Technologies #422

SPIE. Corporate Member

15 Hawthorne Dr, New Providence, NJ, 07974 United States
+1 908 464 6675
co2clean@co2clean.com; www.co2clean.com

Featured Product: CO2 Snow Jet

We demonstrate the CO2 Snow Jet -- a simple, yet novel surface cleaning process that can remove particles of all sizes (down to 0.02 microns) and also organic residues. The CO2 snow cleaning process works well for many substrates, ceramics, metals, wafers, optics, fiber optics, analytical samples (AFM, XPS), telescopes mirrors, diamond turned optics, and many other applications. The Snow Jet process is nondestructive, residue-free and has no environmental limitations. Bring test samples. Contact: Robert Sherman, RobertS@co2clean.com

ASA Astrosysteme GmbH #128

SPIE. Corporate Member

Galgenau 19, Neumarkt im Mühlkreis, 4212 Austria
+43 7942 7781760
office@astrosysteme.at
www.astrosysteme.com

Asahi Spectra USA Inc. #410

SPIE. Corporate Member

23505 Crenshaw Blvd Ste 229, Torrance, CA, 90505 United States
+1 310 530 5855; fax +1 310 530 1739
info@asahi-spectra.com
www.asahi-spectra.com

Featured Product: DECam 620mm VR filter, PFS 400 x 350mm dichroic mirror, MKO YJHKs filter, Broadband 0.4-1.8um AR

Asahi has provided astronomical filters and dichroic mirrors to world's well known observatories for twenty years. Asahi is willing to challenge with you and your science, and continue to develop the coating technology. The largest ever 620mm DECam VR filter, PFS 400 x 350mm dichroic mirror, Mauna Kea YJHKs filters and broadband 0.4-1.8um AR will be displayed. Stop by our booth #410 and let's discuss about the optics for your science ! Contact: Toshihiko Kimura, Overseas Sales Manager, t-kimura@asahi-spectra.co.jp

ASTELCO Systems GmbH #418

Fraunhoferstr 14, Martinsried / Muenchen, 82152 Germany
+49 89 8583 6650; fax +49 89 8583 6644
info@astelco.com; www.astelco.com

Featured Product: Telescopes and Telescope Mounts

ASTELCO Systems is your partner for professional astronomical telescopes and related accessories of any kind. ASTELCO designs, develops, builds and services advanced mechanical and optical systems, special instrumentation like spectrographs, and dedicated software as well as enclosures, domes and towers. ASTELCO is committed to quality, reliability and close connection to science. Contact: Peter Aniol, Director, pa@astelco.com; Mario Costantino, Director, mc@astelco.com

Astro Haven Enterprises #224

PO Box 3637, San Clemente, CA, 92672 United States
+1 949 452 0050
domesales@astrohaven.com
www.astrohaven.com

Astronomical Consultants & Equipment Inc. #325

PO Box 91946, Tucson, AZ, 85752-1946 United States
+1 520 219 8722
purchasing@astronomical.com
www.astronomical.com

AVS - Added Value Industrial Engineering Solutions, S.L.U. #101

Pol Ind Sigma Xixilion Kalea 2 Bajo Pabellón, 10, Elgoibar-Gipuzkoa, 20870 Spain
+34 943 821 841
avs@a-v-s.es; www.a-v-s.es

Boston Micromachines Corp. #419

SPIE. Corporate Member

30 Spinelli Pl, Cambridge, MA, 02138-1070 United States
+1 617 868 4178; fax +1 617 868 7996
moreinfo@bostonmicromachines.com
www.bostonmicromachines.com

Featured Product: The 4K-DM, installed in the Gemini Planet Imager enabling new images

Deformable mirror technology has paved the way for Boston Micromachines to provide MEMS mirrors for advanced optical control. These miniature, precision light-shapers empower the world's top researchers to make breakthroughs in astronomy, microscopy, laser control, and retinal imaging. Leading the industry in MEMS mirror development, BMC is committed to driving medical discovery and supporting national defense. Contact: Boston Micromachines, moreinfo@bostonmicromachines.com

CEDRAT TECHNOLOGIES #520

59 Chemin du Vieux Chêne - Inovallée, Meylan Cedex, 38246 France
+33 456 80400; fax +33 456 580401
actuator@cedrat-tec.com
cedrat-technologies.com

Featured Product: Smart actuators, motors & sensors, mechatronic solutions for demanding applications

CEDRAT TECHNOLOGIES offers a wide range of standard off the shelve mechatronic products including piezoelectric & magnetic actuators, motors, mechanisms with corresponding drivers & controllers. All these products carry one common objective: to be compact, dynamic and precise. Multi axis motion of mirrors or lenses with high precision are realized using for example tip tilts or motorized stages. Every product is vacuum & cryogeny compatible. Dedicated motion systems are also realized on demand. Contact: Thomas MAILLARD, International Sales manager, actuator@cedrat-tec.com; Sandrine HUGI, Communication & Sales Administration Manager, actuator@cedrat-tec.com

CeramOptec Ind. Inc. #305

SPIE Corporate Member

515 Shaker Rd, East Longmeadow, MA, 01028-3126 United States
+1 413 525 0600; fax +1 413 525 1112
salesengineering@ceramoptec.com
www.ceramoptec.com

Worldwide provider optical fiber, fiber bundles, assemblies & spectroscopic fiber accessories. Producing stock/custom silica/silica, non-circular core silica plastic-clad silica, hard polymer-clad silica, silver halide optical fibers, capillary tubing, low loss bundles & assemblies for UV, VIS,& IR transmission. Products for high(+380C) & (-190C)temperature, low - high NA (0.12 - 0.53). Bundle/Assembly replacement for most spectrometer systems & UV curing systems. Custom Solutions/Competitive Pricing Contact: Kevin Bakhshpour, V.P. of Sales and Marketing, kevin.bakhshpour@ceramoptec.com; Cheryl Provost, Industrial Sales Engineer, cheryl.provost@ceramoptec.com

CILAS #109

600 Ave de la Roche Fourcade, Aubagne, 13400 France
+33 4 42 36 97 00
optics@cilas.com; www.cilas.com

Featured Product: Deformable mirrors, coatings for 300nm to 2,5μm spectral range, diode-pumped solid state laser

CILAS is a French company subsidiary Airbus Defence & Space Company group and Areva, which employs 180 people. CILAS is an expert in the design and manufacturing of Lasers, Optical components and Thin Film coatings, Deformable Mirrors, optronics and opto-mechanical systems dedicated to Defence, Space, Astronomy, Scientific, Solar and Industry markets. Contact: Priscilla Viard, Engineer Sales Rep, optics@cilas.com; Richard Palomo, Sales Manager, optics@cilas.com

Compañia Española de Sistemas Aeronauticos, S.A. (CESA) #101

Paseo de John Lennon, 4, Getafe Madrid, 28906 Spain
+349 162 40104
Contact: cesa@cesa.aero; www.cesa.aero

Cosine #115

JH Oortweg 19, Leiden, 2333 CH Netherlands
+31 71 5284962; fax +31 71 5284963
info@cosine.nl; www.cosine.nl

Cryoconnect, a division of Tekdata Interconnections Limited #220

The Glades-Festival Way - Etruria, Stoke-On-Trent Staffordshire, ST1 5SQ United Kingdom
+44 0 1782 254 700; fax +44 0 1782 254 701
sales@cryoconnect.com
www.cryoconnect.com

DynaVac #221

110 Industrial Park Rd, Hingham, MA, 02043-4369 United States
+1 781 740 8600; fax +1 781 740 9996
sales@dynavac.com; www.dynavac.com

e2v #310

SPIE Corporate Member

106 Waterhouse Lane, Chelmsford Essex, CM1 2QU United Kingdom
+ 44 1245 493493; fax + 44 1245 492492
enquiries@e2v.com; www.e2v.com

EIE Group s.r.l. #211

Via Torino 151/A, Mestre-Venezia, AG, 30172 Italy
+39 041 5317906; fax +39 041 5317757
info@eie.it; www.eie.it

Featured Product: Ground-based telescopes, radio-telescopes, radio antennas, Astronomical observatories, Green Energy.

EIE GROUP is an Italian engineering excellence, specialized in the fields of Astronomy and Astrophysics and the Big Science, with the aim of producing machines, equipment and integrated systems for the industry and the scientific research field. EIE GROUP is international leader in the production of Telescopes, Radio-telescopes, Astronomical Observatories and scientific equipment, with focused engineering assets and solid know-how in fabrication and assembly processes. Contact: Gianpietro Marchiori, President & CEO, gmarchiori@eie.it; Lisa Maretto, Marketing Manager, lmaretto@eie.it

Energetiq Technology, Inc. #423

SPIE Corporate Member

7 Constitution Way, Woburn, MA, 01801 United States
+1 781 939 0763; fax +1 781 939 0769
info@energetiq.com; www.energetiq.com

Energetiq Technology is the world's leading developer and manufacturer of ultra-bright broadband light sources for a wide variety of advanced applications in life and materials sciences, semiconductor manufacturing, and R&D. Energetiq's Laser-Driven Light Sources(LDLS™) are based on a revolutionary technology that generates high brightness across the spectrum, with high reliability and long life. Energetiq will be introducing the X Series LDLS, the new ultra-clean version. Contact: Megan Echoff, North America Sales Manager, mechoff@energetiq.com

ESDI #208

SPIE Corporate Member

150 N Tucson Blvd, Tucson, AZ, 85716-4740 United States
+1 520 296 3068; fax +1 520 296 2897
sales@esdimetrology.com
www.esdimetrology.com

Featured Product: Dimetior™ and Intellium™ Fizeau Interferometers and the world-renowned IntelliWave™ software.

ESDI is a globally recognized leader in providing innovative solutions for astronomical, aerospace, bio-medical, optical fabrication, data storage & production metrology applications. ESDI products are the Dimetior™ and Intellium™ Fizeau Interferometers, including vibration insensitive and two-minute auto-alignment Asphere instruments; the world-renowned IntelliWave™ software; accessories & upgrades; and custom metrology solutions. Contact: Jack Schumann, Charman, jack.s@esdimetrology.com; Steven Moore, Applications Engineer, steve.m@esdimetrology.com

Fiberguide Industries, Inc. #201

SPIE Corporate Member

1 Bay St, Stirling, NJ, 07980-1529 United States
+1 908 647 6601
info@fiberguide.com; www.fiberguide.com

Fibertech Optica #316

SPIE Corporate Member

330 Gage Ave, Ste 1, Kitchener, ON, N2M 5C6 Canada
+1 519 745 2763; fax +1 519 342 0128
info@fto.ca; www.fto.ca

Featured Product: Fiber optic array assemblies for IFU

Designer and manufacturer of a broad range of specialty fiber optic assemblies: Bundles, patchcords, ruggedized industrial cables, high power laser cables, fiber optic arrays, feedthroughs, vacuum assemblies and fiber optic probes. Custom design assemblies for operation in extreme environments (high temperature, cryogenic, high pressure). Spectral range from Deep-UV (190nm) to MIR (5500nm). Applications include spectroscopy. Come and chat FRD in optical fibers with us. Contact: Jeff Dupuis, VP Sales & Marketing, jeffdup@fto.ca

EXHIBITOR DIRECTORY

Finger Lakes Instrumentation #424

7298 W Main St, Lima, NY, 14485 United States
+1 585 624 3760; fax +1 585 624 9879
sales@FLIcamera.com; www.FLIcamera.com

Featured Product: Cooled CCD Cameras, High Speed Filter Wheels, Precision Focusers, Gimbal Designs

FLI designs and manufactures cooled CCD cameras, filter wheels, and focusers. Our High Speed Filter Wheels are capable of filter exchanges of 23ms even when fully populated. The Atlas focuser is a thin and rigid design with 105,000 steps of movement (range of 0.35 inches). The CenterLine filter wheels feature a centered aperture and dual internal wheels (2x5 or 2x10 positions). Camera cooling to 75C below ambient; 1-, 2-, and 4-channel 16 bit readout up to 24MHz throughput; CCDs to 4Kx4K. Contact: Gregory Terrance, General Manager, greg@flicamera.com; Gary McAnally, Sales Manager, gary@flicamera.com

Conference Bag Pen Sponsor

First Light Imaging #215

SPIE Corporate Member

100 route des Houilleres, Meyreuil, 13590 France
+ 33 4 42 61 29 20; fax + 33 4 42 61 29 21
david.boutolleau@firstlight.fr
www.firstlight.fr

Featured Product: Fast Low Light Imaging and Infrared Cameras and Wavefront Sensors

We strive to build the best low-noise, low-light fast cameras, both in the visible and infrared. Since 2011, our Ocam2 camera has been delivering sub-electron readout noise. The third generation Ocam2 offers full resolution speed above 2000fps, now with Wavefront Sensor options and an Electronic Shutter version with apertures shorter than 300ns. Our next generation of low-noise fast infrared cameras will deliver unprecedented performance, with \<2 electron noise for 2KHz rate. Come check it out! Contact: Audrey BENVENUTI, Export and administrative assistant, audrey.benvenuti@firstlight.fr; David BOUTOLLEAU, Chairman, david.boutolleau@firstlight.fr

GMTO Corporation #304

251 S Lake Ave Ste 300, Pasadena, CA, 91101 United States
+1 626 204 0500; fax +1 626 204 0535
info@gmto.org; www.gmto.org

Featured Product: Giant Magellan Telescope

The Giant Magellan Telescope project is a collaboration of international institutions to construct a 25m telescope in Chile. The GMT uses a segmented primary comprised of seven 8.4m mirrors, six of which are off-axis. Adaptive optics is integral to the GMT and will be built around a segmented adaptive secondary mirror. As the project transitions from the design phase to the construction phase, we are growing our technical and managerial staff. First-light is expected in 2021. Visit www.gmto.org.

HEIDENHAIN Corporation #402

333 E. State Pkwy, Schaumburg, IL, 60173 United States
+1 847 490 1191; fax +1 847 490 3931
info@heidenhain.com; www.heidenhain.com

Featured Product: PWM 20 (diagnostic tool for onsite encoder testing), Angle Encoders ECA 4000 and RCN 8310

HEIDENHAIN Corporation is the North American subsidiary of the German company DR. JOHANNES HEIDENHAIN GmbH, a leading international manufacturer of precision measurement and control equipment. This superior technology is utilized within high precision motion control and machining systems worldwide. The product lines include linear and angle encoders, rotary encoders, length gauges digital readouts (DROs), numerical controls (TNCs), and touch probes for demanding positioning tasks. Contact: Peggy Homuth, Tradeshow Coordinator, phomuth@heidenhain.com; Kevin Kaufenberg, Product Manager, kkaufenberg@heidenhain.com

Hellma Materials GmbH #404

Moritz-von-Rohr-Str 1, Jena, 07745 Germany
+49 3641 2877 100; fax +49 3641 2877 200
infomaterials@hellma.com
www.hellma-materials.com

Featured Product: 440mm Calcium Fluoride, 350mm Barium Fluoride, Scintillation crystals: 3" x 3" CeBr3 and 1" x1" SrI2

Hellma Materials produces large diameter optical materials for broadband applications covering deep UV, VIS, near- and mid-IR. Calcium Fluoride and Barium Fluoride feature broad band transmittance up to 12 microns, enabling advanced applications in Microlithography, Laser Optics, Analytical Instrumentation, Astronomy and Defense. Hellma Materials radiation detection materials(Scintillator crystals) enable detection of high energy radiation and particles with maximum resolution and sensitivity. Contact: Gordon von der Goenna, gordon.goenna@hellma.com; Dawn Jennings, dawn@siliconsense.com

Hofstadter Analytical Services, LLC #102

SPIE Corporate Member

10 N Norton Ave Ste 120, Tucson, AZ, 85719 United States
+1 520 747 3282; fax +1 520 622 1124
www.hofstadteranalytical.com

HORIBA Jobin Yvon #210

Avenue de la Vauve-CS45002, Palaiseau, 91120 France
+33 1 69 74 72 00; fax +33 1 69 31 32 20
www.horiba.com/scientific

Featured Product: High-performances holographic or ruled diffraction gratings for astronomy or space-flight satellites

HORIBA Jobin Yvon SAS is a world leading and pioneer company in the manufacturing of high-performances holographic and ruled diffraction gratings for astronomy and space applications. Our 40 years experience allows us to propose customized reflection or transmission, master or replica gratings with various groove density (from 30gr/mm to 5000gr/mm), different shape (plane, spherical, toroidal), from XUV to Mid-IR and in dimensions up to meter-size. www.horiba.com/scientific/grating Contact: Arnaud COTEL, Sales and Marketing Manager, arnaud.cotel@horiba.com

ICEX Spain Trade and Investment #101

Paseo de la Castellana 14-16, Madrid, 28046 Spain
+ 34 91 349 61 94
technologias.iniciativas@icex.es
www.icex.es

IDOM #401

Avda Zarandoa 23, Bilbao, 48015 Spain
+34 944797676; fax +34 944761804
info@idom.com; www.idom.es

Imagine Optic Inc. #222

SPIE Corporate Member

One Broadway, 14th Fl Cambridge Innovation Ctr, Cambridge, MA, 02142 United States
+1 617 401 2198
www.imagine-optic.com

Infrared Laboratories #303

1808 East 17th St, Tucson, AZ, 85719 United States
+1 520 622 7074; fax +1 520 623 0765
www.irlabs.com

Since 1967, Infrared Labs has built a strong reputation by helping to solve the instrumentation challenges of the Astronomy, Physics, Chemistry and Aerospace communities. While collaborating with hundreds of scientists, we have participated in the creation of thousands of successful systems, ranging from the simple to the complex. Our team of talented individuals, along with our extensive in-house manufacturing capabilities, uniquely position us to bring your instrumentation needs to fruition. Contact: Steven Zoltowski, Technical Sales Manager, stevez@irlabs.com

Instituto de Astrofísica de Canarias #101

C/Vía Láctea s/n, La Laguna Tenerife, 38205 Spain
+34 922 605 200; fax +34 922 605 201
www.iac.es

Integrated Detector Electronics AS #420

Martin Linges vei 25, Fornebu, 1364 Norway
+47 6741 4990
contact@ideas.no; www.ideas.no

Featured Product: NIRCA - Near Infrared Readout and Controller ASIC

IDE4281 - X-ray Spectrometer Frontend ASIC

IDEAS - Integrated Detector Electronics AS - develops and markets integrated circuits for radiation detection and imaging applications. The company has a strong background in applied physics, radiation detector instrumentation and electrical engineering. The headquarter is located near Oslo, Norway. The products are application specific integrated circuits (ASICs) for many types of radiation detectors, which are used in medical imaging, industrial scanning, nuclear science and astrophysics. Contact: Dirk Meier, Senior Scientist, dirk.meier@ideas.no; Gunnar Maehlum, General Manager, gunnar.maehlum@ideas.no

Iridian Spectral Technologies #317

2700 Swansea Crescent, Ottawa, ON, K1G 6R8 Canada
+1 613 741 4513; fax +1 613 741 9986
inquiries@iridian.ca; www.iridian.ca

Featured Product: Optics and Optical Filters for Astronomy and Space Applications

Iridian Spectral Technologies develops thin film optical filters and associated optical components for a wide variety of applications including astronomy and space applications. Iridian supplies custom filters, with sizes as large as 200 mm x 170 mm, for astronomical observations including a large multi-peak bandpass filter used by the John Hopkin's University Group investigating the physics of the accelerating expansion of the universe. Contact: Robert Bruce, VP Business Development, robert.bruce@iridian.ca

Iris AO, Inc. #106

SPIE. Corporate Member

2680 Bancroft Way, Berkeley, CA, 94704-1717 United States
+1 510 849 2375; fax +1 510 217 9646
info@irisao.com; www.irisao.com

Featured Product: MEMS Deformable Mirrors and AO Systems

Iris AO manufactures high-performance MEMS deformable mirrors and adaptive-optics systems. Our unique factory-calibrated position controller enables easy use out of the box. Dielectric coatings enable applications with high-power pulsed and CW lasers from spanning UV-NIR. Contact: Michael Helmbrecht, President, michael.helmbrecht@irisao.com

ISP Optics Corp. #522

SPIE. Corporate Member

50 S Buckhout St, Irvington, NY, 10533-2203 United States
+1 914 591 3070; fax +1 914 591 3715
sales@ispoptics.com; www.ispoptics.com

Featured Product: High-Contrast Infrared Polarizers for 1.5-5 μm, 3-5 μm, & 8-12 μm. Contrast is \>10,000:1

ISP Optics is a vertically integrated manufacturer of IR catalog and custom optics, off-the-shelf and custom MWIR & LWIR, Continuous Zoom, FFOV, DFOV and Athermal Lens Assemblies for cooled and un-cooled cameras. Our capabilities include a complete range of in-house design and manufacturing of diamond-turned and conventional optics, optical coatings, opto-mechanical and IR Lens Assemblies. From prototype to volume production, offering high performance, versatile and durable solutions. Contact: Andrew Housman, Sales Engineer, ahousman@ispoptics.com

Janssen Precision Engineering #115

Azielaan 12, Maastricht-Aiport, 6199 AG Netherlands
+31 43 358 5777; fax +31 43 358 0036
www.jpe.nl

Featured Product: Cryogenic High Resonance Positioning Stage

Precision engineering and mechatronic solutions in ambient, vacuum and cryogenic environment. Contact: Huub Janssen, Founder & CEO, huub.janssen@jpe.nl

Kaiser Optical Systems, Inc. #301

371 Parkland Plz, Ann Arbor, MI, 48103-6202 United States
+1 734 665 8083; fax +1 734 665 8199
sales@kosi.com; www.kosi.com

Kaiser Optical Systems, a world-recognized leader in the production of instruments, devices, and displays, with over 30 years' experience designing and building volume phase holographic optics produces state-of-the-art VPH diffraction gratings for today's and tomorrow's world-class astronomical telescopes. Contact: Jim Arns, arns@kosi.com

KiwiStar Optics #307

69 Gracefield Rd, Lower Hutt, 5010 New Zealand
+1 64 4 931 3000
callaghaninnovation.govt.nz
www.kiwistaroptics.com

Featured Product: The KiwiSpec R4-100, is a bench-mounted, fibre-fed and compact astronomical spectrograph.

KiwiStar Optics, a business unit of Callaghan innovation, is a world leader in the development and manufacture of large, precision optics for applications in astronomy, instrumentation, defence and surveillance. KiwiStar Optics provides a unique total system integration package, with the ability to design and manufacture the mechanical housing for the optics and the assembly and precision alignment of these optical systems. Contact: Peter Connor, Manager KiwiStar Optics, peter.connor@callaghaninnovation.govt.nz; Tom Nicolle, Senior Business Development Manager, tom.nicolle@callaghaninnovation.govt.nz

EXHIBITOR DIRECTORY

Kogakugiken Corp. #219

135 Nurumizu, Atsugi-shi, Kanagawa, 243-0033 Japan
+81 462 24 2555; fax +81 46 224 8007
info@kogakugiken.co.jp;
www.kogakugiken.com

Featured Product: Various kinds of waveplates - Large Aperture, Large Aperture & Wideband, Wideband & Wide Field Angle

Kogakugiken Corp. was established in 1978. The company is located in Atsugi-shi, Kanagawa, Japan. We are a leading company for high precision optical components and processing services. We provide wave plates, polarizers, crystal products and advanced devices for solid state lasers, optical systems and other applications. Contact: Junichi Hayashi, hayashi@kogakugiken.co.jp; Mitsuhiro Tanaka, General sales manager, mituhiro@kogakugiken.co.jp

Large Synoptic Survey Telescope #217

933 N Cherry Ave, Tucson, AZ, 85712-0009 United States
+1 520 881 2626; fax +1 520 626 5028
contact@lsst.org; www.lsst.org

LIDAX #101

C/ Antonio Alonso Martin 1, Paracuellos del Jarama - MADRID, 28860 Spain
+34 91 678 0805; fax +34 91 656 39 01
comercial@lidax.com; www.lidax.com

Featured Product: Atmosphere and Telescopes Simulators & Optical Ground Suppor Equipment Development

LIDAX has developed a Laboratory Simulator which can completely reproduce the optical behaviour of an astronomical telescope when observing stellar objects. This is achieved by replication and control over each phase of the light trajectory; From the light source to the optical characteristics of the Telescope, and passing through atmospheric turbulence. Researchers have expressed the need for a laboratory tool which could provide better and cheaper accessibility than a real telescope. Contact: Jesus Aivar, Business Development Manager, jesus.aivar@lidax.com; Carlos Laviada, Commercial Director, comercial@lidax.com

Luxel Corporation #502

SPIE Corporate Member

60 Saltspring Dr, PO Box 1879, Friday Harbor, WA, 98250 United States
+1 360 378 4137; fax +1 360 378 4266
luxel@luxel.com; www.luxel.com

Luxel is the world's leading producer of ultra-thin freestanding filters used for soft x-rays and extreme ultraviolet light. Luxel products, including space flight filters, pressure windows, and imaging sensor protectors, are assembled in Class 5 cleanrooms. Filters are fabricated from over 70 different materials, as thin as 30 nanometers. We offer extensive technical support including: modeling, CAD design, and measurement. Lead times can be as short as 1 week. Contact us at www.luxel.com. Contact: Travis Ayers, President, travis.ayers@luxel.com; Bruce Lairson, Chief Scientist, bruce.lairson@luxel.com

LZOS, JSC #121

Bld. 1, Parkovaya Str, Lytkarino, Moscow Region, 140080 Russian Federation
+7 495 552 32 95; fax +7 495 552 17 90
office@lzos.ru; www.lzos.ru

Media Lario Technologies #110

Localita' Pascolo, Bosisio Parini, LC, 23842 Italy
+ 39 31 867 111; fax + 39 31 876 595
info@media-lario.com
www.media-lario.com

MPB Communications Inc. #503

SPIE Corporate Member

147 Hymus Blvd, Pointe-Claire, QC, H9R 1E9 Canada
+1 514 694 8751; fax +1 514 694 6869
info@mpbc.ca; www.mpb.ca

MT Mechatronics GmbH #306

Weberstrasse 21, Mainz, 55130 Germany
+49 6131 2777267; fax +49 6131 2777 205
www.mt-mechatronics.de

National Instruments #100

11500 N Mopac Expy, Scientific Research and Big Physics Segment, Austin, TX, 78759-3504 United States
+1 512 683 6218
info@ni.com; www.ni.com

Since 1976, National Instruments (www.ni.com) has equipped engineers and scientists with tools that accelerate productivity, innovation and discovery. Global leaders in nearly every industry rely on NI products to help them work better, smarter, and faster to achieve their goals from design to production. NI's graphical system design approach to engineering provides an integrated software and hardware platform that speeds the development of any system needing measurement and control.

New England Optical Systems, Inc. #318

SPIE. Corporate Member

237 Cedar Hill St, Marlborough, MA, 01752-3004 United States
+1 508 460 0019; fax +1 508 460 0098
www.neos-inc.com

Featured Product: NEOS is an engineering and manufacturing company of cryogenically cooled infrared optical assemblies

New England Optical Systems (NEOS) is an engineering and manufacturing company specializing in infrared lens assemblies. They have particular expertise in optical systems exposed to cryogenic temperatures. Optical analysis performed using Zemax, and opto-mechanical design is done using Solidworks. NEOS has worked with many of the astronomy institutions to perform design studies and provide hardware. They were recently awarded Architect Status on the Sloan Digital Sky Survey III (SDCC-III). Contact: Peter Kornik, Director of Business Development, pkornik@neos-inc.com

New Scale Technologies #323

121 Victor Heights Pkwy, Victor, NY, 14564-8938 United States
+1 585 924 4450; fax +1 585 924 4468
www.newscaletech.com

Featured Product: COBRA theta-phi fiber positioner for astronomical telescopes: piezo SCARA robot is only 7.7 mm dia.

New Scale Technologies develops small, precise and smart motion systems for critical adjustments of optics. We create compact all-in-one micro motion systems for both rotary and linear movement, applying our deep expertise in piezoelectric motors, position sensing, drive electronics, digital motion control and micro-mechatronic design. No external control board is necessary. You supply simple serial commands using a standard I2C or SPI interface. Contact: David Henderson, CEO/CTO, NSTsales@newscaletech.com; Heidi Quinlivan, Sales, NSTsales@newscaletech.com

NOVA #115

PO Box 9513, NOVA/JH Oort Bldg, Leiden, 2300 RA Netherlands
+31 71 527 5835
nova@strw.leidenuniv.nl; nova-astronomy.nl

Featured Product: The instrumentation program of NOVA focuses on the European Extremely Large Telescope, ALMA and CTA.

NOVA, the Netherlands Research School for Astronomy, is a federation of universities in the Netherlands focused on astronomy (universities of Amsterdam, Leiden, Groningen and Nijmegen). NOVA's mission is to conduct scientific research at the highest international level and to train the next generation of astronomers. Advances in astronomical research are enabled by development of state–of–the–art scientific instrumentation for the world's largest telescopes. Contact: Ramón Navarro, Manager, navarro@astron.nl

Nüvü Caméras Inc. #205

5155 Ave Decelles, Pavillon JA Bombardier, Montréal, QC, H2T 3B1 Canada
+1 514 733 8666; fax +1 514 394 9452
info@nuvucameras.com
www.nuvucameras.com

Featured Product: LN2 and TEC EMCCD cameras with the lowest background noise for improved single photon imaging.

Nüvü Caméras' patented technology offers the highest signal-to-noise ratios EMCCD cameras (total background noise less than 0.001e/pixel/sec and EM gain up to 5000), best image quality (Charge Transfer Efficiency\>0.999993) and the highest pixel readout rates (up to 20MHz for all standard scientific grade 1 EMCCD detectors) for the most demanding low light imaging applications. Increase your system's performances for more reliable data with lesser exposure times, hence faster progress. Contact: Felicien Legrand, Application Scientist, flegrand@nuvucameras.com; Gabrielle Cretot-Richert, Marketing Expert, gcretotrichert@nuvucameras.com

Observatory Sciences Ltd. #421

William James House, Cowley Road, Cambridge, CB4 0WX United Kingdom
+44 1223 508257; fax +44 1223 508258
contact@observatorysciences.co.uk
www.observatorysciences.co.uk

Observatory Sciences is a leading developer and supplier of software for the control of 'big science' systems and instruments, including large telescopes and synchrotrons. We have a reputation for completing complex projects on time and to budget. Meeting the needs of scientific, research and technical clients across the globe, Observatory Sciences is behind some of the world's high-profile astronomy and physics projects. Contact: Philip Taylor, Director, pbt@observatorysciences.co.uk; Chris Mayer, Director, cjm@observatorysciences.co.uk

Floor Plan Sponsor

Officina Stellare SRL #124

Via Marco Corner, 2, Thiene (VI), 36016 Italy
+39 0445 1922219; fax +39 0445 1922009
info@officinastellare.com
www.officinastellare.com

Featured Product: Astronomical Telescopes, SSA products, Fast IR Reflector, Direct Energy, Custom Optical Systems.

Officina Stellare is specialized in the design and manufacturing of instrumentation for professional applications: astronomical observatories, airborne astronomical research, SSA, Aerospace and Defence, Astroimaging, CCD imaging cameras. Headquarters are in Thiene (Italy) whit R&D, manufacturing, assembly and quality control. The Optical Design and Manufacturing Unit is based in Occhiobello (Italy) whit the design/manufacturing of optics up to 80cm. Customers include Cerro Tololo, Mit, Nasa. Contact: Gino Bucciol, Sales Manager, gino.bucciol@officinastellare.com

Ohara Corporation #400

SPIE. Corporate Member

50 Columbia Rd, Branchburg, NJ, 08876 United States
+1 908 218 0100; fax +1 908 218 1685
sales@oharacorp.com; www.oharacorp.com

Manufacturer of precision optical glasses available as strip/slab, cut/molded blanks, high homogeneity blanks, fine gobs and polished ball lenses, near UV transmitting i-Line glasses, glass ceramic substrates, CaF2, UV & IR materials, Quartz, Fused Silica (standard and excimer grade). Ohara ClearCeram-Z ultralow expansion glass with excellent CTE uniformity. Supplier of double side polished substrates (excellent flatness/low surface roughness). Contact: Brion Hoffman, President, brionhoffman@oharacorp.com; Chris Ghio, Director of Sales, chrisghio@oharacorp.com

OPTOCRAFT GmbH #116

Am Weichselgarten 7, Erlangen, 91058 Germany
+1 49 9131 69 15 00; fax +1 49 9131 69 15 11
marketing@optocraft.com
www.optocraft.de

EXHIBITOR DIRECTORY

Photonic Cleaning Technologies #500

SPIE Corporate Member

1895 Short Ln, Bldg 1, Platteville, WI, 53818 United States
+1 608 467 5396; fax +1 608 467 5397
sales@photoniccleaning.com
www.photoniccleaning.com

Featured Product: First Contact Polymers™. Only no-residue strip coat available to clean & protect sensitive surfaces

Manufacturer of First Contact Polymers™. THE Cleaning and Protection System. Apply liquid polymer and peel the dried film leaving the surface nearly atomically clean. Independent XPS/ESCA and Laser Damage Threshold testing shows no residue to the molecular level! Safe with high power laser optics. Remove Dust & Fingerprints. Reduce waste: non-toxic inert polymers. Clean Nanostructures, Gratings & Phase Masks! Protect and clean microscope objectives & CCD Sensors. Safe. Low Adhesion. No residue. Contact: David Giesen, Technical Sales and Manufacturing Manager, davidg@photoniccleaning.com; James Hamilton, Chairman and CEO, hamiltonj@photoniccleaning.com

Promotional Partner

Photonics Media #1L

SPIE Corporate Member

100 W St, 2nd Fl, Pittsfield, MA, 01202-4949 United States
+1 413 499 0514; fax +1 413 442 3180
info@photonics.com; www.photonics.com

Featured Product: Photonics Media - The Pulse of the Industry - latest industry news in print and online.

Photonics Media - The Pulse of the Industry - latest industry news in print and online. Stop by the Photonics Media table and pick up a free copy of our latest publications. Subscription forms also available to begin your free subscription to the photonics industry's leading publications. Contact: More Info, info@photonics.com

Phytron Inc. #209

600 Blair Park Rd Ste 220, Williston, VT, 05495 United States
+1 802 872 1600; fax +1 802 872 0311
info@phytron.com; www.phytron.com

Featured Product: Stepper Motors and Controls

Established in 1947, Phytron is a leading manufacturer of stepper motors and controls. Phytron offers stepper motors for use in extreme environments such as Vacuum (10-11 Torr), Radiation (10^8 Rad), Cryogenic (4.2K) and Space. Unparalleled quality, innovation, full in-house testing and qualification and flexibility in custom design combined with motors as small as 19 mm in diameter are just some of the reasons that have put Phytron in the forefront of stepper motor technology.

PI #300

SPIE Corporate Member

16 Albert St, Auburn, MA, 01501-1304 United States
+1 508 832 3456; fax +1 508 832 0506
info@pi-usa.us; www.pi-usa.us

PI designs & manufactures hexapods for astronomical telescopes and the fastest & highest precision piezo-driven steering platforms for secondary mirror stabilization & beam steering. Active PI-mirrors to 12" dia. are used in all leading telescopes along with high-load Hexapod parallel-kinematics alignment systems. New: High-force sub-nm-precision piezo ceramic linearmotors. Long-travel precision linear actuators (273 channel system delivered to SALT). Ultrareliable ceramic insulated piezo stacks. Contact: Sales Dept, info@pi-usa.us

Polymicro Technologies, A Subsidiary of Molex #406

SPIE Corporate Member

18019 N 25th Ave, Phoenix, AZ, 85023-1200 United States
+1 602 375 4100; fax +1 602 375 4110
polymicrosales@molex.com
www.polymicro.com

Featured Product: FBP series of optical fibers used for focal refraction degradation (FRD).

Polymicro Technologies, an FDA registered leading manufacturer of value added optical fiber as well as fused silica capillary tubing, fiber assemblies, fiber bundles and more. We are a vertically integrated facility that secures all steps in the process; from raw material manufacturing to packaging and sterilization. Polymicro offers optical fibers that work with wavelengths ranging from UV - IR and custom applications. Tell us how we can help with your project. Your resource in optical fiber. Contact: Teodor Tichindelean, Global Fiber Product Manager; Kevin O'Connor, Director of Sales and Marketing.

General Refreshment Sponsor

Printech Circuit Laboratories Ltd. #126

31-35 Haltwhistle Rd, S Woodham Ferrers, Chelmsford Essex, CM3 5ZA United Kingdom
+44 1245 323244
space@rfpcbs.com; www.rfpcbs.com

Featured Product: Bump Plated Flexible Circuits

Printech manufacture the widest range of PCB products. These include RF & Microwave circuits, Flexible PCB's, Curved and Formed Antenna's, Moulded Circuits. Contact: Nick Potts, Managing Director, nick.potts@rfpcbs.com; Oana Lovin, International Business Development, oana.lovin@rfpcbs.com

Rayleigh Optical Corporation #309

3730 Commerce Dr Ste 1117, Baltimore, MD, 21227-1638 United States
+1 410 247 6666
info@rayleighoptical.com
www.rayleighoptical.com

redlogix GmbH #427

Talhofstr 32a, Gilching, 82205 Germany
+49 8105 77 77 9 0; fax +49 8105 77 77 9 20
info@redlogix.de; www.redlogix.de

Featured Product: Generic camera, instrument and telescope controller

Redlogix provides software and system engineering services for astronomical observatories. This includes development of instrument and telescope control software, data reduction software, graphical user interfaces or simulations, as well as system engineering for embedded and realtime control systems. Our generic instrument controller product provides a compact, reliable and integrated platform for instrument or telescope control applications. Contact: Norbert Fiebig, Managing Director, fiebig@redlogix.de

General Refreshment Sponsor

Richardson Gratings #518

705 Saint Paul Street, Rochester, NY, 14605-1730 United States
+1 585 248 4100; fax +1 585 248 4111
gratings@newport.com
www.gratinglab.com

Featured Product: Holographic & ruled gratings for astronomical instrumentation: including grisms, echelles & mosaics

Founded in 1947, Richardson Gratings designs and manufactures standard and custom diffraction gratings for use in analytical instrumentation, lasers and tunable light sources, fiber-optic telecommunications networks and photolithographic systems, as well as for researchers, astronomers and educators. Contact: Sarah Shepard, Scientific Sales Engineer, sarah.shepard@newport.com; Christopher Palmer, Senior Director & General Manager, chris.palmer@newport.com

Sagem REOSC #111

Ave de la Tour Maury, Saint Pierre Du Perray, 91280 France
+33 1 69 89 72 00; fax +33 1 69 89 76 50
reosc@sagem.com; www.reosc.com

Founded by Henri Chrétien and Charles Fabry, Reosc has developed its activity in optics for earth-based astronomy based on know-how unique the world over. Ranging from research and design to production and integration, Reosc currently offers a complete range of high-performance optics and high-precision opto-mechanical equipment. Contact: Slimane DJIDEL, Sales Manager, slimane.djidel@reosc.com

SCHOTT North America #322

SPIE. Corporate Member

400 York Ave, Duryea, PA, 18642 United States
david.schimmel@us.schott.com
www.us.schott.com

Featured Product: ZERODUR®, High Homogenous Optical Glass, Optical Filters

SCHOTT Advanced Optics, with its deep technological expertise, is a valuable partner for its customers in developing products and customized solutions for applications in optics, lithography, astronomy, opto-electronics, architecture, life sciences, and research. With a product portfolio of more than 120 optical glasses, special materials and components, we master the value chain: from customized glass development to high-precision optical product finishing and metrology. Contact: info.optics@us.schott.com

SENER Ingenería y Sistemas, S.A. #101

Creu Casas i Sicart 86-88, Electronics and Astronomy Section, Cerdanyola del Vallès, 08290 Spain
+34 932 283 300; fax +34 932 283 316
info@sener.es; www.sener.es

Featured Product: Custom-made solutions for precision positioning & pointing systems

The engineering company supplies custom-made solutions for precision positioning and pointing systems for optical and electro-optical instruments and equipment in the astronomy field. The company's activities range from conceptual studies to the production of high performance systems and instrumentation for terrestrial astronomical facilities and space missions. The main services and products are focused on positioning systems for telescope mirrors and mechatronics for optical instruments. Contact: Joan Manel Casalta, Product Manager, joanmanel.casalta@sener.es

Sigmadyne #408

SPIE. Corporate Member

803 West Ave Ste 311, Rochester, NY, 14611-2447 United States
+1 585 235 6892; fax +1 585 235 6931
www.sigmadyne.com

Featured Product: SigFit is a software product enabling engineers to link mechanical analysis with optical analysis.

Sigmadyne is an engineering consulting firm specializing in optomechanical analysis services and software. Our specialty is integrating mechanical predictions with optical predictions for photonic applications in a wide array of industries. Contact: Gregory Michels, Vice President,

SKA Organisation #523

Lower Withington, Jodrell Bank Observatory, Macclesfield, SK11 9DL United Kingdom
+44 161 306 9613
enquiries@skatelescope.org
www.skatelescope.org

Featured Product: Presentation of the Square Kilometre Array (SKA), to be the world's largest radio telescope

The Office for the SKA Organisation (SKAO) is responsible for coordinating the global activities of the SKA project. This includes engineering, science, site evaluation, operations and public outreach. The Square Kilometre Array (SKA) project is an international effort to build the world's largest radio telescope, with a square kilometre (one million square metres) of collecting area, to be co-hosted in Africa and Australia, with a start of construction in 2018 and early science in 2020. Contact: William Garnier, Communications and Outreach Manager, w.garnier@skatelescope.org; Mathieu Isidro, Deputy Communication and Outreach Manager, m.isidro@skatelescope.org

Software Bisque, Inc. #124

862 Brickyard Cir, Golden, CO, 80403-8058 United States
+1 303 278 4478; fax +1 303 278 0045
frontdesk@bisque.com; www.bisque.com

Solmirus Corporation #104

3532 Spruce Rd, Woodland Park, CO, 80863-9521 United States
+1 719 964 3838
www.solmirus.com

Wi-Fi Sponsor

Spectral Instruments #314

SPIE. Corporate Member

420 N Bonita Ave, Tucson, AZ, 85745 United States
+1 520 884 8821; fax +1 520 884 8803
www.specinst.com

Spectral Instruments specializes in the development and manufacture of cooled CCD cameras for demanding low-light applications. We provide the finest low noise \<3e-, high sensitivity, -110C cooling, 16-bit CCD cameras that current technology can offer. Optical inputs can include windows with custom coatings through fiber optic tapers or faceplates. Readout options are designed to be flexible and customized to the application. Custom CCD designs and OEM camera production are available. Contact: Kevin Toerne, Systems Specialist, ktoerne@specinst.com

SRON #115

Sorbonnelaan 2, Utrecht, 3584 CA Netherlands
+31 50 3634074; fax +31 50 3634033
www.sron.nl/

Sunpower #320

2005 E. State Street, Athens, OH, 45701 United States
+1 740 594 2221; fax +1 740 593 7531
info@sunpowerinc.com
www.sunpowerinc.com

Featured Product: The CryoTel GT cryocooler with ACS technology.

Sunpower's CryoTel® cryocoolers are the result of over thirty years of technical leadership, innovation, and evolution in free-piston Stirling technology. Our cryocoolers are cost effective, exceptionally quiet, low in vibration, and extremely efficient. Stop by our booth and look at our two new products; the CryoTel Cube and our Active Cancellation System, for applications that require extremely low vibration. Contact: Jimmy Wade, Sales Manager, jimmy.wade@ametek.com

Symetrie #524

10 allee Charles Babbage, Nimes Cedex 1, 30035 France
+33 4 66 29 43 88; fax +33 4 66 29 54 47
info@symetrie.fr; www.hexapod-system.com

Featured Product: SYMETRIE specialized in hexapods, 6DOF precision positioning systems mostly used for alignment.

The hexapod kinematics enable extremely precise motion with high resolution and stiffness. SYMETRIE has more than 10-year experience in providing complete ready-to-use systems with ergonomic control software. Our hexapods are particularly adequate to position mirrors or subreflectors on ground-based telescopes and during mounting and testing phases of space telescopes. Experience: ARIES, OAJ and Pan-STARRS-2 telescopes, JWST, Gaia and BepiColombo satellites. Contact: Anne DUGET, Sales manager, contact@symetrie.fr

Technology of Sense b.v. #115

Capitool 26, Enschede, 7521PL Netherlands
+31 53 737 02 92
info@technologyofsense.com
www.technologyofsense.com/

EXHIBITOR DIRECTORY

Teledyne Imaging Sensors #501

1049 Camino Dos Rios, Thousand Oaks, CA, 91360 United States
+1 805 373 4545; fax +1 805 373 4775
www.teledyne-si.com

Featured Product: Imaging Sensors

Teledyne Imaging Sensors is a leading manufacturer of high performance imaging sensors that detect light in x-ray, ultraviolet, visible and infrared wavelengths. Teledyne's sensors enable cutting edge research in astronomy, Earth science and planetary exploration, and are a critical technology for national defense. Contact: Juli Hotchkiss, Senior Manager - Communications, juli.hotchkiss@teledyne.com

Thales SESO #203

305 rue Louis Armand Cs 30504, Pôle d'Activités d'Aix-en Provence Les Milles, Aix-en-Provence Cedex 3, 13593 France
+33 4 42 16 85 00; fax +33 4 42 16 85 85
info.tseso@fr.thalesgroup.com
www.seso.com

Promotional Partner

The Optronics Co., Ltd. #526

5-5 Shin Ogawamachi, Sanken Bldg, Shinjuku-ku Tokyo, 162-0814 Japan
+81 3 3269 3550; fax +81 3 5229 7253
intl@optronics.co.jp; www.optronicsjp.com

Thorlabs #322

SPIE. Corporate Member

56 Sparta Ave, Newton, NJ, 07860-2402 United States
+1 973 300 3000; fax +1 973 300 3600
sales@thorlabs.com; www.thorlabs.com

Featured Product: Adaptive Optics Kit and Software for Out-of-the-Box Wavefront Measurement and Control

Thorlabs designs, develops, and manufactures building blocks for the Photonics industry, including optomechanics, motion control electronics, nanopositioning stages, fiber and optical components, laser diodes, tunable lasers, and vibration isolation systems. Headquartered in Newton, NJ, our portfolio includes system-level solutions, including complete OCT, multiphoton, confocal, and adaptive optics systems.

Conference Bag Insert Sponsor

TMT Observatory #223

1111 S Arroyo Pkwy Ste 200, Pasadena, CA, 911051 United States
+1 636 395 1602
inquiry@tmt.org; www.tmt.org

Featured Product: TMT - Astronomy's Next-Generation Observatory

A team of scientists, engineers, and project specialists is planning and designing what will become the most advanced and powerful optical/near-infrared telescope on Earth. When completed, the Thirty Meter Telescope (TMT) will enable astronomers to study objects in our own solar system, stars throughout our Milky Way and neighboring galaxies, and forming galaxies at the very edge of the observable Universe, near the beginning of time. TMT will begin construction in the summer of 2014. Contact: Gordon Squires, Communications Lead, squires@tmt.org; Magnolia Ycasas, Sr. HR Specialist, magnolia@tmt.org

TNO #115

Stieltjesweg 1, Delft, 2628 CK Netherlands
+ 31 88 866 20 00; fax +31 15 269 2111
Organisatie-IenT-SecretariaatHPE@tno.nl
www.tno.nl

TOPTICA Photonics, Inc. #503

SPIE. Corporate Member

1286 Blossom Dr, Victor, NY, 14564-1402 United States
+1 585 657 6663; fax +1 877 277 9897
sales@toptica-usa.com; www.toptica.com

TOPTICA is the world leader in diode laser and ultrafast technology for industrial and scientific markets. We offer the widest range of single mode tunable light in the 190 to 2900nm and 0.5-2.5THz spectral region with various accessories to measure, characterize, stabilize and analyze light. With our Passion for Precision, TOPTICA delivers!

TTI #101

C/Albert Einstein 14, Parque Tecnologico de Cantabria, Santander, 39011 Spain
+34 942 291212; fax +34 942 270139
comercial@ttinorte.es; www.ttinorte.es

Featured Product: Cryogenic Low Noise Amplifiers, Cryostats, Geodetic VLBI Receivers

TTI works in the technological forefronts of radioastronomy, space, telecommunications and science sectors. TTI develops equipment to operate at cryogenic temperatures (down to 4K): Cryogenic Low Noise Amplifiers based on GaAs, InP HEMT or hybrid technologies, extremely stable and highly reliable; Laboratory type (reconfigurable) and specific type (customised) Cryostats; and turnkey VLBI Receivers (including design, manufacturing, onsite installation and training). Contact: Miguel Peña, Commercial Manager, mpena@ttinorte.es; Cristina Barquin, Business Development, cbarquin@ttinorte.es

VDL-ETG Research #115

High Tech Campus 07, Eindhoven, 5656 AE Netherlands
+31 402748328; fax +31 402925050
info@vdlgroep.com; www.vdlgroep.com

Vertex Antennentechnik GmbH #114

Baumstr 46-50, Duisburg, 47198 Germany
+49 2066 2096 0
info@vertexant.de; www.vertexant.de

Featured Product: Radio Telescopes, Precision Ground Station Antennas

VERTEX ANTENNENTECHNIK (VA) builds turn-key precision ground station antennas / radio telescopes with modern servo&drive and control systems, complete ground stations with all transmit/receive electronics including M&C for nearly all frequency bands up to terahertz in the fields of astronomy, satellite communications, TT&C, remote sensing, geodesy, deep space missions. VA is certified according to ISO 9001, ISO 14000, BS OHSAS 18001. Contact: Klaus Duespohl, Director Sales/Marketing, kduespohl@vertexant.de

Winlight System #414

135 rue Benjamin Franklin ZA St Martin, Pertuis, 84120 France
+33 490077860; fax +33 490777631
info@winlight-system.com
www.winlight-system.com

Zygo Corporation #319

SPIE. Corporate Member

Laurel Brook Road, Middlefield, CT, 06455-1291 United States
+1 860 347 8506; fax +1 860 347 8372
inquire@zygo.com; www.zygo.com

Zygo Corporation is a worldwide supplier of optical metrology instruments, precision optics, and electro-optical design and manufacturing services, providing productivity and yield improvement solutions for manufacturers of precision components for a variety of industries. Zygo Corporation provides a wide range of inspection, surface analysis, precision displacement measurement, and automated solutions. Contact: David Melton, Director Sales & Support, dmelton@zygo.com; Marc Tricard, Director Optics Division, mtricard@zygo.com

SPAIN AT SPIE 2014

AVS
ADDED VALUE INDUSTRIAL ENGINEERING SOLUTIONS, SLU

CESA
COMPAÑÍA ESPAÑOLA DE SISTEMAS AERONÁUTICOS, S.A.

LIDAX
LIDAX

SENER
SENER INGENIERÍA Y SISTEMAS, S.A.

TTI
TTI NORTE, S.L.

IAC
INSTITUTO DE ASTROFÍSICA DE CANARIAS

GOBIERNO DE ESPAÑA
MINISTERIO DE ECONOMÍA Y COMPETITIVIDAD
ICEX
ineustar
Asociación Española de la Industria de la Ciencia

EXHIBITOR PRODUCT LISTING

ASTRONOMY
4D Technology Corporation
AdTech Ceramics
AMOS
ANU Advanced Instrumentation and Technology Centre
Apogee Imaging Systems
Applied Surface Technologies
Asahi Spectra USA Inc.
ASTELCO Systems GmbH
Boston Micromachines Corp.
CEDRAT TECHNOLOGIES
CILAS
EIE Group s.r.l.
ESDI
Fibertech Optica
First Light Imaging
Hellma Materials GmbH
HORIBA Jobin Yvon
Integrated Detector Electronics AS
Iris AO, Inc.
Janssen Precision Engineering Technology of Sens B.V.
KiwiStar Optics
Kogakugiken Corp.
LIDAX
Luxel Corporation
New Scale Technologies
NOVA
Nüvü Caméras Inc.
Observatory Sciences Ltd.
Officina Stellare SRL
Photonic Cleaning Technologies
PI
redlogix GmbH
Richardson Gratings
Sagem REOSC
SCHOTT North America
SENER Ingenería y Sistemas, S.A.
Sigmadyne
SKA Organisation
Sunpower
Symetrie
TMT Observatory
TTI
Vertex Antennentechnik GmbH
Zygo Corporation

BASIC RESEARCH, SCIENCE
ANU Advanced Instrumentation and Technology Centre
EIE Group s.r.l.
Integrated Detector Electronics AS
Kogakugiken Corp.
Luxel Corporation
NOVA
Symetrie
TMT Observatory

BIOMEDICAL, MEDICAL IMAGING, HEALTH CARE
Asahi Spectra USA Inc.
Boston Micromachines Corp.
CEDRAT TECHNOLOGIES
First Light Imaging
Iris AO, Inc.
New Scale Technologies
Nüvü Caméras Inc.
Photonic Cleaning Technologies
PI
Richardson Gratings
SENER Ingenería y Sistemas, S.A.
Sunpower
Zygo Corporation

CAMERAS AND IMAGING SYSTEMS
4D Technology Corporation
AdTech Ceramics
Apogee Imaging Systems
ASTELCO Systems GmbH
CEDRAT TECHNOLOGIES
First Light Imaging
KiwiStar Optics
NOVA
Nüvü Caméras Inc.
Officina Stellare SRL
Photonic Cleaning Technologies
redlogix GmbH
SENER Ingenería y Sistemas, S.A.
Spectral Instruments

CHEMICAL AND BIOLOGICAL ANALYSIS
Applied Surface Technologies
New Scale Technologies
Richardson Gratings

COMMUNICATIONS & NETWORKING
TTI

COMPUTING SYSTEMS, DATA PROCESSING
redlogix GmbH

COMPUTING, DATA PROCESSING HARDWARE
redlogix GmbH

CONSULTING SERVICES
EIE Group s.r.l.
KiwiStar Optics
Observatory Sciences Ltd.
Sigmadyne

DEFENSE, SECURITY, LAW ENFORCEMENT
AdTech Ceramics
Boston Micromachines Corp.
CEDRAT TECHNOLOGIES
CILAS
First Light Imaging
KiwiStar Optics
Kogakugiken Corp.
New Scale Technologies
Officina Stellare SRL
Photonic Cleaning Technologies
PI
Symetrie

DETECTORS, SENSORS
AdTech Ceramics
ANU Advanced Instrumentation and Technology Centre
CEDRAT TECHNOLOGIES
Energetiq Technology, Inc.
Nüvü Caméras Inc.
Photonic Cleaning Technologies
TMT Observatory

DISTRIBUTOR, RESELLER, INTEGRATOR
TTI

EARTH SCIENCES, ENVIRONMENTAL MONITORING, CLIMATE
HORIBA Jobin Yvon
New Scale Technologies
Nüvü Caméras Inc.
Officina Stellare SRL
SENER Ingenería y Sistemas, S.A.

EDUCATION AND TRAINING
ANU Advanced Instrumentation and Technology Centre
Boston Micromachines Corp.
Nüvü Caméras Inc.
Symetrie
TMT Observatory

ELECTRONIC COMPONENTS
AdTech Ceramics
Integrated Detector Electronics AS
TTI

ELECTRONIC, DIGITAL IMAGING
AdTech Ceramics
Luxel Corporation
SENER Ingenería y Sistemas, S.A.

FIBER OPTICS AND ACCESSORIES
CeramOptec Ind. Inc.
Energetiq Technology, Inc.
Fibertech Optica
Kogakugiken Corp.
New Scale Technologies
PI
Polymicro Technologies, A Subsidiary of Molex

INDUSTRIAL SENSING AND MEASUREMENT
4D Technology Corporation
AdTech Ceramics
First Light Imaging
Kogakugiken Corp.
LIDAX
Richardson Gratings
Symetrie

INFORMATION PROCESSING AND COMPUTING
Nüvü Caméras Inc.

LASER COMPONENTS AND ACCESSORIES
Boston Micromachines Corp.
CILAS
Iris AO, Inc.
Kogakugiken Corp.
Photonic Cleaning Technologies

LASER INDUSTRY
Boston Micromachines Corp.
CILAS
First Light Imaging
Photonic Cleaning Technologies
Sigmadyne

LASERS AND SYSTEMS
ANU Advanced Instrumentation and Technology Centre
CILAS
Energetiq Technology, Inc.

LED, OLED, NON-LASER LIGHT SOURCES
Energetiq Technology, Inc.

LIGHTING AND ILLUMINATION
Asahi Spectra USA Inc.

LITHOGRAPHIC EQUIPMENT
CEDRAT TECHNOLOGIES
Janssen Precision Engineering Technology of Sens B.V.
Sagem REOSC
Zygo Corporation

EXHIBITOR PRODUCT LISTING

MACHINE VISION, FACTORY AUTOMATION
CEDRAT TECHNOLOGIES

MATERIALS PROCESSING, LASERS IN MANUFACTURING
Iris AO, Inc.

MATERIALS, ABRASIVES, CHEMICALS
AdTech Ceramics
Hellma Materials GmbH
Ohara Corporation

MICROSCOPES
Applied Surface Technologies
Boston Micromachines Corp.
PI
Zygo Corporation

MICROTECHNOLOGY
Boston Micromachines Corp.
ESDI
Iris AO, Inc.

MISC CONSUMABLES AND EQUIPMENT
Applied Surface Technologies

MOUNTS, TABLES, VIBRATION ISOLATION
LIDAX

NANOTECHNOLOGY PRODUCTS
CEDRAT TECHNOLOGIES
ESDI
Luxel Corporation

OPTICAL COATINGS, THIN FILMS
Asahi Spectra USA Inc.
Boston Micromachines Corp.
CILAS
Kogakugiken Corp.
Luxel Corporation
Sagem REOSC
SCHOTT North America

OPTICAL COMPONENTS - FILTERS, MIRRORS, OTHER
Asahi Spectra USA Inc.
ASTELCO Systems GmbH
CILAS
Hellma Materials GmbH
HORIBA Jobin Yvon
Iris AO, Inc.
Kogakugiken Corp.
Officina Stellare SRL
Ohara Corporation
Photonic Cleaning Technologies
Richardson Gratings
Sagem REOSC
SCHOTT North America
TMT Observatory

OPTICAL COMPONENTS - LENSES
AMOS
Asahi Spectra USA Inc.
ASTELCO Systems GmbH
Ohara Corporation
Photonic Cleaning Technologies
Sagem REOSC
Zygo Corporation

OPTICAL DESIGN AND ENGINEERING
ANU Advanced Instrumentation and Technology Centre
CILAS
EIE Group s.r.l.
HORIBA Jobin Yvon
KiwiStar Optics
Kogakugiken Corp.
LIDAX
NOVA
Polymicro Technologies, A Subsidiary of Molex
Sagem REOSC
SENER Ingenería y Sistemas, S.A.
Sigmadyne
TMT Observatory
Zygo Corporation

OPTICAL FABRICATION EQUIPMENT
Applied Surface Technologies
HORIBA Jobin Yvon

OPTICS MANUFACTURING
AdTech Ceramics
AMOS
ASTELCO Systems GmbH
CILAS
Energetiq Technology, Inc.
HORIBA Jobin Yvon
KiwiStar Optics
LIDAX
Luxel Corporation
NOVA
Officina Stellare SRL
PI
Sagem REOSC
Zygo Corporation

OPTOMECHANICAL COMPONENTS, DEVICES
ANU Advanced Instrumentation and Technology Centre
KiwiStar Optics
LIDAX
New Scale Technologies
NOVA
PI
Sagem REOSC
SENER Ingenería y Sistemas, S.A.
Symetrie
TMT Observatory

POSITIONING EQUIPMENT, MOTION CONTROL AND ACCESSORIES
Boston Micromachines Corp.
CEDRAT TECHNOLOGIES
Janssen Precision Engineering Technology of Sens B.V.
LIDAX
New Scale Technologies
PI
redlogix GmbH
SENER Ingenería y Sistemas, S.A.
Symetrie
Zygo Corporation

SEMICONDUCTOR MANUFACTURING
AdTech Ceramics
Integrated Detector Electronics AS
Photonic Cleaning Technologies
PI
Sigmadyne

SOFTWARE
4D Technology Corporation
ASTELCO Systems GmbH
EIE Group s.r.l.
ESDI
Nüvü Caméras Inc.
Observatory Sciences Ltd.
redlogix GmbH
Sigmadyne
Symetrie
TMT Observatory

SOLAR & ALTERNATIVE ENERGY
Asahi Spectra USA Inc.
EIE Group s.r.l.
Luxel Corporation
Sigmadyne

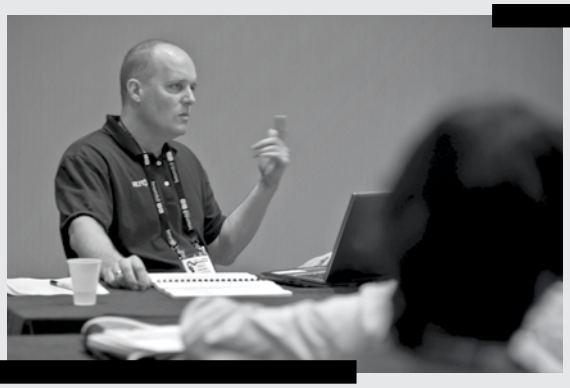
SOLAR AND ALTERNATIVE ENERGY TECHNOLOGY
EIE Group s.r.l.
Luxel Corporation
Officina Stellare SRL

SPECTROSCOPY DEVICES AND EQUIPMENT
ANU Advanced Instrumentation and Technology Centre
Asahi Spectra USA Inc.
Fibertech Optica
HORIBA Jobin Yvon
Integrated Detector Electronics AS
KiwiStar Optics
Kogakugiken Corp.
LIDAX
NOVA
Nüvü Caméras Inc.
SENER Ingenería y Sistemas, S.A.

STRUCTURAL AND INFRASTRUCTURE SENSING
EIE Group s.r.l.
SENER Ingenería y Sistemas, S.A.

TEST AND MEASUREMENT, METROLOGY
4D Technology Corporation
AMOS
ANU Advanced Instrumentation and Technology Centre
ESDI
Fibertech Optica
HORIBA Jobin Yvon
KiwiStar Optics
LIDAX
NOVA
Ohara Corporation
PI
Zygo Corporation

VACUUM, COOLING, GAS HANDLING EQUIPMENT
AMOS
Luxel Corporation
NOVA
Nüvü Caméras Inc.
Sunpower
TTI



COURSES FROM SPIE

SPIE STUDENT MEMBERS GET 50% OFF COURSES—SEE DETAILS ONLINE

Take advantage of direct instruction from some of the biggest names in research and industry—learn from recognized experts

Make the most of your time—get training and access to professional development courses to stay competitive and advance your career. Earn CEUs to fulfill ongoing professional education requirements. See detailed descriptions and register for courses onsite.

- **RELEVANT TRAINING**
- **PROVEN INSTRUCTORS**
- **EDUCATION YOU NEED TO STAY COMPETITIVE IN TODAY'S JOB MARKET**

www.spie.org/education

MONEY-BACK GUARANTEE

We are confident that once you experience an SPIE course for yourself you will look to us for your future education needs. However, if for any reason you are dissatisfied, we will gladly refund your money. We just ask that you tell us what you did not like; suggestions for improvement are always welcome.

CONTINUING EDUCATION UNITS

SPIE has been approved as an authorized provider of CEUs by IACET, The International Association for Continuing Education and Training (Provider #1002091). In obtaining this approval, SPIE has demonstrated that it complies with the ANSI/IACET Standards which are widely recognized as standards of good practice.

SPIE reserves the right to cancel a course due to insufficient advance registration.

Courses Daily Schedule

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
	NEW SC1139 **Systems Engineering and Large Telescope Observatories** *(Lightsey/Arenberg)* 08:30 to 17:30	SC906 **Introduction to Visible and NIR Spectrograph Design and Development for Astronomy** *(Sheinis)* 08:30 to 17:30 SC1078 **Advanced Composite Materials for Astronomical Telescopes and Optomechanical Instruments** *(Zweben)* 08:30 to 17:30	***NEW*** SC1120 **Finite Element Analysis of Optics** *(Doyle, Genberg)* 08:30 to 17:30	SC1001 **Systems Engineering for Astronomy Projects** *(Schnetler)* 08:30 to 17:30	

Systems Engineering and Large Telescope Observatories New

SC1139

Course Level: Introductory
CEU: 0.65 $525 Members | $635 Non-Members USD
Monday 8:30 to 17:30

Modern astronomical observatories are becoming larger and more complex with many components working together to achieve the common goal of gathering useful information for astro-scientists. Successful engineering of these observatories is enabled by following a systems engineering viewpoint of looking at the whole.
This viewpoint requires a multidisciplinary breadth and the ability to find a balance among 1) the system user's needs and desires, 2) the manager's funding and schedule constraints, and 3) the capabilities and ambitions of the engineering specialists who develop and build the system. The system engineer is sometimes described as the person on the program who should know the partial derivative of every parameter of the system with respect to every other parameter.
This course introduces the concepts and models that are used to evolve a system from an abstract vision to the final validated and verified operational system. Examples are given that provide insight into the variety of engineering disciplines and typical subsystems found in observatories for optical astronomy observatories (X-ray through IR).

LEARNING OUTCOMES

This course will enable you to:
- explain the stages within a System Engineering Life Cycle Model
- create a context diagram for the system, identifying both internal and external interfaces
- construct an iterative process for flowing from Science Mission goals to system level functional and physical requirements down to component level requirements within the constraints of the development process
- demonstrate how to evaluate trades and analyses of alternatives
- conduct maturity, risk assessment and tracking analyses to identify and manage technology development and risk mitigation activities
- explain the role of technical budgets for managing requirements and the mathematics behind them
- determine the basics of probabilistic risk assessment
- provide examples of Technical Performance Metrics monitoring as a tool in requirements management
- describe the use of integrated modeling as a tool for design development and system verification

INTENDED AUDIENCE

Scientists, engineers, or managers who wish to learn more about system engineering as applied to mission definition and engineering development of large telescope astronomical observatories. The focus will be on space based observatories, but with relevant overlap with ground based systems. Undergraduate training in science or engineering is assumed.

INSTRUCTOR

Paul Lightsey has 40+ years' experience in Physics, Mathematics, and Engineering, much in the area of optical systems analysis and design. He has worked on JWST since 1997 and is currently the Chief Engineer for the James Webb Space Telescope program at Ball Aerospace & Technologies Corp., and is in NASA/GSFC Mission Systems Engineering Optical Leads team. He has contributed to all phases of development from new business through design, fabrication, alignment, test, calibration, and on-orbit operations while at Ball. Dr. Lightsey worked on several of the Hubble Space Telescope (HST) instruments built by Ball and before that, the Relay Mirror Experiment (RME) and the Retroreflector Assisted Imaging Laser Experiment (RAILE). He is a Lecturer in the Whiting School of Engineering for Professional Programs at Johns Hopkins University, teaching in the Master of Science in Systems Engineering program. He received his BS with High Distinction in Physics from Colorado State University in 1966, and his Ph.D. in Physics from Cornell University in 1972. He has received the William H. Follett, Jr. Award for Excellence in System Engineering at Ball, and the Distinguished Public Service Medal from NASA for his work on HST and JWST.

Jonathan Arenberg is currently the Chief Engineer for the James Webb Space Telescope at Northrop Grumman Aerospace Systems and has been with the company since 1989. He started his career at Hughes Aircraft Company. His work experience includes optical, space and laser systems. Dr. Arenberg has worked on such astronomical programs as the Chandra X-ray Observatory, James Webb Space Telescope and helped develop the New Worlds Observer concept for the imaging of extra-solar planets. He has worked on major high-energy and tactical laser systems, laser component engineering and metrology issues. He is a member of the ISO sub-committee charged with writing standards for laser and electro-optic systems and components, SPIE, American Astronomical Society and AIAA. Dr. Arenberg holds a BS in physics (1983) and an MS (1985) and PhD (1987) in engineering, all from the University of California, Los Angeles. He is the author of over 100 conference presentations and publications, and holds 1 European and 11 U.S. Patents in a wide variety of areas of technology. Dr. Arenberg is a member of the SPIE Distinguished Speakers program.

Finite Element Analysis of Optics New

SC1120

Course Level: Intermediate
CEU: 0.65 $585 Members | $695 Non-Members USD
Wednesday 8:30 to 17:30

This course presents the use of finite element methods to model and predict the behavior of optical elements and support structures including lenses, mirrors, windows, and optical mounts in the presence of mechanical and environmental loads. Students will learn general FEA modeling strategies and guidelines specific to optical systems including how to develop low-fidelity models to quickly perform optomechanical design tradeoffs as well as the creation of high-fidelity models to support detailed design.
Emphasized will be the application of FEA techniques to meet optical system error budget allocations including mounting tolerances, alignment errors, optical surface distortions, image stability, and wavefront error. In addition, use of FEA to ensure structural integrity requirements including yield, buckling, and fracture will be discussed.

LEARNING OUTCOMES

This course will enable you to:
- develop optical component and system level finite element models
- model conventional and lightweight mirrors including evaluating the impact of optical coatings
- analyze optical mounts including kinematic, flexure, and optical bond designs
- predict optical alignment errors due to mechanical, assembly, and environmental loads
- perform optical surface error analyses using Zernike polynomials
- predict optical system image motion due to thermal and dynamic environments
- evaluate the effects of temperature and stress on optical performance

INTENDED AUDIENCE

This course is intended for mechanical engineers interested in learning about the application of finite element analysis in the mechanical design of optical systems. An interest in optomechanical engineering and/or familiarity with finite element software is recommended.

INSTRUCTOR

Keith Doyle has over 25-years experience in the field of optical engineering, specializing in opto-mechanics and the multidisciplinary modeling of optical systems. He is the co-author of the book titled Integrated Optomechanical Analysis and has authored or co-authored over 30-publications in this field. He is currently employed at MIT Lincoln Laboratory as a Group Leader in the Engineering Analysis and Testing Group. Previously he served as Vice President of Sigmadyne Inc. and as a Senior Systems Engineer at Optical Research Associates. He received his Ph.D. in engineering mechanics with a minor in optical sciences from the University of Arizona.

Victor Genberg has over 40-years experience in the application of finite element methods to high-performance optical structures and is a recognized expert in opto-mechanics. He is currently President of Sigmadyne, Inc. and a Professor of Mechanical Engineering at the University of Rochestor where he teaches courses in optomechanics, finite element analysis, and design optimization. He is the co-author of the book titled Integrated Optomechanical Analysis has over 40 publications in this field including two chapters in the CRC Handbook of Optomechanical Engineering. Prior to founding Sigmadyne, Dr. Genberg spent 28-years at Eastman Kodak serving as a technical specialist for military and commercial optical systems.

COURSE PRICE INCLUDES the text *Integrated Optomechanical Analysis, 2nd Edition* (SPIE Press, 2012) by Keith Doyle, Victor Genberg, and Gregory Michels.

Systems Engineering for Astronomy Projects

SC1001

Course Level: Introductory
CEU: 0.65 $525 Members | $635 Non-Members USD
Thursday 8:30 to 17:30

This course provides an introduction to lean systems engineering for the development of telescopes, facilities and instruments for astronomy. A primary goal of this course is to illustrate how the rigor of the systems engineering process can help us to build better astronomy products more quickly and cheaply.
The course will be exercise-driven, using an example of an actual instrument. During the course we will explore the various analysis methods that can be used to ensure performance budgets are partitioned and allocated correctly. This will be followed by working through an example to show the interaction between allocations and performance estimations.

LEARNING OUTCOMES

This course will enable you to:

- describe the various roles of a project Systems Engineer and list the activities for each of the following participants in a project: Project manager, Project Scientist/Instrument Scientist, Systems Engineer and Discipline Lead Engineers
- describe the typical life-cycle of an astronomy product
- capture and write user requirements and derived the technical product requirements
- perform a functional analysis
- prepare solutions to implement each functions
- allocate functions to physical items and then to partition these into systems, sub-systems, modules and assemblies
- evaluate the overall system performance

INTENDED AUDIENCE

All project managers and systems engineers in astronomy who wish to learn more about the application area. Engineers and Project/Instrument scientists who wish to learn more about systems engineering and specifically how to write good science requirements. Undergraduate training in engineering or science is assumed.

INSTRUCTOR

Hermine Schnetler has been a Systems Engineer for more than 25 years, initially working in the Defence industry on products such as inertial navigation systems for aircraft, helmet sighting systems and helicopter mounted sighting systems. She has joined the United Kingdom Astronomy Technology Centre (UK ATC) nine years ago and is the Head of Group: Systems Engineering. She tailored and successfully introduced systems engineering for astronomy and was also involved in a number of instrument studies. She has a first degree in Electronics Engineering and an MSc in Systems Engineering. Both of these were obtained from the University of Pretoria in South Africa. She followed this with a PhD in Software Engineering from Cranfield University, UK. Dr Schnetler is a member of the International Council on Systems Engineering (INCOSE) and a member of the Institute for Engineering Technology.

Advanced Composite Materials for Astronomical Telescopes and Optomechanical Instruments

SC1078

Course Level: Intermediate
CEU: 0.65 $525 Members | $635 Non-Members USD
Tuesday 8:30 to 17:30

Advanced composite materials have been used successfully in optomechanical systems since the 1970s. They are being used increasingly in telescopes, mirrors, and other optomechanical systems. There are a significant and increasing number of spacecraft, airborne and ground-based applications. A growing array of polymer matrix-, metal matrix-, ceramic matrix- and carbon/carbon composites provide great improvements in stiffness, strength, dimensional stability, thermal conductivity and corrosion resistance over conventional materials of construction, and are considerably lighter. Low-cost, net-shape manufacturing processes make many of these materials economically attractive.

LEARNING OUTCOMES

This course will enable you to:

- acquire terminology and understand the basic properties and characteristics of the four classes of composites used in telescopes and other optomechanical systems
- select appropriate candidate composites and perform design studies
- improve thermal and moisture dimensional stability
- increase stiffness
- reduce weight
- increase acceleration and deceleration tolerance
- reduce vibrations
- reduce thermal stresses by matching CTEs
- increase thermal conductivity
- reduce design complexity
- review where composites are being used in spacecraft, airborne and ground-based applications, such as SOFIA, ALMA, and James Webb Space Telescope
- be aware of future developments, such as potential use of lunar materials to make composite mirrors

INTENDED AUDIENCE

This course is designed for engineers, scientists and managers involved in design and manufacture of telescopes and optomechanical systems.

INSTRUCTOR

Carl Zweben , an independent consultant on composites and advanced thermal materials, was for many years Advanced Technology Manager and Division Fellow at GE Astro Space. He has over 40 years' experience in development and application of all types of advanced composites in optomechanical systems, dimensionally stable structures, and thermal control. He is a Life Fellow of ASME, a Fellow of ASM and SAMPE, and an Associate Fellow of AIAA. He is the first winner of the GE Engineer-of-the-Year and One-in-a-Thousand awards. He has taught over 250 short courses, worldwide.

Introduction to Visible and NIR Spectrograph Design and Development for Astronomy

SC906

Course Level: Introductory
CEU: 0.65 $645 Members | $755 Non-Members USD
Tuesday 8:30 to 17:30

This course provides attendees with an introduction to aerial spectrograph design and development for astronomy. The course concentrates on system configurations and performance optimization and analysis. Specific concepts to be addressed include: image quality, throughput, flexure, performance modeling and system testing.

LEARNING OUTCOMES

This course will enable you to:

- identify the fundamental optical and mechanical principles that affect spectrograph performance
- construct different first-order design configurations that achieve a desired resolution and field-of-view
- compare the relative merits of different component designs
- specify optical components for vendor quote and fabrication
- judge whether various vendor acceptance tests are sufficient
- design efficient end-to-end testing for your spectrograph

INTENDED AUDIENCE

The material presented in this course is intended for anyone who is developing an astronomical spectrograph or who wants to understand the various constraints, trade-offs and system-level decisions that go into the design of a visible/NIR spectrograph in order to optimize for performance. This course is ideal for a first-time instrument PI as well as graduate students and engineers who will be part of an astronomical-spectrograph development team.

INSTRUCTOR

Andrew Sheinis is the Head of Instrumentation at the Australian Astronomical Observatory (AAO) in Sydney Australia. He has been involved in optical system design and engineering for over 25 years. He is currently the PI for the HERMES Spectrograph being developed for the GALAH Galactic Archeology Survey at the Australian Astronomical Telescope (AAT) and has developed instruments for the SALT Telescope, Lick Observatory, Keck Observatory and the University of Hawaii as well as medical and defense applications in industry.

COURSE PRICE INCLUDES the text *Astronomical Optics, Second Edition* (Academic Press, 1999) by Daniel J. Schroeder.

DAILY CONFERENCE SESSION SCHEDULE

Telescopes and Systems Daily Session Schedule

SUNDAY	MONDAY	TUESDAY
9143 Space Telescopes and Instrumentation 2014: Optical, Infrared, and Millimeter Wave		
SESSION 1 · **JWST I** *(Eric P. Smith)*	**Plenary Session**	**Plenary Session**
SESSION 2 · **JWST II** *(Giorgio Savini)*	SESSION 5 · **AFTA/WFIRST I** *(Jacobus Oschmahn, Jr.)*	SESSION 8 · **Innovative Concepts I** *(Howard A. MacEwen)*
SESSION 3 · **JWST III** *(Mark Clampin)*	SESSION 6 · **AFTA/WFIRST II** *(Lee D. Feinberg)*	SESSION 9 · **Innovative Concepts II** *(Jacobus M. Oschmann Jr.)*
SESSION 4 · **Euclid** *(Jonathan W. Arenberg)*	SESSION 7 · **Astrometry** *(Giovanni G. Fazio)*	
Poster Session		
9144 Space Telescopes and Instrumentation 2014: Ultraviolet to Gamma Ray		
SESSION 1 · **Ultraviolet Instruments and Missions I** *(Steven E. Boggs)*	**Plenary Session**	**Plenary Session**
SESSION 2 · **Ultraviolet Instruments and Missions II** *(Luigi Gallo)*	SESSION 7 · **Fifteen Years of Chandra and XMM/Newton: Lessons Learned** *(Marshall W. Bautz)*	SESSION 11 · **X-ray Optics I** *(Richard Willingale)*
SESSION 3 · **Solar Instruments** *(Luigi Gallo)*	SESSION 8 · **Future Directions in UV to Gamma-ray Space Astronomy and Perspectives from Agencies** *(Jan-Willem A. den Herder)*	SESSION 12 · **X-ray Optics II** *(Hisamitsu Awaki)*
SESSION 4 · **Gamma-ray Telescopes, Optics and Instruments** *(Tadayuki Takahashi)*	SESSION 9 · **Cosmic Ray Measurements in Space** *(Jan-Willem A. den Herder)*	SESSION 13 · **Instrumentation for Polarimetry** *(Martin C. Weisskopf)*
SESSION 5 · **Gamma-ray Sky Surveys II** *(François Lebrun)*	SESSION 10 · **Detectors for High-energy Astrophysics** *(Caroline A. Kilbourne)*	SESSION 14 · **MAXI and NuStar** *(Mikhail N. Pavlinsky)*
SESSION 6 · **Polarimetry Missions** *(François Lebrun)*	**Poster Session**	
9145 Ground-based and Airborne Telescopes V		
SESSION 1 · **Project Reviews I** *(Roberto Gilmozzi)*	**Plenary Session**	**Plenary Session**
SESSION 2 · **Project Reviews II** *(Helen Hall)*	SESSION 7 · **Cherenkov Telescopes I** *(Jean-Gabriel Cuby)*	SESSION 12 · **Telescopes and Arrays for Surveys, Time-domain and Transient Observations I** *(Victor L. Krabbendam)*
SESSION 3 · **Upgrades to Existing Observatories** *(Matthew Colless)*	SESSION 8 · **Cherenkov Telescopes II** *(Helen Hall)*	SESSION 13 · **Telescopes and Arrays for Surveys, Time-domain and Transient Observations II** *(Matthew Colless)*
SESSION 4 · **Site Characterization and Testing** *(Jason Spyromilio)*	SESSION 9 · **Airborne Telescopes I** *(Helen Hall)*	SESSION 14 · **Telescopes and Arrays for Surveys, Time-domain and Transient Observations III** *(Tomonori Usuda)*
SESSION 5 · **Design of Telescopes for Extreme Environments** *(Xiangqun Cui)*	SESSION 10 · **Airborne Telescopes II** *(Göran Sandell)*	SESSION 15 · **Telescope Performance Measurement** *(Tomonori Usuda)*
SESSION 6 · **Telescopes to Image Orbiting Objects** *(Göran Sandell)*	SESSION 11 · **Airborne Telescopes III** *(Göran Sandell)*	
	Poster Session	

WEDNESDAY	THURSDAY	FRIDAY
Conference Chairs: **Jacobus M. Oschmann Jr.,** Ball Aerospace & Technologies Corp. (USA); **Mark Clampin,** NASA Goddard Space Flight Ctr. (USA); **Giovanni G. Fazio,** Harvard-Smithsonian Ctr. for Astrophysics (USA); **Howard A. MacEwen,** Reviresco LLC (USA)		
Plenary Session	**Plenary Session**	SESSION 15 · **Exoplanets I** *(Jean-Pierre Maillard)*
SESSION 10 · **SPICA/SPITZER** *(James B. Breckinridge)*	SESSION 13 · **Technology Instruments I** *(Jaymie Mark Matthews)*	SESSION 16 · **Exoplanets II** *(Makenzie Lystrup)*
SESSION 11 · **Solar System** *(Allison A. Barto)*	SESSION 14 · **Technology Instruments II** *(René Doyon)*	
SESSION 12 · **Technology - Optics** *(Gary W. Matthews)*		
Conference Chairs: **Tadayuki Takahashi,** Japan Aerospace Exploration Agency (Japan); **Jan-Willem A. den Herder,** SRON Netherlands Institute for Space Research (Netherlands); **Mark Bautz,** Massachusetts Institute of Technology (USA)		
Plenary Session	**Plenary Session**	
SESSION 15 · **Future Missions I: Astrosat and Spektrum-Roentgen Gamma** *(Kirpal Nandra)*	SESSION 18 · **The Next Generation: Athena I** *(Giovanni Pareschi)*	
SESSION 16 · **Future Missions II: Neutron Stars to Gamma-ray Bursts** *(João Braga)*	SESSION 19 · **The Next Generation: Athena II** *(Takaya Ohashi)*	
SESSION 17 · **Future Missions III: ASTRO-H** *(Didier Barret)*	SESSION 20 · **The Next Generation: Small Mission Concepts** *(Shuangnan Zhang)*	
	SESSION 21 · **The Next Generation: LOFT** *(Hiroshi Tsunemi)*	
	Poster Session	
Conference Chairs: **Larry M. Stepp,** Thirty Meter Telescope Observatory Corp. (USA); **Roberto Gilmozzi,** European Southern Observatory (Germany); **Helen J. Hall,** SOFIA / USRA (USA)		
Plenary Session	**Plenary Session**	SESSION 25 · **Solar Telescopes I** *(Heather K. Marshall)*
SESSION 16 · **Extremely Large Telescopes I** *(Roberto Gilmozzi)*	SESSION 21 · **Segmented Mirror Alignment, Phasing and Wavefront Control** *(Larry Stepp)*	SESSION 26 · **Solar Telescopes II** *(Jason Spyromilio)*
SESSION 17 · **Extremely Large Telescopes II** *(Tomonori Usuda)*	SESSION 22 · **Millimeter Wavelength Telescopes and Arrays I** *(Jean-Gabriel Cuby)*	SESSION 27 · **AIV, Commissioning and Early Operations** *(Jason Spyromilio)*
SESSION 18 · **Enabling Technologies for Extremely Large Telescopes I** *(Larry Stepp)*	SESSION 23 · **Millimeter Wavelength Telescopes and Arrays II** *(Heather K. Marshall)*	SESSION 28 · **Telescope Structures, Bearings and Drives** *(Victor L. Krabbendam)*
SESSION 19 · **Enabling Technologies for Extremely Large Telescopes II** *(Jeffrey R. Kuhn)*	SESSION 24 · **Radio Telescopes and Arrays** *(Xiangqun Cui)*	SESSION 29 · **Observatory Facilities and Enclosures** *(Frank W. Kan)*
SESSION 20 · **Telescope Controls** *(Jeffrey R. Kuhn)*		SESSION 30 · **Measurement and Control of Telescope Vibration** *(Frank W. Kan)*
Poster Session		

DAILY CONFERENCE SESSION SCHEDULE

Telescopes and Systems Daily Session Schedule

SUNDAY	MONDAY	TUESDAY
9146 Optical and Infrared Interferometry IV		
	Plenary Session	**Plenary Session**
	SESSION 1 · **Air/Space Interferometry** *(Jayadev K. Rajagopal)*	SESSION 5 · **Historical Perspectives** *(Fabien Malbet)*
	SESSION 2 · **Observing Techniques** *(Jayadev K. Rajagopal)*	SESSION 6 · **Science II** *(Jean-Philippe Berger)*
	SESSION 3 · **Science I** *(Ellyn K. Baines)*	SESSION 7 · **Current Facilities I** *(Jean-Philippe Berger)*
	SESSION 4 · **Observing Techniques II** *(Ellyn K. Baines)*	SESSION 8 · **Current Facilities II** *(Theo A. ten Brummelaar)*
9147 Ground-based and Airborne Instrumentation for Astronomy V		
SESSION 1 · **Instrument Programs at Major Observatories** *(Hideki Takami)*	**Plenary Session**	**Plenary Session**
SESSION 2 · **New Instruments and Upgrades to Existing Instruments** *(Oskar von der Lühe)*	SESSION 3 · **High Multiplex and Survey Instruments I** *(Stephen S. Eikenberry)*	SESSION 5 · **High Multiplex and Survey Instruments III** *(Julia J. Bryant)*
Poster Pops	SESSION 4 · **High Multiplex and Survey Instruments II** *(Ian S. McLean)*	SESSION 6 · **High Spectral Resolution Instruments I** *(Suzanne K. Ramsay)*
Poster Session	**Poster Pops**	
	Poster Session	
9148 Adaptive Optics Systems IV		
SESSION 1 · **Status of Current AO Instrument Projects I** *(Enrico Marchetti)*	**Plenary Session**	**Plenary Session**
SESSION 2 · **Laser Guide Star Systems I** *(Celine D'Orgeville)*	SESSION 5 · **Extreme AO I** *(Simone Esposito)*	SESSION 8 · **AO for ELTs** *(Richard M. Myers)*
SESSION 3 · **Astronomy with AO I** *(Laird M. Close)*	SESSION 6 · **Advances in AO Control I** *(Caroline Kulcsar)*	SESSION 9 · **New Proposed AO Systems and Concepts for Large Telescopes and ELTs** *(Simone Esposito)*
SESSION 4 · **Wavefront Correction I** *(Norbert Hubin)*	SESSION 7 · **Post-Processing AO Data I** *(Francois Rigaut)*	SESSION 10 · **Wavefront Sensing I** *(Brent L. Ellerbroek)*
Poster Session	**Poster Session**	

WEDNESDAY	THURSDAY	FRIDAY
Conference Chairs: **Jayadev K. Rajagopal,** National Optical Astronomy Observatory (USA); **Michelle J. Creech-Eakman,** New Mexico Institute of Mining and Technology (USA); **Fabien Malbet,** Institut de Planétologie et d'Astrophysique de Grenoble (France)		
Plenary Session	**Plenary Session**	SESSION 18 · **Science V** *(Claudia Paladini)*
SESSION 9 · **Data Processing/Analysis I** *(Michelle J. Creech-Eakman)*	SESSION 15 · **Future II: The Planet Formation Imager** *(Peter G. Tuthill)*	SESSION 19 · **Critical Subsystems and Technologies I** *(Claudia Paladini)*
SESSION 10 · **Science III** *(Lucas Labadie)*	**Poster Pops**	SESSION 20 · **Science VI** *(Claudia Paladini)*
SESSION 11 · **Planned Facilities I** *(Lucas Labadie)*	SESSION 16 · **Future III** *(Henrique Schmitt)*	SESSION 21 · **Critical Subsystems and Technologies II** *(Stephen A. Rinehart)*
SESSION 12 · **Science IV** *(Matthew Ward Muterspaugh)*	SESSION 17 · **Technologies I** *(Henrique Schmitt)*	SESSION 22 · **Data Processing Analysis II** *(Stephen A. Rinehart)*
SESSION 13 · **Planned Facilities II: Facility Issues** *(Matthew Ward Muterspaugh)*	**Poster Session**	
SESSION 14 · **Future I** *(Matthew Ward Muterspaugh)*		
Poster Pops		
Poster Session		
Conference Chairs: **Suzanne K. Ramsay,** European Southern Observatory (Germany); **Ian S. McLean,** Univ. of California, Los Angeles (USA); **Hideki Takami,** Subaru Telescope, National Astronomical Observatory of Japan (USA)		
Plenary Session	**Plenary Session**	
SESSION 7 · **High Spectral Resolution Instruments II** *(Ramón J. García López)*	SESSION 9 · **High Spatial Resolution Instruments II** *(Maureen L. Savage)*	
SESSION 8 · **High Spatial Resolution Instruments I** *(Hideki Takami)*	**Poster Pops**	
Poster Pops	SESSION 10 · **Instruments for Extremely Large Telescopes** *(Luc Simard)*	
Poster Session	**Poster Session**	
Conference Chairs: **Enrico Marchetti,** European Southern Observatory (Germany); **Laird M. Close,** The Univ. of Arizona (USA); **Jean-Pierre Véran,** National Research Council Canada (Canada)		
Plenary Session	**Plenary Session**	SESSION 19 · **Status of Current AO Instrument Projects III** *(Yutaka Hayano)*
SESSION 11 · **Laser Guide Star Systems II** *(Peter L. Wizinowich)*	SESSION 15 · **Status of Current AO Instrument Projects II** *(Emiliano Diolaiti)*	SESSION 20 · **Wavefront Sensing II** *(Donald Gavel)*
SESSION 12 · **Pathfinders to Enable AO on ELTs and New AO Concepts I** *(Glen Herriot)*	SESSION 16 · **Characterization, Measurement and Modeling of the Distrurbances Faced by AO** *(Michael Hart)*	SESSION 21 · **Advances in AO Control II** *(Mitchell Troy)*
SESSION 13 · **Pathfinders to Enable AO on ELTs and New AO Concepts II** *(Glen Herriot)*	SESSION 17 · **Extreme AO II** *(Bruce Macintosh)*	SESSION 22 · **AO Modeling, Analysis and Simulations** *(Thierry Fusco)*
SESSION 14 · **Astronomy with AO II** *(Anne-Marie Lagrange)*	SESSION 18 · **Wavefront Correction II** *(Norbert Hubin)*	SESSION 23 · **Post-Processing AO Data II** *(Jean-Pierre Véran)*
Poster Session	**Poster Session**	

DAILY CONFERENCE SESSION SCHEDULE

Telescopes and Systems Daily Session Schedule

SUNDAY	MONDAY	TUESDAY

9150 Modeling, Systems Engineering, and Project Management for Astronomy VI

Conference Chairs: **George Z. Angeli,** LSST Corp. (USA); **Philippe Dierickx,** European Southern Observatory (Germany)

SESSION 1 · **Project Management I** *(George Angeli)*	**Plenary Session**	**Plenary Session**
SESSION 2 · **Project Management II** *(Sebastian G. Els)*	SESSION 5 · **Model Based Systems Engineering I** *(Sebastian G. Els)*	SESSION 8 · **Model Based Systems Engineering II** *(Michael Sheehan)*
SESSION 3 · **System Integration, Verification, and Validation** *(Scott Roberts)*	SESSION 6 · **System Modeling I** *(George Z. Angeli)*	SESSION 9 · **System Modeling II** *(Mitchell Troy)*
SESSION 4 · **System Designs and Architectures** *(Hermine Schnetler)*	SESSION 7 · **Systems Engineering I** *(Simon Craig)*	SESSION 10 · **Systems Engineering III** *(Philippe Dierickx)*
	Poster Session	

Technology Advancements Daily Session Schedule

9151 Advances in Optical and Mechanical Technologies for Telescopes and Instrumentation

	Plenary Session	**Plenary Session**
	SESSION 1 · **Telescope Structures** *(Andrew T. Sarawit)*	SESSION 4 · **Mirror Materials** *(Peter Hartmann)*
	SESSION 2 · **Active Instruments** *(David M. Montgomery)*	SESSION 5 · **Mirror Finishing** *(Roland Geyl)*
	SESSION 3 · **Cryogenic Techniques** *(Huub Janssen)*	SESSION 6 · **Test and Metrology** *(James H. Burge)*

9152 Software and Cyberinfrastructure for Astronomy III

SESSION 1 · **Project Overview** *(Gianluca Chiozzi, Hilton A. Lewis)*	**Plenary Session**	**Plenary Session**
SESSION 2 · **Control Systems Using PLC Technology and Field Buses** *(Juan C. Guzman, David L. Terrett)*	SESSION 5 · **Data Processing and Pipelines** *(Tom Donaldson, Juan C. Guzman)*	SESSION 8 · **Control Systems** *(Kim K. Gillies, Gianluca Chiozzi)*
SESSION 3 · **Data Management and Archives** *(Nicole M. Radziwill, Tom Donaldson)*	SESSION 6 · **Control Systems for Spectrographs** *(Alan Bridger, Bret Goodrich)*	SESSION 9 · **Software Engineering** *(Juan C. Guzman, Nicole M. Radziwill)*
SESSION 4 · **Control Systems: Camera and Data Acquisition** *(David L. Terrett, Hilton A. Lewis)*	SESSION 7 · **Cyberinfrastructure I** *(Bret Goodrich, Alan Bridger)*	**Lightning Talks** *(Nicole M. Radziwill, Kim K. Gillies)*
Open Discussion / Astroshare *(Alan Bridger, Bret Goodrich)*		
Poster Session		

WEDNESDAY	THURSDAY	FRIDAY

9149 Observatory Operations: Strategies, Processes, and Systems V

Conference Chairs: **Alison B. Peck,** National Radio Astronomy Observatory (USA); **Chris R. Benn,** Isaac Newton Group of Telescopes (Spain); **Robert L. Seaman,** National Optical Astronomy Observatory (USA)

Plenary Session	**Plenary Session**	SESSION 10 · **User Support** *(Chris R. Benn)*
SESSION 1 · **Archive Operations and Data Flow** *(Alison B. Peck)*	SESSION 6 · **Science Operations I** *(Robert Seaman)*	SESSION 11 · **Site and Facility Operations I** *(Andreas Kaufer)*
SESSION 2 · **Time Domain Follow-up I** *(Alison B. Peck)*	SESSION 7 · **Science Operations II** *(Alison B. Peck)*	SESSION 12 · **Site and Facility Operations II** *(Todd Boroson)*
SESSION 3 · **Time Domain Follow-up II** *(David S. Adler)*	SESSION 8 · **Operations and Data Quality Control** *(Suzanne R. Dodd)*	SESSION 13 · **Site and Facility Operations III** *(Christian Veillet)*
SESSION 4 · **Operations Benchmarking and Metrics** *(David S. Adler)*	SESSION 9 · **Virtual Observatory** *(Suzanne R. Dodd)*	
SESSION 5 · **Program and Observation Scheduling** *(Dennis R. Crabtree)*	**Poster Session**	

Conference Chairs: **Ramón Navarro,** NOVA Optical & Infrared Instrumentation Group at ASTRON (Netherlands); **Colin R. Cunningham,** UK Astronomy Technology Ctr. (United Kingdom); **Allison A. Barto,** Ball Aerospace & Technologies Corp. (USA)

Plenary Session	**Plenary Session**	SESSION 14 · **Spectroscopy** *(Eric Prieto)*
SESSION 7 · **Test and Metrology of Large Optics** *(Daniel R. Blanco)*	SESSION 10 · **Coatings** *(Allison A. Barto)*	SESSION 15 · **Optical Fibers and Positioners I** *(Roger Haynes)*
SESSION 8 · **System Test and Alignment** *(James H. Burge)*	SESSION 11 · **Gratings I** *(Allison A. Barto)*	SESSION 16 · **Optical Fibers and Positioners II** *(Roger Haynes)*
SESSION 9 · **Novel Technologies** *(Colin Cunningham)*	SESSION 12 · **Gratings II** *(Ramón Navarro)*	**Closing Session** (Colin Cunningham); **Award Ceremony: Best Poster and Best Oral Presentation**
Poster Session	SESSION 13 · **High Contrast Imaging** *(Jinxue Wang)*	
	Poster Session	

Conference Chairs: **Gianluca Chiozzi,** European Southern Observatory (Germany); **Nicole M. Radziwill,** James Madison Univ. (USA)

Plenary Session	**Software Hack Day** *(Sarah Kendrew)*	
SESSION 10 · **Innovations** *(Kim K. Gillies, Tom Donaldson)*		
SESSION 11 · **Cyberinfrastructure II** *(David L. Terrett, Alan Bridger)*		
SESSION 12 · **Project Management** *(Hilton A. Lewis, Gianluca Chiozzi)*		
Conference Conclusions		

DAILY CONFERENCE SESSION SCHEDULE

Technology Advancements Daily Session Schedule

SUNDAY	MONDAY	TUESDAY

9153 Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy VII

		Plenary Session
		SESSION 1 · **Current/Near-Term Cameras and Arrays** *(Wayne S. Holland)*
		SESSION 2 · **Transition-Edge Sensors: Theory and Design** *(Kent D. Irwin)*
		SESSION 3 · **Transition-Edge Sensors: Performance and Developments** *(Jian-Rong Gao)*

9154 High Energy, Optical, and Infrared Detectors for Astronomy VI

Conference Chairs: **Andrew D. Holland,** e2v Ctr. for Electronic Imaging at The Open Univ. (United Kingdom); **James Beletic,** Teledyne Imaging Sensors (USA)

SESSION 1 · **Programs**	**Plenary Session**	**Plenary Session**
SESSION 2 · **CCDs I**	SESSION 7 · **Electronics and Cameras**	SESSION 11 · **Hybrid Detectors**
SESSION 3 · **EM-CCDs**	SESSION 8 · **CCDs II**	SESSION 12 · **CCDs and CMOS Detectors**
SESSION 4 · **IR Detectors I**	SESSION 9 · **PN CCDs**	SESSION 13 · **IR Detectors II**
SESSION 5 · **Test and Characterization**	SESSION 10 · **Radiation Damage**	SESSION 14 · **IR Detectors II**
SESSION 6 · **Cryogenic Detectors**	**Poster Session**	

SPIE would like to express its deepest appreciation to the symposium chairs, conference chairs, program committees, session chairs, and authors who have so generously given their time and advice to make this symposium possible.

The symposium, like our other conferences and activities, would not be possible without the dedicated contribution of our participants and members. This program is based on commitments received up to the time of publication and is subject to change without notice.

Conference Chairs: **Wayne S. Holland,** UK Astronomy Technology Ctr. (United Kingdom); **Jonas Zmuidzinas,** California Institute of Technology (USA)

WEDNESDAY	THURSDAY	FRIDAY
Plenary Session	**Plenary Session**	SESSION 10 · **CMB Instruments: New Developments I** *(Wayne S. Holland)*
SESSION 4 · **Future Cameras and Arrays** *(Christopher K. Walker)*	SESSION 7 · **CMB Instruments: Current and Near-Term** *(Karl Schuster)*	SESSION 11 · **CMB Instruments: New Developments II** *(Gordon J. Stacey)*
SESSION 5 · **Coherent Detector Technology** *(Albrecht Poglitsch)*	SESSION 8 · **Optics and Components** *(J. Anthony Murphy)*	SESSION 12 · **Terahertz Technology** *(Christopher K. Walker)*
SESSION 6 · **Kinetic Inductance Detectors** *(Jonas Zmuidzinas)*	SESSION 9 · **Multiplexing and Readout Systems** *(Jian-Rong Gao)*	SESSION 13 · **Emerging Concepts and New Instruments** *(Jonas Zmuidzinas)*
Poster Session	**Poster Session**	

CONFERENCE 9143 · LOCATION: ROOM 519A

Sunday–Friday 22–27 June 2014 • Proceedings of SPIE Vol. 9143

Space Telescopes and Instrumentation 2014: Optical, Infrared, and Millimeter Wave


(Oschmann)


(Clampin)


(Fazio)


(MacEwen)

Conference Chairs: **Jacobus M. Oschmann Jr.,** Ball Aerospace & Technologies Corp. (USA); **Mark Clampin,** NASA Goddard Space Flight Ctr. (USA); **Giovanni G. Fazio,** Harvard-Smithsonian Ctr. for Astrophysics (USA); **Howard A. MacEwen,** Reviresco LLC (USA)

Conference Co-Chair: **Allison A. Barto,** Ball Aerospace & Technologies Corp. (USA)

Program Committee: **Jonathan W. Arenberg,** Northrop Grumman Aerospace Systems (USA); **Richard K. Barry,** NASA Goddard Space Flight Ctr. (USA); **Natalie M. Batalha,** NASA Ames Space Flight Ctr. (USA); **James B. Breckinridge,** California Institute of Technology (USA); **Richard W. Capps,** Jet Propulsion Lab. (USA); **Jennifer A. Dooley,** Jet Propulsion Lab. (USA); **René Doyon,** Univ. de Montréal (Canada); **Lee D. Feinberg,** NASA Goddard Space Flight Ctr. (USA); **Makenzie Lystrup,** Ball Aerospace & Technologies Corp. (USA); **Jean-Pierre Maillard,** Institut d'Astrophysique de Paris (France); **Gary W. Matthews,** Exelis Geospatial Systems (USA); **Jaymie Mark Matthews,** The Univ. of British Columbia (Canada); **Mark J. McCaughrean,** European Space Research and Technology Ctr. (Netherlands); **Eric P. Smith,** NASA Headquarters (USA); **Giorgio Savini,** Univ. College London (United Kingdom); **Giovanna Tinetti,** Univ. College London (United Kingdom)

SUNDAY 22 JUNE

SESSION 1

LOCATION: ROOM 519A . . . . . SUN 9:40 TO 11:50

JWST I

Session Chair: **Eric P. Smith,** NASA Headquarters (USA)

9:40: **Recent progress with the JWST Observatory**, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-1]

10:00: **Status of the JWST optical telescope element**, Charles B. Atkinson, Northrop Grumman Aerospace Systems (USA) . . . . . [9143-3]

10:20: **Status of the optical performance for the James Webb Space telescope**, Paul A. Lightsey, J. Scott Knight, Ball Aerospace & Technologies Corp. (USA); Gary Golnik, Golnik Engineering, LLC (USA) . . . . . [9143-4]

10:40: **JWST telescope integration and test status**, Gary W. Matthews, Thomas R. Scorse, Scott Kennard, John Spina, Exelis Inc. (USA); Ritva A. Keski-Kuha, Lee D. Feinberg, James M. Marsh, Juli Lander, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-5]

11:00: **Design of the master optical reference for the James Webb Space telescope**, J. Scott Knight, Benjamin B. Gallagher, Doug Frazier, Ball Aerospace & Technologies Corp. (USA); Tony L. Whitman, Exelis Geospatial Systems (USA); Lee D. Feinberg, Murzy D. Jhabvala, Bill Hayden, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-6]

11:20: **Status of the James Webb Space telescope science instrument payload** *(Invited Paper),* Matthew A. Greenhouse, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-7]

Lunch Break . . . . . Sun 11:50 to 13:20

SESSION 2

LOCATION: ROOM 519A . . . . . SUN 13:20 TO 15:00

JWST II

Session Chair: **Giorgio Savini,** Univ. College London (United Kingdom)

13:20: **Status of the NIRSpec instrument**, Stephan M. Birkmann, Pierre Ferruit, European Space Research and Technology Ctr. (Netherlands); Catarina Alves de Oliveira, European Space Astronomy Ctr. (Spain); Torsten Böker, Space Telescope Science Institute (USA); Guido de Marchi, Giovanna Giardino, Marco Sirianni, European Space Research and Technology Ctr. (Netherlands); Martin Stuhlinger, European Space Astronomy Ctr. (Spain); Peter L. Jensen, Peter Rumler, Massimo Falcolini, European Space Research and Technology Ctr. (Netherlands); Maurice B. J. te Plate, NASA Goddard Space Flight Ctr. (USA); Giovanni Cresci, INAF - Osservatorio Astrofisico di Arcetri (Italy); Bernhard Dorner, Max-Planck-Institut für Astronomie (Germany); Ralf Ehrenwinkler, Airbus Defence and Space (Germany); Xavier Gnata, EADS Astrium GmbH (Germany); Ralf Ehrenwinkler, Airbus Defence and Space (Germany); Thomas Wettemann, EADS Astrium GmbH (Germany) . . . . . [9143-8]

13:40: **James Webb Space telescope optical simulation testbed I: overview and goals**, Marshall D. Perrin, Rémi Soummer, Space Telescope Science Institute (USA); Olivier Levecq, Institut d'Optique Graduate School (France); Mamadou N'Diaye, Élodie Choquet, Charles-Philippe Lajoie, Laurent A. Pueyo, Erin M. Elliott, Rachel Anderson, George F. Hartig, Chris A. Long, Space Telescope Science Institute (USA) . . . . . [9143-150]

14:00: **Observing transiting exoplanets with NIRSpec onboard JWST**, Torsten Böker, European Space Agency (USA); Stephan M. Birkmann, Pierre Ferruit, European Space Agency (Netherlands); Marco Sirianni, European Space Agency (USA); Giovanna Giardino, Guido de Marchi, European Space Agency (Netherlands); Catarina Alves de Oliveira, European Space Agency (Spain); Bernhard Dorner, Max-Planck-Institut für Astronomie (Germany) . . . . . [9143-10]

14:20: **Status of the JWST near-infrared imager and slitless spectrograph (NIRISS)**, René Doyon, Loïc Albert, Étienne Artigau, Univ. de Montréal (Canada); André R. Martel, Kevin Volk, Swara Ravindranath, Anand Sivaramakrishnan, Alex W. Fullerton, Pierre Chayer, Space Telescope Science Institute (USA); Neil Rowlands, Gerry Warner, COM DEV Canada (Canada); Maria B. Vila, Scott Rohrbach, NASA Goddard Space Flight Ctr. (USA); Michael Maszkiewicz, Isabelle Tremblay, Karl Saad, Jean Dupuis, Canadian Space Agency (Canada); Chris Willott, John B. Hutchings, NRC - Herzburg Institute of Astrophysics (Canada); David Lafrenière, Univ. de Montréal (Canada). . . . . [9143-11]

14:40: **Thermal distortion testing of the JWST Backplane from room temperature to 25K**, James R. Tucker, Sze M. Chaung, Austin VanOtten, Anthony M. Bluth, ATK Space Systems (USA) . . . . . [9143-12]

Coffee Break . . . . . Sun 15:00 to 15:30

SESSION 3

LOCATION: ROOM 519A . . . . . .SUN 15:30 TO 16:30

JWST III

Session Chair: **Mark Clampin,** NASA Goddard Space Flight Ctr. (USA)

15:30: **James Webb Space telescope (JWST) optical telescope element (OTE) Pathfinder status and test program**, Lee D. Feinberg, Ritva A. Keski-Kuha, NASA Goddard Space Flight Ctr. (USA); Charles B. Atkinson, Northrop Grumman Aerospace Systems (USA); Andrew J. Booth, Sigma Space Corp. (USA); Tony L. Whitman, Exelis Geospatial Systems (USA) . . . . . [9143-13]

15:50: **Testing the equipment for the cryogenic optical test of the James Webb Space telescope**, Tony L. Whitman, Exelis, Inc. (USA); Andrew Diantonio, Kenneth J. Dziak, Jesse A. Huguet, Exelis Inc. (USA); J. Scott Knight, Ball Aerospace & Technologies Corp. (USA); Carl A. Reis, NASA Johnson Space Ctr. (USA); Erin M. Wilson, Genesis Engineering Solutions (USA). . . . . [9143-145]

16:10: **Multi-wavelength interferometer testing on the JWST test bed telescope**, James B. Hadaway, The Univ. of Alabama in Huntsville (USA); Gene Olczak, Conrad Wells, Exelis Geospatial Systems (USA); D. Scott Acton, Ball Aerospace & Technologies Corp. (USA); Douglas B. Leviton, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-15]

SESSION 4

LOCATION: ROOM 519A . . . . . .SUN 16:30 TO 17:50

Euclid

Session Chair: **Jonathan W. Arenberg,** Northrop Grumman Aerospace Systems (USA)

16:30: **Euclid mission status**, René J. Laureijs, Giuseppe D. Racca, Luca Stagnaro, Jean-Christophe Salvignol, Jose Lorenzo Alvarez, Gonzalo Saavedra Criado, Luis Miguel Gaspar Venancio, Alexander D. Short, Paolo Strada, Cyril Colombo, European Space Research and Technology Ctr. (Netherlands); John Hoar, Ralf Kohley, Roland Vavrek, Guillermo Buenadicha, European Space Astronomy Ctr. (Spain); Yannick Mellier, Institut d'Astrophysique de Paris (France) and Commissariat à l'Énergie Atomique (France); Jerome Amiaux, Commissariat à l'Énergie Atomique (France); Mark S. Cropper, Sami Niemi, Univ. College London (United Kingdom); Anne Ealet, Ctr. de Physique des Particules de Marseille (France); Knud Jahnke, Stefanie Wachter, Max-Planck-Institut für Astronomie (Germany); Fabio Pasian, INAF - Osservatorio Astronomico di Trieste (Italy); Christophe Dabin, Ctr. National d'Études Spatiales (France); Ulf E. Israelsson, Michael D. Seiffert, Warren A. Holmes, Jet Propulsion Lab. (USA); Paolo Musi, Alberto Anselmi, Thales Alenia Space (Italy); Vincent H. Cazaubiel, EADS Astrium (France) . . . . . [9143-16]

16:50: **Euclid payload module: telescope characteristics and technical challenges**, Luis Miguel Gaspar Venancio, Alexander D. Short, Paolo Strada, Jose Lorenzo Alvarez, René J. Laureijs, European Space Research and Technology Ctr. (Netherlands); Ludovic H. Vaillon, EADS Astrium (France); Jerome Amiaux, Commissariat à l'Énergie Atomique (France); Corrado Gennaro, Thales Alenia Space (Italy); Jean-Christophe Salvignol, European Space Research and Technology Ctr. (Netherlands); Roland Vavrek, European Space Astronomy Ctr. (Spain) . . [9143-17]

17:10: **VIS: the visible imager for Euclid**, Mark S. Cropper, Sabrina Pottinger, Sami Niemi, Jamie Denniston, Richard E. Cole, Magdalena B. Szafraniec, Univ. College London (United Kingdom); Yannick Mellier, Institut d'Astrophysique de Paris (France) and Commissariat à l'Énergie Atomique (France); Michel Berthé, Jérôme Martignac, Christophe Cara, Commissariat à l'Énergie Atomique (France); Anna Maria Di Giorgio, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Andrea Sciortino, CGS S.p.A. - Compagnia Generale per lo Spazio (Italy); Stéphane Paltani, Ludovic Genolet, ISDC Data Ctr. for Astrophysics (Switzerland); Jean-Jaques Fourmond, Maryse Charra, Institut d'Astrophysique Spatiale (France); Phillip R. Guttridge, Berend Winter, Univ. College London (United Kingdom); James Endicott, e2v technologies plc (United Kingdom); Andrew D. Holland, Jason P. D. Gow, Neil J. Murray, David J. Hall, The Open Univ. (United Kingdom); Jerome Amiaux, Commissariat à l'Énergie Atomique (France); René J. Laureijs, Giuseppe D. Racca, Jean-Christophe Salvignol, Alexander D. Short, Jose Lorenzo Alvarez, European Space Research and Technology Ctr. (Netherlands); Thomas Kitching, Univ. College London (United Kingdom); Henk Hoekstra, Leiden Observatory (Netherlands); Richard J. Massey, Durham Univ. (United Kingdom) . . . . . [9143-18]

17:30: **Euclid near infrared spectro photometer instrument concept and first test results at the end of phase B**, Thierry Maciaszek, Ctr. National d'Études Spatiales (France); Anne Ealet, Ctr. de Physique des Particules de Marseille (France); Knud Jahnke, Max-Planck-Institut für Astronomie (Germany); Eric Prieto, Lab. d'Astrophysique de Marseille (France); Remi Barbier, Institut de Physique Nucléaire de Lyon (France); Yannick Mellier, Institut d'Astrophysique de Paris (France); Jean Christophe Barrière, Michel Berthé, Commissariat à l'Énergie Atomique (France); Carlotta Bonoli, Favio Bortoletto, INAF - Osservatorio Astronomico di Padova (Italy); Anne Costille, Lab. d'Astrophysique de Marseille (France); Jean Claude Clemens, Ctr. de Physique des Particules de Marseille (France); Leonardo Corcione, INAF - Osservatorio Astronomico di Torino (Italy); José Javier Díaz Garcia, Instituto de Astrofísica de Canarias (Spain); Franck Ducret, Christophe Fabron, Lab. d'Astrophysique de Marseille (France); Enrico Franceschi, INAF - IASF Bologna (Italy); Bianca Garilli, INAF - IASF Milano (Italy); Jean Luc Gimenez, Lab. d'Astrophysique de Marseille (France); Ferràn Grañena, Institut de Física d'Altes Energies (Spain); Robert Grange, Lab. d'Astrophysique de Marseille (France); Frank U. Grupp, Max-Planck-Institut für extraterrestrische Physik (Germany); Felix Hormuth, Max-Planck-Institut für Astronomie (Germany); Sebastiano Ligori, INAF - Osservatorio Astronomico di Torino (Italy); Laurent Martin, Lab. d'Astrophysique de Marseille (France); Gianluca Morgante, INAF - IASF Bologna (Italy); Cristobal Padilla, Institut de Física d'Altes Energies (Spain); Tony Pamplona, Lab. d'Astrophysique de Marseille (France); Marco Riva, INAF - IASF Milano (Italy); Christelle Rossin, Lab. d'Astrophysique de Marseille (France); Gregor Seidel, Max-Planck-Institut für Astronomie (Germany); Gérard Smadja, Institut de Physique Nucléaire de Lyon (France); Bjarte Solheim, CMR Prototech (Norway); Rafael Toledo-Moreo, Univ. Politécnica de Cartagena (Spain); Massimo Trifoglio, Luca Valenziano, INAF - IASF Bologna (Italy); Carolin Vogel, Max-Planck-Institut für extraterrestrische Physik (Germany); Pascal Vola, Lab. d'Astrophysique de Marseille (France); Stefanie Wachter, Max-Planck-Institut für Astronomie (Germany); Jerome Amiaux, Commissariat à l'Énergie Atomique (France); Warren A. Holmes, Ulf E. Israelsson, NASA Headquarters (USA); René J. Laureijs, European Space Research and Technology Ctr. (Netherlands); Giuseppe D. Racca, Jean-Christophe Salvignol, Paolo Strada, European Space Agency (Netherlands); Augustyn Waczynski, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-19]

POSTER SESSION–SUNDAY

LOCATION: ROOM 516 . . . . . SUN 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Sunday. The interactive poster session with authors in attendance will be Sunday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Preparing Echo Space mission: laboratory simulations of planetary atmospheres, Riccardo U. Claudi, INAF - Osservatorio Astronomico di Padova (Italy); Marco Sergio Erculiani, Univ. degli Studi di Padova (Italy); Giuseppina Micela, INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy); Maurizio D'Alessandro, INAF - Osservatorio Astronomico di Padova (Italy); Giuseppe Galletta, Univ. degli Studi di Padova (Italy); Enrico Giro, INAF - Osservatorio Astronomico di Padova (Italy); Alberto Adriani, INAF - IASF Roma (Italy); Francesca Altieri, Giancarlo Bellucci, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Daniela Billi, Univ. degli Studi di Roma La Sapienza (Italy); Cesare Cecchi-Pestellini, Angela Ciaravella, INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy); Gianrico Filacchione, Marco Giuranna, Davide Grassi, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Giuseppe Leto, INAF - Osservatorio Astrofisico di Catania (Italy); Emanuele Pace, Univ. degli Studi di Firenze (Italy); Maria Elisabetta Palumbo, INAF - Osservatorio Astrofisico di Catania (Italy); Giuseppe Piccioni, INAF - IASF Roma (Italy); Salvatore Scuderi, Giovanni Strazzulla, INAF - Osservatorio Astrofisico di Catania (Italy); Diego Turrini, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy) . . . . . [9143-82]

MTF and PSF measurements of the CCD273-84 detector for the Euclid visible channel, Ian Swindells, Ross Wheeler, Steve Darby, Steve Bowring, David J. Burt, Ray Bell, e2v technologies plc (United Kingdom); Ludovic Duvet, European Space Research and Technology Ctr. (Netherlands); David M. Walton, Richard E. Cole, Univ. College London (United Kingdom) . . . . . [9143-96]

The control unit of the near infrared spectrograph of the EUCLID space mission: preliminary design, Rafael Toledo-Moreo, Carlos Colodro-Conde, Univ. Politécnica de Cartagena (Spain); José Javier Díaz Garcia, Instituto de Astrofísica de Canarias (Spain); Antonio Peña, EADS Astrium Crisa (Spain); Sebastián Sánchez, Univ. de Alcalá (Spain); Óscar Tubío, Instituto de Astrofísica de Canarias (Spain); Tirso Velasco, EADS Astrium Crisa (Spain); Isidro Villó, Univ. Politécnica de Cartagena (Spain); Rafael Rebolo-López, Instituto de Astrofísica de Canarias (Spain) . . . . . [9143-97]

CONFERENCE 9143 · LOCATION: ROOM 519A

The EUCLID NISP tolerancing concept and results, Frank U. Grupp, Univ.-Sternwarte München (Germany) and Max-Planck-Institut für extraterrestrische Physik (Germany); Eric Prieto, Observatoire Astronomique de Marseille-Provence (France); Andreas Bode, Ralf Bender, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9143-98]

Thermo-mechanical architecture of the VIS focal plane for Euclid, Jérôme Martignac, Michael Carty, Thierry Tourrette, Damien Bachet, Michel Berthé, Jean-Louis Auguères, Jerome Amiaux, Jean Fontignie, Benoît Horeau, Diana M. Renaud, Commissariat à l'Énergie Atomique (France); Sabrina Pottinger, Univ. College London (United Kingdom) and Mullard Space Science Lab. (Venezuela); Jamie Denniston, Berend Winter, Phillip R. Guttridge, Richard E. Cole, Mark S. Cropper, Sami Niemi, John Coker, Thomas Hunt, Univ. College London (United Kingdom) . . . . . [9143-99]

Euclid: image compression activities for the VIS instrument, Giovanni Giusi, Scige J. Liu, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Gianluca Li Causi, INAF - Osservatorio Astronomico di Roma (Italy); Sami Niemi, Univ. College London (United Kingdom); Anna Maria Di Giorgio, INAF - IASF Roma (Italy); Emanuele Galli, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Maria Farina, INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy) . . . . . [9143-100]

Design of the on-board application software for the instrument control unit of Euclid-NISP, Sebastiano Ligori, Leonardo Corcione, Vito Capobianco, INAF - Osservatorio Astronomico di Torino (Italy); Luca Valenziano, INAF - IASF Bologna (Italy) . . . . . [9143-101]

The data processing unit of the NISP instrument of the Euclid mission, Leonardo Corcione, Sebastiano Ligori, Istituto Nazionale di Astrofisica (Italy); Vito Capobianco, INAF - Osservatorio Astronomico di Torino (Italy); Favio Bortoletto, Carlotta Bonoli, Maurizio D'Alessandro, INAF - Osservatorio Astronomico di Padova (Italy); Angelo Longoni, Raoul Grimoldi, CGS S.p.A. - Compagnia Generale per lo Spazio (Italy); Luca Valenziano, INAF - IASF Bologna (Italy) . . . . . [9143-102]

Performance of detectors and focal plane electronics for the Euclid near-infrared spectro-photometer (NISP), Selmer W. Anglin, Eric C. Piquette, Scott A. Cabelli, Lalit Bhambhani, Mark Farris, Andre Wong, Richard Blank, Teledyne Imaging Sensors (USA) . . . . . [9143-103]

Lab demonstrations of vision-based sensors for the formation flying of starshades, Anthony Harness, Webster Cash, Univ. of Colorado at Boulder (USA) . . . . . [9143-104]

Recent progress on phase-mask coronagraphy based on photonic-crystal technology, Naoshi Murakami, Hokkaido Univ. (Japan) and Jet Propulsion Lab. (USA); Jun Nishikawa, National Astronomical Observatory of Japan (Japan); Motohide Tamura, The Univ. of Tokyo (Japan); Eugene Serabyn, Wesley A. Traub, Kurt M. Liewer, Dwight C. Moody, John T. Trauger, Jet Propulsion Lab. (USA); Olivier Guyon, National Astronomical Observatory of Japan (Japan); Frantz Martinache, Observatoire de la Côte d'Azur (France); Nemanja Jovanovic, Garima Singh, National Astronomical Observatory of Japan (Japan); Fumika Oshiyama, Hayato Shoji, Moritsugu Sakamoto, Shoki Hamaguchi, Kazuhiko Oka, Naoshi Baba, Hokkaido Univ. (Japan) . . . . . [9143-105]

Simulation of a method to directly image exoplanets around multiple stars systems, Sandrine J. Thomas, Ruslan Belikov, Eduardo A. Bendek, NASA Ames Research Ctr. (USA) . . . . . [9143-106]

Image plane mask requirements in high-contrast coronagraphs, Erkin Sidick, Stuart B. Shaklan, Kunjithapatham Balasubramanian, Jet Propulsion Lab. (USA) . . . . . [9143-107]

Simulated broadband contrast of a visible nulling coronagraph, Erkin Sidick, Bertrand Mennesson, Jagmit S. Sandhu, Hong Tang, Michael Shao, Jet Propulsion Lab. (USA) . . . . . [9143-108]

Measurements of incoherent light and background structure at exo-Earth detection levels in the high contrast imaging testbed, Eric Cady, Stuart B. Shaklan, Brian Kern, Jet Propulsion Lab. (USA) . . . . . [9143-109]

ADDEDPT: apparatus for direct detection of exoplanets by diffractive pupil telescopy, Thomas D. Ditto, 3DeWitt, LLC (USA) . . . . . [9143-110]

A coronagraph system with unbalanced nulling interferometer: progress of optics and control method, Jun Nishikawa, National Astronomical Observatory of Japan (Japan) and The Graduate Univ. for Advanced Studies (Japan); Masahito Oya, Masaaki Horie, Nihon Univ. (Japan) and National Astronomical Observatory of Japan (Japan); Kazumi Sato, Tokyo Univ. of Agriculture and Technology (Japan); Masao Fukase, Nihon Univ. (Japan) and National Astronomical Observatory of Japan (Japan); Naoshi Murakami, Hokkaido Univ. (Japan) and Jet Propulsion Lab. (USA); Takayuki Kotani, National Astronomical Observatory of Japan (Japan); Shiomi Kumagai, Nihon Univ. (Japan); Motohide Tamura, The Univ. Tokyo (Japan) and National Astronomical Observatory of Japan (Japan); Yosuke Tanaka, Tokyo Univ. of Agriculture and Technology (Japan); Takashi Kurokawa, Tokyo Univ. of Agriculture and Technology (Japan) and National Astronomical Observatory of Japan (Japan) . . . . . [9143-111]

Adaptive optics operation with focal wavefront sensor in a coronagraph for direct observation of exoplanets, Masahito Oya, Nihon Univ. (Japan) and National Astronomical Observatory of Japan (Japan); Jun Nishikawa, National Astronomical Observatory of Japan (Japan) and The Graduate Univ. for Advanced Studies (Japan); Masaaki Horie, Nihon Univ. (Japan) and National Astronomical Observatory of Japan (Japan); Kazumi Sato, Tokyo Univ. of Agriculture and Technology (Japan) and National Astronomical Observatory of Japan (Japan); Masao Fukase, Nihon Univ. (Japan) and National Astronomical Observatory of Japan (Japan); Naoshi Murakami, Hokkaido Univ. (Japan) and Jet Propulsion Lab. (USA); Takayuki Kotani, National Astronomical Observatory of Japan (Japan); Shiomi Kumagai, Nihon Univ. (Japan); Motohide Tamura, The Univ. of Tokyo (Japan) and National Astronomical Observatory of Japan (Japan); Yosuke Tanaka, Tokyo Univ. of Agriculture and Technology (Japan); Takashi Kurokawa, Tokyo Univ. of Agriculture and Technology (Japan) and National Astronomical Observatory of Japan (Japan) . . . . . [9143-112]

The thermal architecture of the Exoplanet Characterisation Observatory payload, Gianluca Morgante, Luca Terenzi, INAF - IASF Bologna (Italy); Paul Eccleston, Tom W. Bradshaw, Martin Crook, Rutherford Appleton Lab. (United Kingdom); Mauro Focardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Thomas Hunt, Berend Winter, Mullard Space Science Lab. (United Kingdom); Giuseppe Malaguti, INAF - IASF Bologna (Italy); Giuseppina Micela, INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy); Emanuele Pace, Univ. degli Studi di Firenze (Italy); Giovanna Tinetti, Univ. College London (United Kingdom) . . . . . [9143-113]

The astrometry concept for terrestrial exoplanets detection, Ding Chen, National Space Science Ctr. (China) . . . . . [9143-118]

Infrared spectroscopy of exoplanet atmospheres, Marcell Tessenyi, Univ. College London (United Kingdom) . . . . . [9143-120]

Photometric testing of the prototype TESS camera, Peter W. Sullivan, Jesus S. Villasenor, MIT Kavli Institute for Astrophysics and Space Research (USA); Roland K. Vanderspek, Edward H. Morgan, George R. Ricker Jr., Massachusetts Institute of Technology (USA) . . . . . [9143-121]

The HST/WFC3 flux calibration ladder, Susana E. Deustua, Ralph C. Bohlin, John W. MacKenty, Norbert Pirzkal, Space Telescope Science Institute (USA) [9143-123]

Building an interferometer at the edge of space: pointing and phase control system for BETTII, Maxime J. Rizzo, Univ. of Maryland, College Park (USA); Stephen A. Rinehart, NASA Goddard Space Flight Ctr. (USA); John Alcorn, The Univ. of Alabama in Huntsville (USA); Richard B. Barclay, Richard K. Barry, Dominic J. Benford, NASA Goddard Space Flight Ctr. (USA); Arnab Dhabal, Univ. of Maryland, College Park (USA); Dale J. Fixsen, Univ. of Maryland College Park (USA); Albert S. Gore, Univ. of Illinois at Urbana-Champaign (USA); Sophie Johnson-Shapoval, Univ. of Maryland, College Park (USA); David T. Leisawitz, Stephen F. Maher, John E. Mentzell, NASA Goddard Space Flight Ctr. (USA); Lee G. Mundy, Univ. of Maryland, College Park (USA); Andreas Papageorgiou, Enzo Pascale, Cardiff Univ. (United Kingdom); Arpan Rau, Naperville North High School (USA); Robert F. Silverberg, Todd J. Veach, NASA Goddard Space Flight Ctr. (USA); Stephen Weinreich, Brown Univ. (USA) . . . . . [9143-129]

The JANUS camera onboard JUICE mission for Jupiter system optical imaging, Pasquale Palumbo, Univ. degli Studi di Napoli Parthenope (Italy); Ralf Jaumann, Deutsches Zentrum für Luft- und Raumfahrt e.V (Germany); Vincenzo Della Corte, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Gabriele Cremonese, INAF - Osservatorio Astronomico di Padova (Italy); Stefano Debei, Univ. degli Studi di Padova (Italy); Harald Hoffmann, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Andrew D. Holland, e2v Ctr. for Electronic Imaging (United Kingdom); Luisa Maria Lara, José Maria Castro-Marin, Instituto de Astrofísica de Andalucía (Spain); Enrico Friso, Univ. degli Studi di Padova (Italy); Davide Greggio, INAF - Osservatorio Astronomico di Padova (Italy); Miguel Herranz, Instituto de Astrofísica de Andalucía (Spain); Mark Leese, The Open Univ. (United Kingdom); Alexander Lichopoj, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Demetrio Magrin, INAF - Osservatorio Astronomico di Padova (Italy); Gabriella Marra, Parthenope Univ. (Italy); Elena Mazzotta Epifani, INAF - Osservatorio Astronomico di Capodimonte (Italy); Harald Michaelis, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Roberto Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy); Thomas Roatsch, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Emilio Rodríguez Pérez, Instituto de Astrofísica de Andalucía (Spain); Pietro S. Schipani, INAF - Osservatorio Astronomico di Capodimonte (Italy); Nicole Schmitz, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Michele Zusi, INAF - Osservatorio Astronomico di Capodimonte (Italy) . . . . . [9143-130]

Design of the deployable antenna for Millimetron Space Observatory, Evgeniy Golubev, Mikhail Arkhipov, Vladimir B. Bulanov, Nelly V. Myshonkova, Sergey Fedorchuk, Astro Space Ctr. (Russian Federation). . . . . [9143-131]

The Galaxy Evolution Spectroscopic Explorer (GESE): requirements definition and analysis, Sara R. Heap, NASA Goddard Space Flight Ctr. (USA). . . [9143-132]

The Galaxy Evolution Spectroscopic Explorer (GESE): optical design, Qian Gong, Sara R. Heap, Lloyd R. Purves, NASA Goddard Space Flight Ctr. (USA); Tony B. Hull, The Univ. of New Mexico (USA) . . . . . [9143-134]

The Galaxy evolution spectroscopic explorer (GESE): telescope architecture, Tony B. Hull, The Univ. of New Mexico (USA); Quin Gong, Sara R. Heap, Joseph M. Howard, Lloyd R. Purves, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-135]

Studying extragalactic background fluctuations with the Cosmic Infrared Background ExpeRiment 2 (CIBER-2), Alicia Lanz, California Institute of Technology (USA); Michael Zemcov, James J. Bock, California Institute of Technology (USA) and Jet Propulsion Lab. (USA); John O. Battle, California Institute of Technology (USA); Asantha R. Cooray, Univ. of California, Irvine (USA); Viktor V. Hristov, Philip Korngut, California Institute of Technology (USA); Dae-Hee Lee, KAIST (Korea, Republic of); Peter V. Mason, California Institute of Technology (USA); Toshio Matsumoto, Japan Aerospace Exploration Agency (Japan) and Seoul National Univ. (Korea, Republic of) and National Taiwan Univ. (Taiwan); Shuji Matsuura, Mai Shirahata, Kohji Tsumura, Takehiko Wada, Japan Aerospace Exploration Agency (Japan). . . . . [9143-136]

Mirror placement optimization for the multi-segmented James Webb Space telescope primary mirror, Daniel A. Porpora, Jordan Wachs, Allison A. Barto, J. Scott Knight, Ball Aerospace & Technologies Corp. (USA) . . . . . [9143-138]

Stray light performance for the James Webb Space telescope, Paul A. Lightsey, Zongying Wei, Ball Aerospace & Technologies Corp. (USA); Perry J. Knollenberg, Jonathan W. Arenberg, Northrop Grumman Aerospace Systems (USA); Dennis L. Skelton, Shaun R. Thomson, Kimberly I. Mehalick, Charles W. Bowers, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-139]

Determination of emissivities of key thermo-optical surfaces on the James Webb Space telescope, Jonathan W. Arenberg, Northrop Grumman Aerospace Systems (USA). . . . . [9143-140]

Simulations of JWST MIRI coronagraphs operations and performances, Charles-Philippe Lajoie, Rémi Soummer, Dean C. Hines, Laurent A. Pueyo, Space Telescope Science Institute (USA) . . . . . [9143-141]

Applications of non-redundant masking concepts on JWST NIRISS, NIRCam, and MIRI, Anand Sivaramakrishnan, Space Telescope Science Institute (USA); Alexandra Z. Greenbaum, Johns Hopkins Univ. (USA); Anthony Cheetham, Peter G. Tuthill, The Univ. of Sydney (Australia); André R. Martel, Laurent A. Pueyo, Space Telescope Science Institute (USA); Scott D. Acton, Ball Aerospace & Technologies Corp. (USA); Douglas B. Leviton, NASA Goddard Space Flight Ctr. (USA); Saavik Ford, Barry McKernan, The City Univ. of New York (USA); Étienne Artigau, David Lafrenière, René Doyon, Univ. de Montréal (Canada); Benjamin J. Pope, Univ. of Oxford (United Kingdom); Frantz Martinache, Observatoire de la Côte d'Azur (France) . . . . . [9143-142]

James Webb Space telescope optical simulation testbed II: design and implementation of a three-lens anastigmat telescope, Olivier Levecq, Institut d'Optique Graduate School (France) and Space Telescope Science Institute (USA); Élodie Choquet, Mamadou N'Diaye, Charles-Philippe Lajoie, Erin M. Elliott, Chris A. Long, George F. Hartig, Laurent A. Pueyo, Rachel Anderson, Marshall D. Perrin, Rémi Soummer, Space Telescope Science Institute (USA) . . . . . [9143-143]

Improving JWST science productivity by changing the detector reset mode, Michael W. Regan, Rachel Anderson, Eddie Bergeron, Doug Long, Space Telescope Science Institute (USA) . . . . . [9143-144]

Small-grid dithering strategy for improved coronagraphic performance with JWST, Rémi Soummer, Laurent A. Pueyo, Charles-Philippe Lajoie, Dean C. Hines, John C. Isaacs III, Edmund P. Nelan, Space Telescope Science Institute (USA); Mark Clampin, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-146]

Stable Reference Bench (SRB) for testing of the JWST backplane, James R. Tucker, Anthony M. Bluth, Austin VanOtten, Sze M. Chaung, ATK Space Systems (USA) . . . . . [9143-147]

New method for characterizing the state of optical and opto-mechanical systems, Ritva A. Keski-Kuha, Babak N. Saif, Lee D. Feinberg, NASA Goddard Space Flight Ctr. (USA); David M. Chaney, Ball Aerospace & Technologies Corp. (USA); Anthony M. Bluth, ATK Space Systems (USA); Perry E. Greenfield, Warren Hack, Space Telescope Science Institute (USA); James A. Sanders, Vantage Systems, Inc. (USA). . . . . [9143-148]

Updated point spread function simulations for JWST with WebbPSF, Marshall D. Perrin, Erin M. Elliott, Anand Sivaramakrishnan, Rémi Soummer, Charles-Philippe Lajoie, Laurent A. Pueyo, Space Telescope Science Institute (USA); Loïc Albert, Univ. de Montréal (Canada) . . . . . [9143-149]

Post-launch deployment of JWST: stowed to science, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-151]

A generalized least square algorithm to process infrared data taken in non-destructive readout mode, Massimo Robberto, Space Telescope Science Institute (USA) . . . . . [9143-152]

NIRISS aperture masking interferometry: an overview of science opportunities, Étienne Artigau, Univ. de Montréal (Canada); Alexandra Z. Greenbaum, Johns Hopkins Univ. (USA); Anand Sivaramakrishnan, Space Telescope Science Institute (USA); René Doyon, Univ. de Montréal (Canada); Paul Goudfrooij, Alex W. Fullerton, Space Telescope Science Institute (USA). . . . . [9143-153]

Preliminary LSF and MTF determination for the stereo camera on board the Bepicolombo mission, Emanuele E. S. Simioni, Vania Da Deppo, IFN-CNR LUXOR Lab. (Italy); Giampiero Naletto, Univ. degli Studi di Padova (Italy); Donato Borrelli, Michele Dami, Iacopo Ficai Veltroni, SELEX Galileo S.p.A. (Italy); Leonardo Tommasi, SELEX ES S.p.A. (Italy); Gabriele Cremonese, INAF - Osservatorio Astronomico di Padova (Italy) . . . . . [9143-154]

Thermal effects on solar images recorded in space, Abdanour Irbah, Mustapha Meftah, Maxime Bocquier, LATMOS (France). . . . . [9143-155]

A preliminary optical design for the JANUS camera of ESA space mission JUICE, Davide Greggio, INAF - Osservatorio Astronomico di Padova (Italy) and Univ. degli Studi di Padova (Italy); Demetrio Magrin, Roberto Ragazzoni, Gabriele Cremonese, INAF - Osservatorio Astronomico di Padova (Italy); Stefano Debei, Univ. degli Studi di Padova (Italy); Vincenzo Della Corte, INAF - Osservatorio Astronomico di Capodimonte (Italy); Harald Hoffmann, Ralf Jaumann, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Pasquale Palumbo, Univ. degli Studi di Napoli Parthenope (Italy); Pietro S. Schipani, INAF - Osservatorio Astronomico di Capodimonte (Italy) . . . . . [9143-156]

Characterization of the integrating sphere for the on-ground calibration of the SIMBIOSYS instrument for the BepiColombo ESA mission, Vania Da Deppo, IFN-CNR LUXOR Lab. (Italy) and INAF - Osservatorio Astronomico di Padova (Italy); Elena Martellato, Univ. degli Studi di Padova (Italy) and INAF- Osservatorio Astronomico di Padova (Italy); Guglielmo Rossi, Univ. degli Studi di Firenze (Italy); Giampiero Naletto, Univ. degli Studi di Padova (Italy) and CNR-IFN UOS Padova (Italy); Vincenzo Della Corte, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Fabrizio Capaccioni, INAF - IASF Roma (Italy); Marco Baroni, Leonardo Tommasi, Michele Dami, Iacopo Ficai Veltroni, SELEX ES S.p.A. (Italy); Gabriele Cremonese, INAF - Osservatorio Astronomico di Padova (Italy) . . . . . [9143-157]

Design of a cryogenic test facility for evaluating the performance of interferometric components of the SPICA/SAFARI instrument, Ian T. Veenendaal, David A. Naylor, Brad G. Gom, Univ. of Lethbridge (Canada)[9143-158]

The DCU: the digital readout electronic for SPICA-SAFARI, Antoine Clénet, Laurent Ravera, Bernard Bertrand, Institut de Recherche en Astrophysique et Planétologie (France); Roland H. den Hartog, Brian D. Jackson, Bert-Joost van Leeuwen, Dennis van Loon, SRON Netherlands Institute for Space Research (Netherlands); Yann Parot, Etienne Pointecouteau, Anthony Sournac, Institut de Recherche en Astrophysique et Planétologie (France) . . . . . [9143-160]

Precision pointing control for SPICA: risk mitigation phase study, Shinji Mitani, Naomi Murakami, Shin-ichiro Sakai, Yasuhiro Kawakatsu, Toshihiko Yamawaki, Tadahito Mizutani, Keiji Komatsu, Takao Nakagawa, Japan Aerospace Exploration Agency (Japan) . . . . . [9143-161]

Contamination control for the space infrared observatory SPICA, Naoki Isobe, Takao Nakagawa, Shun Okazaki, Yohichi Sato, Makiko Ando, Susumu Baba, Yuka Miura, Eiji Miyazaki, Yugo Kimoto, Junichiro Ishizawa, Hiroumi Tani, Kenta Maruyama, Japan Aerospace Exploration Agency (Japan); Fumitaka Urayama, SED Co., Ltd. (Japan) . . . . . [9143-162]

Thermal study of payload module for the next-generation infrared space telescope SPICA in risk mitigation phase, Keisuke Shinozaki, Yohichi Sato, Kentaro Sawada, Makiko Ando, Hiroyuki Sugita, Toshihiko Yamawaki, Tadahito Mizutani, Keiji Komatsu, Shun Okazaki, Hiroyuki Ogawa, Takao Nakagawa, Hideo Matsuhara, Japan Aerospace Exploration Agency (Japan); Makoto Takada, Akinobu Okabayashi, Shoji Tsunematsu, Katsuhiro Narasaki, Sumitomo Heavy Industries, Ltd. (Japan) . . . . . [9143-163]

A large-stroke cryogenic imaging FTS system for SPICA-Safari, Willem Jellema, Dennis van Loon, SRON Netherlands Institute for Space Research (Netherlands); David A. Naylor, Univ. of Lethbridge (Canada); Peter R. Roelfsema, SRON Netherlands Institute for Space Research (Netherlands) . . . . . [9143-164]

CONFERENCE 9143 · LOCATION: ROOM 519A

The optical design of a far infrared imaging FTS for SPICA, Carmen Pastor, Pablo Zuluaga, INTA Instituto Nacional de Técnica Aeroespacial (Spain); Willem Jellema, SRON Netherlands Institute for Space Research (Netherlands); Luis Gonzalez, Tomas Belenguer-Dávila, INTA Instituto Nacional de Técnica Aeroespacial (Spain); Josefina Torres Redondo, Ctr. de Astrobiología (Spain); Francisco Najarro de la Parra, Ctr. de Astrobiología (Spain); Peter Paul Kooijman, Peter R. Roelfsema, Martin J. Eggens, SRON Netherlands Institute for Space Research (Netherlands); Takao Nakagawa, Japan Aerospace Exploration Agency (Japan) . . . . . [9143-165]

Feasibility study of an image slicer for future space application, Ariadna Calcines Rosario, Instituto de Astrofísica de Canarias (Spain); Kiyoshi Ichimoto, Kyoto Univ. Hida Observatory (Japan) and Kwasan Observatory (Japan) [9143-166]

The electrical ground support equipment for the ExoMars 2016 dreams scientific instrument, Cesare Molfese, Pietro S. Schipani, Laurent Marty, Francesca Esposito, Sergio D'Orsi, INAF - Osservatorio Astronomico di Capodimonte (Italy); Alessio Aboudan, Stefano Debei, Carlo Bettanini, Giacomo Colombatti, Univ. degli Studi di Padova (Italy); Raffaele Mugnuolo, Ernesto Marchetti, Simone Pirrotta, Agenzia Spaziale Italiana (Italy) . . . . . [9143-167]

An improved version of the visible and near infrared (VNIR) spectrometer of EChO, Alberto Adriani, Giancarlo Bellucci, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Lisa Gambicorti, Mauro Focardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Ernesto Oliva, INAF - Osservatorio Astronomico di Arcetri (Italy); Emanuele Pace, Univ. degli Studi di Firenze (Italy); Giuseppe Piccioni, Gianrico Filacchione, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Maurizio Pancrazzi, Andrea Tozzi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Giuseppina Micela, INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy) . . . . . [9143-168]

Transverse translation diversity wavefront sensing with limited position and pupil illumination knowledge, Dustin Moore, James R. Fienup, Univ. of Rochester (USA) . . . . . [9143-169]

Space-based far-infrared interferometry technology development through a laboratory-based spatial/spectral interferometry testbed instrument, Locke D. Spencer, David A. Naylor, Univ. of Lethbridge (Canada); Giorgio Savini, Univ. College London (United Kingdom); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Brad G. Gom, Univ. of Lethbridge (Canada) . . . . . [9143-171]

The instrument control unit of the EChO space mission: electrical architecture and processing requirements, Mauro Focardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Maria Farina, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Maurizio Pancrazzi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Anna Maria Di Giorgio, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Tanya L. Lim, Rutherford Appleton Lab. (United Kingdom); Roland Ottensamer, Univ. Wien (Austria); Emanuele Pace, Univ. degli Studi di Firenze (Italy); Giuseppina Micela, INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy); Stefano Pezzuto, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy). . . . . [9143-172]

An end-to end far infrared interferometer instrument simulator (FIInS), Roser Juanola-Parramon, Giorgio Savini, Danielle M. Fenech, Univ. College London (United Kingdom); Catherine Walsh, Leiden Univ. (Netherlands) . . . . . [9143-173]

Telescope pointing control for a bright point source using an infrared dichroic mirror, Keigo Enya, Japan Aerospace Exploration Agency (Japan); Naofumi Fujishiro, Kyoto Sangyo Univ. (Japan); Kanae Haze, Japan Aerospace Exploration Agency (Japan); Takayuki Kotani, National Astronomical Observatory of Japan (Japan); Hidehiro Kaneda, Shinki Oyabu, Daisuke Ishihara, Shinji Oseki, Nagoya Univ. (Japan) . . . . . [9143-174]

Heating of polymers-based filters in sub-mm space optics, Nicola Baccichet, Giorgio Savini, Univ. College London (United Kingdom). . . . . [9143-175]

Shaping the PSF to nearly top-hat profile: CHEOPS laboratory results, Demetrio Magrin, Jacopo Farinato, INAF - Osservatorio Astronomico di Padova (Italy); Gabriele Umbriaco, Univ. degli Studi di Padova (Italy); Maria Bergomi, Marco Dima, INAF - Osservatorio Astronomico di Padova (Italy); Davide Greggio, INAF - Osservatorio Astronomico di Padova (Italy) and Univ. degli Studi di Padova (Italy); Luca Marafatto, INAF - Osservatorio Astronomico di Padova (Italy) and Univ. degli Studi di Padova (Italy); Roberto Ragazzoni, Valentina Viotto, INAF - Osservatorio Astronomico di Padova (Italy); Matteo Munari, Isabella Pagano, Salvatore Scuderi, INAF - Osservatorio Astrofisico di Catania (Italy); Giampaolo Piotto, Univ. degli Studi di Padova (Italy); Willy Benz, Christopher Broeg, Andrea Fortier, Univ. Bern (Switzerland); Udo J. Wehmeier, ETH Zürich (Switzerland) and Univ. Bern (Switzerland) . . . . . [9143-176]

NIRISS plate scale measurement and NRM contrast prediction from CV1RR, Alexandra Z. Greenbaum, Johns Hopkins Univ. (USA); Anand Sivaramakrishnan, André R. Martel, Space Telescope Science Institute (USA); Peter G. Tuthill, The Univ. of Sydney (Australia); Étienne Artigau, Univ. de Montréal (Canada) [9143-177]

Solar orbiter PHI image stabilisation system (ISS) ground testing, Reiner Volkmer, Jörg Baumgartner, Thomas Berkefeld, Kiepenheuer-Institut für Sonnenphysik (Germany); Jose Bosch Estrada, Manuel Carmona, Albert Casas Bou, José María Gómez, Univ. de Barcelona (Spain); Frank Heidecke, Kiepenheuer-Institut für Sonnenphysik (Germany); Atilà Herms, Univ. de Barcelona (Spain); Christoph Kiess, Kiepenheuer-Institut für Sonnenphysik (Germany); Manuel López, Univ. de Barcelona (Spain); Thorsten Maue, Eiji Nakai, Kiepenheuer-Institut für Sonnenphysik (Germany); David Roma, Univ. de Barcelona (Spain); Thomas Scheiffelen, Wolfgang Schmidt, Dirk Soltau, Kiepenheuer-Institut für Sonnenphysik (Germany) . . . . . [9143-178]

EChO fine guidance sensor design and architecture, Roland Ottensamer, Univ. Wien (Austria); Paul Eccleston, Rutherford Appleton Lab. (United Kingdom); Manuel Guedel, Franz Kerschbaum, Armin Luntzer, Univ. Wien (Austria); Miroslaw Rataj, Space Research Ctr. (Poland); Jan-Rutger Schrader, SRON Netherlands Institute for Space Research (Netherlands) . . . . . [9143-179]

SAFARI digital processing unit: performance analysis of the SpaceWire links in case of a LEON3-FT based CPU, Giovanni Giusi, Scige J. Liu, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Anna Maria Di Giorgio, INAF - IASF Roma (Italy); Emanuele Galli, Stefano Pezzuto, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Maria Farina, INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy); Luigi Spinoglio, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy) . . . . . [9143-180]

Design of a telescope control system using an ARM microcontroller with embedded RTOS, Cristian R. Penuela, Fabian A. Atara, Jesus Gonzalez-Llorente, Juan C. Cuervo, Univ. Sergio Arboleda (Colombia) . . . . . [9143-181]

Apodized pupil Lyot coronagraphs: numerical optimization of apodizer transmission with PSF dark zone, Mamadou N'Diaye, Laurent A. Pueyo, Rémi Soummer, Space Telescope Science Institute (USA); Alexis Carlotti, Institut de Planétologie et d'Astrophysique de Grenoble (France); Élodie Choquet, Marshall D. Perrin, Space Telescope Science Institute (USA) . . . . . [9143-182]

Metrology calibration and very high accuracy centroiding with the NEAT testbed, Antoine Crouzier, Fabien Malbet, Olivier Preis, François B. Hénault, Pierre Kern, Guillermo Martin, Philippe Feautrier, Eric Stadler, Sylvain Lafrasse, Alain Delboulbé, Etienne Behar, Morgan Saint-Pe, Jan Dupont, Sandra Potin, Institut de Planétologie et d'Astrophysique de Grenoble (France); Christophe Cara, Commissariat à l'Énergie Atomique (France); Modeste Donati, Eric Doumayrou, CEA-Ctr. de SACLAY (France); Pierre-Olivier Lagage, Commissariat à l'Énergie Atomique (France); Alain M. Léger, Institut d'Astrophysique Spatiale (France); Jean-Michel Le Duigou, Ctr. National d'Études Spatiales (France); Michael Shao, Renaud Goullioud, Jet Propulsion Lab. (USA) . . . . . [9143-183]

An infrared high resolution silicon immersion grating spectrometer for space missions, Jian Ge, Bo Zhao, Scott Powell, David B. Tanner, Peng Jiang, Univ. of Florida (USA) . . . . . [9143-184]

A trial production of the image slicer unit for next generation infrared instruments and the assembly of the evaluation system of the pseudo slit image quality, Itsuki Sakon, Takashi Onaka, The Univ. of Tokyo (Japan); Hirokazu Kataza, Japan Aerospace Exploration Agency (Japan); Yoshiko K. Okamoto, Ibaraki Univ. (Japan); Mitsuhiko Honda, Kanagawa Univ. (Japan); Hitoshi Tokoro, Nano-Optonics Research Institute (Japan); Naofumi Fujishiro, Kyoto Sangyo Univ. (Japan) and Kyoto Niji-koubou (Japan); Yuji Ikeda, Photocoding (Japan); Hiroyuki Nakagawa, Okiharu Kirino, Crystal Optics, Inc. (Japan); Kenji Mitsui, Norio Okada, National Astronomical Observatory of Japan (Japan). . . . . [9143-185]

Polarimetric calibration and astronomical polarimetry in the V-band with Solar Orbiter/METIS instrument, Gerardo Capobianco, Silvano Fineschi, INAF - Osservatorio Astronomico di Torino (Italy); Mauro Focardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Vincenzo Andretta, INAF - Osservatorio Astronomico di Capodimonte (Italy); Giuseppe Massone, Alessandro Bemporad, INAF - Osservatorio Astronomico di Torino (Italy); Marco Romoli, INAF - Osservatorio Astrofisico di Arcetri (Italy); Ester Antonucci, INAF - Osservatorio Astronomico di Torino (Italy); Giampiero Naletto, Univ. degli Studi di Padova (Italy); Gianalfredo Nicolini, INAF - Osservatorio Astronomico di Torino (Italy); Piergiorgio Nicolosi, Univ. degli Studi di Padova (Italy); Daniele Spadaro, INAF - Osservatorio Astronomico di Catania (Italy) . . . . . [9143-186]

11 years of tracking the SORCE SIM instrument degradation caused by space radiation and solar exposure, Stephane Beland, Jerald W. Harder, Thomas N. Woods, Univ. of Colorado at Boulder (USA) . . . . . [9143-187]

Fast F/2 wide field distortion-free camera for far universe survey, Xin Wang, Aix-Marseille Univ. (France) and Ctr. National de la Recherche Scientifique (Fiji); Emmanuel Hugot, Aix-Marseille Univ. (France); Tibor Agócs, ASTRON (Netherlands); Gerard R. Lemaitre, Aix-Marseille Univ. (France); David Valls-Gabaud, Observatoire de Paris (France) . . . . . [9143-188]

ACCESS-absolute color calibration experiment for standard stars: status and pre-flight performance, Mary Elizabeth Kaiser, Matthew J. Morris, Stephan R. McCandliss, Johns Hopkins Univ. (USA); Bernard J. Rauscher, Randy A. Kimble, Jeffrey W. Kruk, NASA Goddard Space Flight Ctr. (USA); Edward L. Wright, Univ. of California, Los Angeles (USA); Paul D. Feldman, H. Warren Moos, Russell Pelton, Johns Hopkins Univ. (USA); Adam Guy Riess, Johns Hopkins Univ. (USA) and Space Telescope Science Institute (USA); David B. Mott, Yiting Wen, Dominic J. Benford, Jonathan P. Gardner, Bruce E. Woodgate, NASA Goddard Space Flight Ctr. (USA); Ralph C. Bohlin, Susana E. Deustua, William V. Dixon, David J. Sahnow, Space Telescope Science Institute (USA); Robert Kurucz, Harvard-Smithsonian Ctr. for Astrophysics (USA); Michael Lampton, Space Sciences Lab. (USA); Saul Perlmutter, Univ. of California, Berkeley (USA) . . . . . [9143-189]

A study on ultra precision machining technique for Al6061-T6 to fabricate space infrared optics, Geuman Ryu, Chungnam National Univ. (Korea, Republic of); Giljae Lee, Sangwon Hyun, Korea Basic Science Institute (Korea, Republic of); Hayeong Sung, Chungnam National Univ. (Korea, Republic of); Geonhee Kim, Korea Basic Science Institute (Korea, Republic of) and Chungnam National Univ. (Korea, Republic of). . . . . [9143-191]

Smart materials optical mirrors, Peter C. Chen, Lightweight Telescopes, Inc. (USA) and NASA Goddard Space Flight Ctr. (USA); Douglas M. Rabin, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-192]

TALC a 20-m deployable space telescope for far infrared, Gilles A. Durand, CEA-Ctr. de SACLAY (France); Marc Sauvage, Louis R. Rodriguez, Commissariat à l'Énergie Atomique (France); Pierre Chanial, Univ. Paris 7-Denis Diderot (France); Hervé Aussel, Michel Berthé, Michael Carty, CEA-Ctr. de SACLAY (France); Lancelot Durand, Univ. de Technologie Compiègne (France); Matthis Durand, Ecole Normale Supérieure de Cachan (France); Jérôme Martignac, Vincent Minier, CEA-Ctr. de SACLAY (France); Frederique Motte, Commissariat à l'Énergie Atomique (France); Eric J. Pantin, CEA-Ctr. de SACLAY (France); Vincent Revéret, Samuel Ronayette, Commissariat à l'Énergie Atomique (France); Loris Scola, CEA-Ctr. de SACLAY (France); Michel Talvard, Commissariat à l'Énergie Atomique (France); Thierry Tourrette, CEA-Ctr. de SACLAY (France); Pascal Tremblin, Univ. of Exeter (United Kingdom). . . . . [9143-193]

Fizeau interferometric cophasing of segmented mirrors, Anthony Cheetham, The Univ. of Sydney (Australia); Nick Cvetojevic, Ctr. for Ultrahigh bandwidth Devices for Optical Systems (Australia) and Macquarie Univ. (Australia); Alexandra Z. Greenbaum, Johns Hopkins Univ. (USA); Peter G. Tuthill, The Univ. of Sydney (USA); Anand Sivaramakrishnan, Space Telescope Science Institute (USA); Barnaby R. Norris, The Univ. of Sydney (Australia) . . . . . [9143-194]

Stitched Fresnel diffraction space telescope, Lihua Wang, Shibin Wu, Wei Yang, Xiangang Luo, Institute of Optics and Electronics (China) . . . . . [9143-195]

Evaluation of centroiding algorithm error for Nano-JASMINE, Takuji Hara, The Univ. of Tokyo (Japan); Naoteru Gouda, Taihei Yano, Yoshito Niwa, National Astronomical Observatory of Japan (Japan) . . . . . [9143-196]

Interpreting EChO's future data: biological laboratory extimates under M star's planetary surface conditions, Erculiani Marco Sergio, CISAS-Centro di Ateneo di Studi e attività spaziali Giuseppe Colombo (Italy) and INAF - Osservatorio Astronomico di Padova (Italy); Riccardo U. Claudi, Enrico Giro, INAF - Osservatorio Astronomico di Padova (Italy); Giuseppe Galletta, Univ. degli Studi di Padova (Italy); Maurizio D'Alessandro, Giancarlo Farisato, Luigi Lessio, INAF - Osservatorio Astronomico di Padova (Italy); Giuseppina Micela, INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy); Daniela Billi, Univ. degli Studi di Roma "Tor Vergata" (Italy) . . . . . [9143-197]

Preliminary study of the EChO data sampling and processing, Maria Farina, INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy); Anna Maria Di Giorgio, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Mauro Focardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Emanuele Pace, Univ. degli Studi di Firenze (Italy); Giuseppina Micela, INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy); Emanuele Galli, Giovanni Giusi, Scige J. Liu, Stefano Pezzuto, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy) . . . . . [9143-198]

ALICE-archival legacy investigation of circumstellar environments: overview and first results, Élodie Choquet, Rémi Soummer, Laurent A. Pueyo, J. Brendan Hagan, Marshall D. Perrin, Christine Chen, John H. Debes, David A. Golimowski, Dean C. Hines, Space Telescope Science Institute (USA); Glenn H. Schneider, The Univ. of Arizona (USA); Christian Marois, National Research Council Canada (Canada); Dimitri Mawet, European Southern Observatory (Chile) and Jet Propulsion Lab. (USA); Margaret Moerchen, Mamadou N'Diaye, Space Telescope Science Institute (USA); Abhijith Rajan, Arizona State Univ. (USA); Schuyler G. Wolff, Alexandra Z. Greenbaum, Tushar Mittal, Johns Hopkins Univ. (USA) . . . [9143-199]

Enhancement of the Spitzer IRAC distortion correction for parallax measurements, Patrick J. Lowrance, Sean J. Carey, James G. Ingalls, Jason A. Surace, Spitzer Science Ctr. (USA); Charles Beichman, J. Davy Kirkpatrick, Infrared Processing and Analysis Ctr. (USA) . . . . . [9143-200]

Improving our understanding of the Spitzer Space telescope's pointing drift, Carl J. Grillmair, Sean J. Carey, Spitzer Science Ctr. (USA); John R. Stauffer, Spitzer Science Ctr. (USA) and California Institute of Technology (USA); James G. Ingalls, Spitzer Science Ctr. (USA) . . . . . [9143-201]

High contrast imaging on the THD bench: progress and upgrades, Raphaël Galicher, Pierre Baudoz, Observatoire de Paris (France); Jacques-Robert Delorme, Observatoire de Paris à Meudon (France); Gérard Rousset, Observatoire de Paris (France); Johan Mazoyer, Observatoire de Paris à Meudon (France); Anthony Boccaletti, Observatoire de Paris (France) . . . . . [9143-202]

AIV procedure for CHEOPS demonstration model, Maria Bergomi, Valentina Viotto, Marco Dima, Davide Greggio, Jacopo Farinato, Demetrio Magrin, Luca Marafatto, Roberto Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy); Matteo Munari, Isabella Pagano, Salvatore Scuderi, INAF - Osservatorio Astrofisico di Catania (Italy); Robert Buxton, Daniele Piazza, Willy Benz, Christopher Broeg, Virginie Cessa, Univ. Bern (Switzerland); Giampaolo Piotto, Univ. degli Studi di Padova (Italy); Udo J. Wehmeier, Univ. Bern (Switzerland) and ETH Zürich (Switzerland) . . . . . [9143-203]

Opto-mechanical design of the vacuum compatible EXCEDE's mission testbed, Eduardo A. Bendek, NASA Ames Research Ctr. (USA); Julien Lozi, The Univ. of Arizona (USA); Sandrine J. Thomas, Eugene Pluzhnik, Dana H. Lynch, Kevin E. Newman, NASA Ames Research Ctr. (USA); Troy T. Hix, Roger Mihara, Lockheed Martin Space Systems Co. (USA). . . . . [9143-204]

From 3D view to 3D print, Marco Dima, Valentina Viotto, Roberto Ragazzoni, Maria Bergomi, Jacopo Farinato, Demetrio Magrin, Luca Marafatto, Davide Greggio, INAF - Osservatorio Astronomico di Padova (Italy) . . . . . [9143-205]

Compact polarimeters based on polarization-sensitive focal plane arrays, Dmitry Vorobiev, Zoran Ninkov, Rochester Institute of Technology (USA)[9143-206]

Optical characterization of the breadboard narrowband prefilters for Solar Orbiter PHI, Carlos Dominguez-Tagle, Institut d'Astrophysique Spatiale (Spain); Thierry Appourchaux, Claudia Ruiz de Galarreta Fanjul, Jean-Jacques Fourmond, Anne Philippon, Jean-Christophe Le Clech, Mehdi Bouzit, Institut d'Astrophysique Spatiale (France); Veronique Bommier, Regis Lecocguen, Daniel Crussaire, Jean-Marie Malherbe, LESIA, Observatoire de Paris (France). . . . . [9143-207]

MONDAY 23 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . MON 8:50 TO 10:00

Session Chair: **Luc Simard,** National Research Council of Canada - Herzberg Institute of Astrophysics (Canada)

08:50: **Welcome**

9:00: **James Webb Space Telescope: the road to first science observations** *(Plenary)*, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) [9143-501]

9:30: **The Square Kilometre Array: a physics machine for the 21st Century** *(Plenary)*, Philip Diamond, SKA Organisation (United Kingdom) . . [9143-502]

Coffee Break . . . . . Mon 10:00 to 10:30

SESSION 5

LOCATION: ROOM 519A . . . . . MON 10:30 TO 11:50

AFTA/WFIRST I

Session Chair: **Jacobus M. Oschmann Jr.,** Ball Aerospace & Technologies Corp. (USA)

10:30: **Science yield estimation for AFTA coronagraphs**, Wesley A. Traub, Jet Propulsion Lab. (USA); Bruce A. Macintosh, Lawrence Livermore National Lab. (USA); N. Jeremy Kasdin, Princeton Univ. (USA); John Krist, Bertrand Mennesson, Jet Propulsion Lab. (USA); Dmitry Savransky, Lawrence Livermore National Lab. (USA); Michael Shao, Eugene Serabyn, John T. Trauger, Jet Propulsion Lab. (USA) . . . . . [9143-20]

10:50: **Overview of WFIRST-AFTA coronagraph instrument**, Feng Zhao, Jet Propulsion Lab. (USA) . . . . . [9143-21]

11:10: **Technology development towards a WFIRST-AFTA coronagraph**, Nicholas Siegler, Ilya Poberezhskiy, Feng Zhao, Xin An, Kunjithapatham Balasubramanian, Jet Propulsion Lab. (USA); Ruslan Belikov, NASA Ames Research Ctr. (USA); Eric Cady, Richard T. Demers, Rosemary T. Diaz, Brian Gordon, Renaud Goullioud, Jet Propulsion Lab. (USA); Olivier Guyon, Subaru Telescope, National Astronomical Observatory of Japan (USA); Michael E. Hoenk, Jet Propulsion Lab. (USA); N. Jeremy Kasdin, Princeton Univ. (USA); Brian Kern, John Krist, Andreas Kuhnert, Jet Propulsion Lab. (USA); Michael W. McElwain, NASA Goddard Space Flight Ctr. (USA); Bertrand Mennesson, Dwight C. Moody, Bijan Nemati, Keith Patterson, Jet Propulsion Lab. (USA); A. J. Riggs, Princeton Univ. (USA); Daniel J. Ryan, Byoung-Joon Seo, Stuart B. Shaklan, Erkin Sidick, Fang Shi, Nicholas Siegler, Jet Propulsion Lab. (USA); Rémi Soummer, Space Telescope Science Institute (USA); Hong Tang, John T. Trauger, James Kent Wallace, Xu Wang, Victor White, Karl Y. Yee, Hanying Zhou, Jet Propulsion Lab. (USA); Neil Zimmerman, Princeton Univ. (USA) . . . . . [9143-22]

11:30: **Detector development for the WFIRST-AFTA coronagraph integral field spectrograph**, Bijan Nemati, Jet Propulsion Lab. (USA) . . . . . [9143-23]

Lunch Break . . . . . Mon 11:50 to 13:20

SESSION 6

LOCATION: ROOM 519A . . . . . MON 13:20 TO 15:20

AFTA/WFIRST II

Session Chair: **Lee D. Feinberg,** NASA Goddard Space Flight Ctr. (USA)

13:20: **Astrometry and direct-imaging exoplanet detection laboratory validation and its application for AFTA**, Eduardo A. Bendek, Ruslan Belikov, NASA Ames Research Ctr. (USA); Olivier Guyon, The Univ. of Arizona (USA) . . . . . [9143-24]

13:40: **The WFIRST-AFTA coronagraph design update**, Renaud Goullioud, Feng Zhao, Hong Tang, Mayer Rud, Jet Propulsion Lab. (USA) . . . . . [9143-25]

14:00: **The hybrid Lyot coronagraph for exoplanet imaging and spectroscopy with the WFIRST/AFTA and probe-class space missions**, John T. Trauger, Dwight C. Moody, Brian Gordon, Jet Propulsion Lab. (USA) . . . . . [9143-26]

14:20: **PIAA coronagraphy for centrally obscured apertures**, Olivier Guyon, Subaru Telescope, National Astronomical Observatory of Japan (USA); Ruslan Belikov, NASA Ames Research Ctr. (USA); Brian Kern, John Krist, Jet Propulsion Lab. (USA); Kevin E. Newman, The Univ. of Arizona (USA) . . . . . [9143-27]

14:40: **End-to-end numerical modeling of AFTA coronagraphs**, John Krist, Jet Propulsion Lab. (USA) . . . . . [9143-28]

15:00: **Simulated contrast performance of phase induced amplitude apodization (PIAA) coronagraph testbed**, Erkin Sidick, Brian Kern, Andreas Kuhnert, Jet Propulsion Lab. (USA). . . . . [9143-29]

Coffee Break . . . . . Mon 15:20 to 15:50

SESSION 7

LOCATION: ROOM 519A . . . . . MON 15:50 TO 16:50

Astrometry

Session Chair: **Giovanni G. Fazio,** Harvard-Smithsonian Ctr. for Astrophysics (USA)

15:50: **ESA Gaia on-board metrology: the basic angle monitoring and wavefront sensor systems**, Alcione Mora, European Space Astronomy Ctr. (Spain) and Aurora Technology B.V. (Netherlands); Michael Biermann, Astronomisches Rechen-Institut (Germany); Matthias Erdmann, European Space Agency (Netherlands); Iñaki Serraller, European Space Astronomy Ctr. (Spain) and GMV S.A. (Spain); Wouter van Reeven, European Space Astronomy Ctr. (Spain) and Aurora Technology B.V. (Netherlands) . . . . . [9143-30]

16:10: **Enabling Gaia observations of naked-eye stars**, Juan Manuel Martin-Fleitas, Alcione Mora, European Space Astronomy Ctr. (Spain) and Aurora Technology B.V. (Netherlands); Johannes Sahlmann, Ralf Kohley, European Space Astronomy Ctr. (Spain) . . . . . [9143-31]

16:30: **Structure design of the telescope for Small JASMINE program**, Shin Utsunomiya, Japan Aerospace Exploration Agency (Japan); Taihei Yano, National Astronomical Observatory of Japan (Japan); Susumu Yasuda, Japan Aerospace Exploration Agency (Japan); Yoshito Niwa, National Astronomical Observatory of Japan (Japan) . . . . . [9143-32]

TUESDAY 24 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . TUE 8:50 TO 10:00

Session Chair: **Gillian S. Wright,** UK Astronomy Technology Ctr. (United Kingdom)

8:50: **SPIE Fellows Awards** presented by H. Philip Stahl, President of SPIE. The following individuals will be recognized for their contributions to SPIE and the scientific community: **Mark Clampin,** NASA Goddard Space Flight Ctr. (United States); **Gary Matthews,** Exelis Inc. (United States); **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (United States)

9:00: **Gaia: scientific in-orbit performance** *(Plenary),* Timo Prusti, European Space Agency (Netherlands) . . . . . [9143-503]

9:30: **ALMA Update** *(Plenary)*, Pierre Cox, Joint ALMA Observatory (Chile); Stuartt A. Corder, National Radio Astronomy Observatory (Chile) [9143-504]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 8

LOCATION: ROOM 519A . . . . . TUE 10:30 TO 12:10

Innovative Concepts I

Session Chair: **Howard A. MacEwen,** Reviresco LLC (USA)

10:30: **Beyond JWST: performance requirements for a future large UVOIR space telescope**, David C. Redding, Jet Propulsion Lab. (USA); Lee D. Feinberg, NASA Goddard Space Flight Ctr. (USA); Marc Postman, Space Telescope Science Institute (USA); Harley A. Thronson Jr., NASA Goddard Space Flight Ctr. (USA); H. Philip Stahl, NASA Marshall Space Flight Ctr. (USA) . . . . . [9143-33]

10:50: **Technology maturation process: the NASA strategic astrophysics technology (SAT) program**, Mario R. Perez, NASA Headquarters (USA); Thai Pham, NASA Goddard Space Flight Ctr. (USA); Peter R. Lawson, Jet Propulsion Lab. (USA) . . . . . [9143-34]

11:10: **Optical telescope design for a space-based gravitational-wave mission**, Shannon R. Sankar, Univ. of Florida (USA) and NASA Goddard Space Flight Ctr. (USA); Jeffrey C. Livas, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-133]

11:30: **A new paradigm for space astrophysics mission design**, Jonathan W. Arenberg, Charles B. Atkinson, Alberto Conti, Ronald S. Polidan, Northrop Grumman Aerospace Systems (USA); Lee D. Feinberg, NASA Goddard Space Flight Ctr. (USA); Marc Postman, Space Telescope Science Institute (USA)[9143-36]

11:50: **A cost-effective and serviceable ATLAST 9.2-m telescope architecture**, Lee D. Feinberg, Norman M. Rioux, Gary E. Mosier, Andrew L. Jones, NASA Goddard Space Flight Ctr. (USA); David C. Redding, Jet Propulsion Lab. (USA); Mike Kienlen, NASA Kennedy Space Ctr. (USA). . . . . [9143-37]

Lunch Break . . . . . Tue 12:10 to 13:40

SESSION 9

LOCATION: ROOM 519A . . . . . TUE 13:40 TO 17:30

Innovative Concepts II

Session Chair: **Jacobus M. Oschmann Jr.,** Ball Aerospace & Technologies Corp. (USA)

13:40: **Breakthrough capability for UVOIR space astronomy: reaching the darkest sky**, Matthew A. Greenhouse, NASA Goddard Space Flight Ctr. (USA); Scott W. Benson, Robert D. Falck, NASA Glenn Research Ctr. (USA); Dale J. Fixsen, Univ. of Maryland, College Park (USA); Jonathan P. Gardner, Jeffrey W. Kruk, NASA Goddard Space Flight Ctr. (USA); Stephen R. Oleson, NASA Glenn Research Ctr. (USA); Harley A. Thronson Jr., NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-38]

14:00: **A deployable, annular, Thirty Meter telescope space-based observatory**, Justin J. Rey, Allan Wirth, Andrew J. Jankevics, Northrop Grumman Xinetics (USA); David Rohweller, Chungte W. Chen, Allen J. Bronowicki, Northrop Grumman Aerospace Systems (USA) . . . . . [9143-39]

14:20: **An evolvable space telescope for future astronomical missions**, Ronald S. Polidan, Northrop Grumman Aerospace Systems (USA); James B. Breckinridge, Breckinridge Associates, LLC (USA); Charles F. Lillie, Lillie Consulting, LLC (USA); Howard A. MacEwen, Riveresco LLC (USA); Martin R. Flannery, Northrop Grumman Aerospace Systems (USA) . . . . . [9143-40]

14:40: **A new deployable concept for a 20-m far-infrared space telescope**, Gilles A. Durand, CEA-Ctr. de SACLAY (France); Marc Sauvage, Louis R. Rodriguez, Samuel Ronayette, Commissariat à l'Énergie Atomique (France); Pierre Chanial, AstroParticule et Cosmologie (France); Loris Scola, CEA-Ctr. de SACLAY (France); Aymeric Bonnet, Michelin (France); Vincent Revéret, Commissariat à l'Énergie Atomique (France); Hervé Aussel, CEA-Ctr. de SACLAY (France); Michael Carty, Vincent Minier, Commissariat à l'Énergie Atomique (France); Pascal Tremblin, Univ. of Exeter (United Kingdom); Eric J. Pantin, Michel Berthé, CEA-Ctr. de SACLAY (France); Jérôme Martignac, Frederique Motte, Michel Talvard, Commissariat à l'Énergie Atomique (France); Thierry Tourrette, Jean-Luc Starck, CEA-Ctr. de SACLAY (France); Lancelot Durand, Univ. de Technologie Compiègne (France); Matthis Durand, Ecole Normale Supérieure de Cachan (France). [9143-41]

15:00: **The science case and data processing strategy for the thinned aperture light collector: a project for a 20-m far-infrared space telescope**, Marc Sauvage, Gilles A. Durand, Louis R. Rodriguez, Commissariat à l'Énergie Atomique (France); Pierre Chanial, AstroParticule et Cosmologie (France); Jean-Luc Starck, Samuel Ronayette, Commissariat à l'Énergie Atomique (France); Hervé Aussel, CEA-IRFU (France); Vincent Minier, AstroParticule et Cosmologie (France); Frederique Motte, Commissariat à l'Énergie Atomique (France); Eric J. Pantin, CEA-Ctr. de SACLAY (France). . . . . [9143-42]

Coffee Break . . . . . Tue 15:20 to 15:50

15:50: **Mission concept of the Millimetron Space Observatory**, Andrey V. Smirnov, Astro Space Ctr. (Russian Federation); Andrey M. Baryshev, SRON Netherlands Institute for Space Research (Netherlands); Mattheus W. M. de Graauw, Astro Space Ctr. (Russian Federation); Paolo de Bernardis, Univ. degli Studi di Roma La Sapienza (Italy); Paul F. Goldsmith, Jet Propulsion Lab. (USA); Nikolay S. Kardashev, Astro Space Ctr. (Russian Federation) . . . . . [9143-43]

16:10: **Scientific instrumentation and program for the Millimetron Space Observatory**, Mattheus W. M. de Graauw, Astro Space Ctr. (Russian Federation) and P.N. Lebedev Physical Institute (Russian Federation); Andrey M. Baryshev, SRON Netherlands Institute for Space Research (Russian Federation); Andrey V. Smirnov, Astro Space Ctr. (Russian Federation) and P.N. Lebedev Physical Institute (Russian Federation); Paul F. Goldsmith, Jet Propulsion Lab. (USA); Paolo de Bernardis, Univ. degli Studi di Roma La Sapienza (Italy); Sergey F. Likhachev, Nikolay S. Kardashev, Astro Space Ctr. (Russian Federation) and P.N. Lebedev Physical Institute (Russian Federation) . . . . . [9143-44]

16:30: **The Primordial Inflation Explorer (PIXIE)**, Alan J. Kogut, David T. Chuss, NASA Goddard Space Flight Ctr. (USA); Jessie L. Dotson, NASA Ames Research Ctr. (USA); Dale J. Fixsen, Univ. of Maryand College Park (USA); Mark Halpern, Gary F. Hinshaw, The Univ. of British Columbia (Canada); Stephan S. Meyer, The Univ. of Chicago (USA); Samuel Harvey Moseley Jr., NASA Goddard Space Flight Ctr. (USA); Michael D. Seiffert, Jet Propulsion Lab. (USA); David N. Spergel, Princeton Univ. (USA); Edward J. Wollack, NASA Goddard Space Flight Ctr. (USA) . . . . . [9143-45]

16:50: **LiteBIRD mission and design tradeoffs**, Tomotake Matsumura, High Energy Accelerator Research Organization (Japan); Yoshiki Akiba, The Graduate Univ. for Advanced Studies (Japan); Yuji Chinone, High Energy Accelerator Research Organization (Japan); Matthew A. Dobbs, McGill Univ. (Canada); Hideyuki Fuke, Japan Aerospace Exploration Agency (Japan); Adnan Ghribi, Ctr. National de la Recherche Scientifique (France) and Univ. Paris 7-Denis Diderot (France); Masaya Hasegawa, Kaori Hattori, High Energy Accelerator Research Organization (Japan); Makoto Hattori, Tohoku Univ. (Japan); Masashi Hazumi, High Energy Accelerator Research Organization (Japan); William L. Holzapfel, Univ. of California, Berkeley (USA); Yasuto Hori, High Energy Accelerator Research Organization (Japan); Yuki Inoue, The Graduate Univ. for Advanced Studies (Japan); Koji Ishidoshiro, Tohoku Univ. (Japan); Hirokazu Ishino, Okayama Univ. (Japan); Hikaru Ishitsuka, The Graduate Univ. for Advanced Studies (Japan); Julian Borrill, Lawrence Berkeley National Lab. (Japan); Kenichi Karatsu, National Astronomical Observatory of Japan (Japan); Nobuhiko Katayama, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Isao Kawano, Japan Aerospace Exploration Agency (Japan); Atsuko Kibayashi, Yoshiaki Kibe, Okayama Univ. (Japan); Nobuhiro Kimura, High Energy Accelerator Research Organization (Japan); Kimihiro Kimura, Osaka Prefecture Univ. (Japan); K. Koga, RIKEN (Japan); Eiichiro Komatsu, Max-Planck-Institut für Astrophysik (Germany); M. Kozu, Osaka Prefecture Univ. (Japan); Adrian T. Lee, Univ. of California, Berkeley (USA); Makoto Nagai, Univ. of Tsukuba (Japan); Hideo Matsuhara, Japan Aerospace Exploration Agency (Japan); Satoru Mima, RIKEN (Japan); Kazuhisa Mitsuda, Japan Aerospace Exploration Agency (Japan); K. Mizukami, Yokohama National Univ. (Japan); Hideki Morii, High Energy Accelerator Research Organization (Japan); Takahiro Morishima, Tohoku Univ. (Japan); Shogo Nakamura, Yokohama National Univ. (Japan); Ryo Nagata, High Energy Accelerator Research Organization (Japan); Masato Naruse, Saitama Univ. (Japan); Kota Natsume, Yokohama National Univ. (Japan); Toshiyuki Nishibori, Japan Aerospace Exploration Agency (Japan); Haruki Nishino, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Atsushi Noda, Japan Aerospace Exploration Agency (Japan); Takashi Noguchi, National Astronomical Observatory of Japan (Japan); H. Ogawa, Osaka Prefecture Univ. (Japan); Shugo Oguri, High Energy Accelerator Research Organization (Japan); Izumi S. Ohta, Konan Univ. (Japan); Chiko Otani, RIKEN (Japan); Paul L. Richards, Univ. of California, Berkeley (USA); Shin-ichiro Sakai, Japan Aerospace Exploration Agency (Japan); Nobuaki Sato, High Energy Accelerator Research Organization (Japan); Yutaro Sekimoto, National Astronomical Observatory of Japan (Japan); Keisuke Shinozaki, Hiroyuki Sugita, Japan Aerospace Exploration Agency (Japan); Toshikazu Suzuki, High Energy Accelerator Research Organization (Japan); Aritoki Suzuki, Univ. of California, Berkeley (USA); Osamu Tajima, High Energy Accelerator Research Organization (Japan); Suguru Takada, National Institute for Fusion Science (Japan); Satoru Takakura, Osaka Univ. (Japan); Yoh Takei, Japan Aerospace Exploration Agency (Japan); Takayuki Tomaru, High Energy Accelerator Research Organization (Japan); Yoshinori Uzawa, National Astronomical Observatory of Japan (Japan); Takehiko Wada, Japan Aerospace Exploration Agency (Japan); Hiroki Watanabe, The Graduate Univ. for Advanced Studies (Japan); Hiroshi Yamaguchi, High Energy Accelerator Research Organization (Japan); Noriko Y. Yamasaki, Mitsuhiro Yoshida, High Energy Accelerator Research Organization (Japan); Tetsuya Yoshida, Kazuhiko Yotsumoto, Japan Aerospace Exploration Agency (Japan) . . . . [9143-46]

17:10: **Advances in stellar imaging with Cassini using occultations by the rings of Saturn**, Paul N. Stewart, Peter G. Tuthill, Sydney Institute for Astronomy (Australia); Phillip D. Nicholson, Cornell Univ. (USA); Matthew M. Hedman, Univ. of Idaho (USA) . . . . . [9143-47]

WEDNESDAY 25 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . WED 9:00 TO 10:00

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

9:00: **Highlights from the Multi Unit Spectroscopic Explorer (MUSE): a 2nd generation VLT instrument for the VLT** *(Plenary)*, Roland M. Bacon, Observatoire de Lyon (France). . . . . [9147-506]

9:30: **Canadian Space Astronomy: past, present and future** *(Plenary)*, John B. Hutchings, NRC - Herzberg Institute of Astrophysics (Canada) [9143-505]

Coffee Break . . . . . Wed 10:00 to 10:30

SESSION 10

LOCATION: ROOM 519A . . . . . WED 10:30 TO 12:30

SPICA/SPITZER

Session Chair: **James B. Breckinridge,** The Univ. of Arizona (USA)

10:30: **The next-generation infrared astronomy mission SPICA under the new framework**, Takao Nakagawa, Hideo Matsuhara, Yasuhiro Kawakatsu, Japan Aerospace Exploration Agency (Japan); Peter R. Roelfsema, SRON Netherlands Institute for Space Research (Netherlands). . . . . [9143-48]

10:50: **The SPICA coronagraph instrument (SCI): overview and progresses in the risk mitigation phase**, Keigo Enya, Japan Aerospace Exploration Agency (Japan); Hidehiro Kaneda, Nagoya Univ. (Japan); Kanae Haze, Japan Aerospace Exploration Agency (Japan); Takayuki Kotani, National Astronomical Observatory of Japan (Japan); Shinki Oyabu, Daisuke Ishihara, Shinji Oseki, Nagoya Univ. (Japan). . . . . [9143-49]

11:10: **SAFARI new and improved: extending the capabilities of SPICA's imaging spectrometer**, Peter R. Roelfsema, SRON Netherlands Institute for Space Research (Netherlands) and Kapteyn Astronomical Institute (Netherlands); Martin Giard, Institut de Recherche en Astrophysique et Planétologie (France); Francisco Najarro de la Parra, Ctr. de Astrobiología (Spain); Kees Wafelbakker, SRON Netherlands Institute for Space Research (Netherlands); Willem Jellema, SRON Netherlands Institute for Space Research (Netherlands) and Kapteyn Astronomical Institute (Netherlands); Brian D. Jackson, Bruce Sibthorpe, SRON Netherlands Institute for Space Research (Netherlands); Marc Audard, ISDC Data Ctr. for Astrophysics (Switzerland); Anna Maria Di Giorgio, INAF - IASF Roma (Italy); Javi Rodriguez Goicoechea, Ctr. de Astrobiología (Spain); Matthew J. Griffin, Cardiff Univ. (United Kingdom); Frank P. Helmich, SRON Netherlands Institute for Space Research (Netherlands) and Kapteyn Astronomical Institute (Netherlands); Franz Kerschbaum, Univ. Wien (Austria); Michael R. Meyer, ETH Zürich (Switzerland); David A. Naylor, Univ. of Lethbridge (Canada); Albrecht Poglitsch, Max-Planck-Institut für extraterrestrische Physik (Germany); Luigi Spinoglio, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Bart Vandenbussche, Katholieke Univ. Leuven (Belgium). . . . . [9143-50]

11:30: **Preliminary structural design and key technology demonstration of cryogenic assembly in the next-generation infrared space telescope SPICA**, Tadahito Mizutani, Toshihiko Yamawaki, Keiji Komatsu, Ken Goto, Shinsuke Takeuchi, Japan Aerospace Exploration Agency (Japan). . . . . [9143-51]

11:50: **Using drift scans to improve astrometry with Spitzer**, James G. Ingalls, Sean J. Carey, Patrick J. Lowrance, Carl J. Grillmair, John R. Stauffer, Spitzer Science Ctr. (USA). . . . . [9143-52]

12:10: **Intricacies of centroiding and aperture photometry in warm IRAC observations of exoplanets**, Sean J. Carey, James G. Ingalls, William J. Glaccum, Infrared Processing and Analysis Ctr. (USA); Joseph L. Hora, Harvard-Smithsonian Ctr. for Astrophysics (USA); Kenneth J. Mighell, National Optical Astronomy Observatory (USA). . . . . [9143-53]

Lunch/Exhibition Break . . . . . Wed 12:30 to 13:40

SESSION 11

LOCATION: ROOM 519A . . . . . WED 13:40 TO 15:00

Solar System

Session Chair: **Allison A. Barto,** Ball Aerospace & Technologies Corp. (USA)

13:40: **The Solar-C mission**, Tetsuya Watanabe, National Astronomical Observatory of Japan (Japan) and Solar-C Working Group, Institute of Space and Astronautical Science (Japan) and Office F Solar-C, National Astronimical Observatory of Japan (Japan) . . . . . [9143-54]

14:00: **Large aperture solar optical telescope and instruments for the SOLAR-C mission**, Yoshinori Suematsu, Yukio Katsukawa, Hirohisa Hara, Ryouhei Kano, National Astronomical Observatory of Japan (Japan); Toshifumi Shimizu, Japan Aerospace Exploration Agency (Japan); Kiyoshi Ichimoto, Kyoto Univ. Hida Observatory (Japan) . . . . . [9143-55]

14:20: **Construction of a photometer to detect stellar occultations by outer solar system bodies for the Whipple mission**, Ralph P. Kraft, Almus T. Kenter, Charles Alcock, Harvard-Smithsonian Ctr. for Astrophysics (USA); Stephen S. Murray, Johns Hopkins Univ. (USA); Thomas M. Gauron, Harvard-Smithsonian Ctr. for Astrophysics (USA); Gregg Germain, Smithsonian Astrophysical Observatory (USA); Lawrence Peregrim, Harvard-Smithsonian Ctr. for Astrophysics (USA); Markus Loose, Markury Scientific, Inc. (USA). . . . . [9143-56]

14:40: **Solar astrophysical fundamental parameters**, Mustapha Meftah, LATMOS (France) . . . . . [9143-57]

Coffee Break . . . . . Wed 15:00 to 15:30

SESSION 12

LOCATION: ROOM 519A . . . . . WED 15:30 TO 17:50

Technology - Optics

Session Chair: **Gary W. Matthews,** Exelis Inc. (USA)

15:30: **Advanced mirror technology development project: 2.5 year status**, H. Philip Stahl, NASA Marshall Space Flight Ctr. (USA) . . . . . [9143-58]

15:50: **AMTD: update of engineering specifications derived from science requirements for future UVOIR space telescopes**, H. Philip Stahl, NASA Marshall Space Flight Ctr. (USA) . . . . . [9143-59]

16:10: **Development and testing of stacked core technology for the fabrication of 4-meter lightweight UV quality space mirrors**, Gary W. Matthews, Laura B. Abplanalp, Exelis Inc. (USA); H. Philip Stahl, Ron Eng, NASA Marshall Space Flight Ctr. (USA); Michael R. Effinger, NASA Marshall Space Flight Ctr. (USA) and Exelis Inc. (USA). . . . . [9143-60]

16:30: **Extreme lightweight ZERODUR mirrors (ELZM): supporting characteristics for spaceborne applications**, Tony B. Hull, The Univ. of New Mexico (USA); Thomas Westerhoff, SCHOTT AG (Germany) . . . . . [9143-61]

16:50: **MOIRE: ground demonstration of a large aperture diffractive transmissive telescope**, Paul Atcheson, Jeanette L. Domber, Kevin L. Whiteaker, Ball Aerospace & Technologies Corp. (USA); Jerald A. Britten, Shamasundar N. Dixit, Lawrence Livermore National Lab. (USA); Brandon S. Farmer, NeXolve Corp. (USA) . . . . . [9143-62]

17:10: **FalconSAT-7: a membrane space telescope**, Geoff P. Andersen, Olha V. Asmolova, U.S. Air Force Academy (USA) . . . . . [9143-63]

17:30: **Cryo optical properties of 4 selected materials CaF2, Silica, LF5G15 and S-FTM16**, Frank U. Grupp, Max Planck Institut für extraterrestrische Physik (Germany); Douglas B. Leviton, NASA Goddard Space Flight Ctr. (USA); Carolin Vogel, Max Planck Institut für extraterrestrische Physik (Germany); Manuel A. Quijada, NASA Goddard Space Flight Ctr. (USA); Hans D. Thiele, Amir Mottaghibonab, Stephan Rapp, Kayser-Threde GmbH (Germany); Ralf Bender, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9143-64]

THURSDAY 26 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . THU 9:00 TO 10:00

Session Chair: **Masanori Iye,** National Astronomical Observatory of Japan (Japan)

9:00: **Hyper Suprime-Cam for Weak Gravitational Lensing Survey** *(Plenary)*, Satoshi Miyazaki, National Astronomical Observatory of Japan (Japan) . . . . . [9143-507]

9:30: **Transiting Exoplanet Survey Satellite (TESS)** *(Plenary)*, George R. Ricker Jr., Massachusetts Institute of Technology (USA) . . . . . [9143-508]

Coffee Break . . . . . Thu 10:00 to 10:30

SESSION 13

LOCATION: ROOM 519A . . . . . THU 10:30 TO 12:10

Technology Instruments I

Session Chair: **Jaymie Mark Matthews,** The Univ. of British Columbia (Canada)

10:30: **High contrast imaging with an arbitrary aperture: active correction of aperture discontinuities: fundamental limits and practical trades offs**, Laurent A. Pueyo, Space Telescope Science Institute (USA); Colin Norman, Jordan Hoffmann, Johns Hopkins Univ. (USA); Rémi Soummer, Marshall D. Perrin, Space Telescope Science Institute (USA); Alexis Carlotti, Univ. Joseph Fourier (France); Dimitri Mawet, European Southern Observatory (Chile); Mamadou N'Diaye, Élodie Choquet, Space Telescope Science Institute (USA). . . . . [9143-65]

10:50: **Experimental study of a low-order wavefront sensor for high-contrast coronagraphic imagers: results in air and in vacuum**, Julien Lozi, The Univ. of Arizona (USA); Ruslan Belikov, Sandrine J. Thomas, Eugene Pluzhnik, Eduardo A. Bendek, NASA Ames Research Ctr. (USA); Olivier Guyon, Glenn H. Schneider, The Univ. of Arizona (USA). . . . . [9143-66]

11:10: **EXCEDE technology development III: first vacuum tests**, Ruslan Belikov, Eduardo A. Bendek, NASA Ames Research Ctr. (USA); Alan L. Duncan, Lockheed Martin Space Systems Co. (USA); Thomas P. Greene, NASA Ames Research Ctr. (USA); Olivier Guyon, The Univ. of Arizona (USA); Troy T. Hix, James Wes Irwin, Richard L. Kendrick, Lockheed Martin Space Systems Co. (USA); Julien Lozi, The Univ. of Arizona (USA); Dana H. Lynch, NASA Ames Research Ctr. (USA); Roger Mihara, Lockheed Martin Space Systems Co. (USA); Eugene Pluzhnik, NASA Ames Research Ctr. (USA); Glenn H. Schneider, The Univ. of Arizona (USA); Eric H. Smith, Lockheed Martin Space Systems Co. (USA); Sandrine J. Thomas, Fred C. Witteborn, NASA Ames Research Ctr. (USA) . . . . . [9143-67]

11:30: **Optimal wavefront estimation of incoherent sources and dynamic speckle patterns**, A. J. Eldorado Riggs, N. Jeremy Kasdin, Tyler D. Groff, Princeton Univ. (USA) . . . . . [9143-68]

11:50: **Shaped pupil design for future space telescopes**, A. J. Eldorado Riggs, Princeton Univ. (USA); Alexis Carlotti, Univ. Joseph Fourier (France); N. Jeremy Kasdin, Robert J. Vanderbei, Neil Zimmerman, Princeton Univ. (USA) . . . [9143-69]

Lunch/Exhibition Break . . . . . Thu 12:10 to 13:40

SESSION 14

LOCATION: ROOM 519A . . . . . THU 13:40 TO 16:50

Technology Instruments II

Session Chair: **René Doyon,** Univ. de Montréal (Canada)

13:40: **Optimal apodizations for on-axis vector vortex coronagraphs**, Kevin Fogarty, Johns Hopkins Univ. (USA); Laurent A. Pueyo, Space Telescope Science Institute (USA); Dimitri Mawet, European Southern Observatory (Chile); Alexis Carlotti, Institut de Planétologie et d'Astrophysique de Grenoble (France) [9143-70]

14:00: **High contrast imager for complex aperture telescopes (HICAT): II. design overview and first light results**, Mamadou N'Diaye, Élodie Choquet, Laurent A. Pueyo, Erin M. Elliot, Marshall D. Perrin, Space Telescope Science Institute (USA); James K. Wallace, Jet Propulsion Lab. (USA); Rachel Anderson, Space Telescope Science Institute (USA); Alexis Carlotti, Institut de Planétologie et d'Astrophysique de Grenoble (France); Audrey DiFelice, Space Telescope Science Institute (USA); Tyler D. Groff, Princeton Univ. (USA); George F. Hartig, Space Telescope Science Institute (USA); N. Jeremy Kasdin, Princeton Univ. (USA); Charles-Philippe Lajoie, Space Telescope Science Institute (USA); Olivier Levecq, Institut d'Optique Graduate School (France) and Space Telescope Science Institute (USA); Chris A. Long, Space Telescope Science Institute (USA); Dimitri Mawet, European Southern Observatory (Chile) and Jet Propulsion Lab. (USA); Bruce A. Macintosh, Lawrence Livermore National Lab. (USA); Colin Norman, Space Telescope Science Institute (USA); Stuart B. Shaklan, Jet Propulsion Lab. (USA); Matt Sheckells, Johns Hopkins Univ. (USA); Rémi Soummer, Space Telescope Science Institute (USA) . . . . . [9143-71]

14:20: **HST/WFC3: new capabilities, improved IR detector calibrations, and long-term performance stability**, John W. MacKenty, Sylvia M. Baggett, Bryan Hilbert, Knox S. Long, Peter McCullough, Adam Guy Riess, Space Telescope Science Institute (USA) . . . . . [9143-72]

14:40: **Field dependent calibration for high precision astrometry using focal plane array detectors**, Chengxing Zhai, Michael Shao, Bijan Nemati, Inseob Hahn, Tsae-Pyng J. Shen, Jet Propulsion Lab. (USA). . . . . [9143-73]

15:00: **Microbolometer FPA characterization with the electronics prototype of the IRCAM-JEMEUSO mission**, Yolanda Martín-Hernando, Enrique Joven-Alvarez, Marcos Reyes Garcia-Talavera, Javier Licandro, Instituto de Astrofísica de Canarias (Spain); Oscar Maroto, Laura Diez-Merino, Albert Tomàs, NTE-SENER S.A. (Spain); Jordi Carbonell, NTE-SENER S.A (Spain); José A. Morales de los Rios, Luis del Peral, Maria D. Rodriguez Frias, Univ. de Alcalá (Spain). . . . . [9143-74]

Coffee Break . . . . . Thu 15:20 to 15:50

15:50: **BATMAN flies: a compact spectro-imager for space observation**, Frédéric Zamkotsian, Olivier Ilbert, Lab. d'Astrophysique de Marseille (France); Julien Zoubian, Ctr. de Physique des Particules de Marseille (France); Audrey Delsanti, Samuel Boissier, Lab. d'Astrophysique de Marseille (France); Ariane Lancon, Observatoire Astronomique de Strasbourg (France). . . . . [9143-75]

16:10: **Micro-Spec: an integrated direct-detection spectrometer for far-infrared space telescopes**, Giuseppe Cataldo, NASA Goddard Space Flight Ctr. (USA) and Massachusetts Institute of Technology (USA); Wen-Ting Hseih, Wei-Chung Huang, Samuel Harvey Moseley Jr., Thomas R. Stevenson, Edward J. Wollack, NASA Goddard Space Flight Ctr. (USA). . . . . [9143-76]

16:30: **The performance of the Herschel/SPIRE imaging Fourier transform spectrometer**, David A. Naylor, Univ. of Lethbridge (Canada); Jean-Paul Baluteau, Lab. d'Astrophysique de Marseille (France); George J. Bendo, The Univ. of Manchester (United Kingdom); Dominique Benielli, Lab. d'Astrophysique de Marseille (France); Marc Ferlet, Rutherford Appleton Lab. (United Kingdom); Trevor R. Fulton, Blue Sky Spectroscopy Inc. (Canada) and Univ. of Lethbridge (Canada); Matthew J. Griffin, Cardiff Univ. (United Kingdom); Rosalind Hopwood, Imperial College London (United Kingdom); Peter Imhof, Blue Sky Spectroscopy Inc. (Canada) and Univ. of Lethbridge (Canada); Tanya L. Lim, Rutherford Appleton Lab. (United Kingdom); Nanyao Lu, Infrared Processing and Analysis Ctr. (USA); Gibion Makiwa, Univ. of Lethbridge (Canada); Nicola Marchili, Univ. degli Studi di Padova (Italy); Glenn S. Orton, Jet Propulsion Lab. (USA); Andreas Papageorgiou, Cardiff Univ. (United Kingdom); Chris Pearson, Rutherford Appleton Lab. (United Kingdom) and The Open Univ. (United Kingdom); Edward T. Polehampton, Rutherford Appleton Lab. (United Kingdom) and Univ. of Lethbridge (Canada); Bernhard Schulz, Infrared Processing and Analysis Ctr. (USA); Sunil D. Sidher, Rutherford Appleton Lab. (United Kingdom); Locke D. Spencer, Cardiff Univ. (United Kingdom) and Univ. of Lethbridge (Canada); Bruce M. Swinyard, Univ. College London (United Kingdom) and Rutherford Appleton Lab. (United Kingdom); Ivan Valtchanov, European Space Astronomy Ctr. (Spain); Matthijs H. D. van der Wiel, Ian T. Veenendaal, Univ. of Lethbridge (Canada); Ronin Wu, CEA-Ctr. de SACLAY (France) . . . . . [9143-122]

FRIDAY 27 JUNE

SESSION 15

LOCATION: ROOM 519A . . . . . FRI 8:30 TO 12:00

Exoplanets I

Session Chair: **Jean-Pierre Maillard,** Institut d'Astrophysique de Paris (France)

8:30: **Design and performance of the Exo-planet Characterisation Observatory (ECHO) integrated payload**, Bruce M. Swinyard, Univ. College London (United Kingdom) . . . . . [9143-79]

8:50: **The mid-infrared channel of the EChO mission**, Jean-Michel Reess, Observatoire de Paris (France); Giovanna Tinetti, Univ. College London (United Kingdom); Jean-Philippe Beaulieu, Institut d'Astrophysique (France); Pernelle Bernardi, Observatoire de Paris à Meudon (France); Olivier Boulade, Christophe Cara, Commissariat à l'Énergie Atomique (France); Vincent Coudé de Foresto, Observatoire de Paris (France); Sophie Jacquinod, Observatoire de Paris à Meudon (France); Pierre-Olivier Lagage, Commissariat à l'Énergie Atomique (France); Gilles Morinaud, Institut d'Astrophysique Spatiale (France); Napoléon Nguyen-Tuong, Observatoire de Paris (France); Marc Ollivier, Institut d'Astrophysique Spatiale (France); Frédéric Pinsard, Commissariat à l'Énergie Atomique (France); Jonathan Tanrin, Didier Zeganadin, Observatoire de Paris (France); Rodolphe Clédassou, Ctr. National d'Études Spatiales (France) . . . . . [9143-80]

9:10: **EChO SWiR: exoplanet atmospheres characterization observatory sort-wave infrared channel of the EChO payload**, Gonzalo Ramos Zapata, INTA Instituto Nacional de Técnica Aeroespacial (Spain) . . . . . [9143-81]

9:30: **Origami nanosat telescopes: astronomy's future unfolds**, Franck Marchis, SETI Institute (USA); Samuel C. Bradford, Andrew Klesh, Jet Propulsion Lab. (USA); Jon M. Jenkins, SETI Institute (USA); Julie Castillo-Rogez, Bertrand Mennesson, Sarah Spangelo, Brian P. Trease, Jet Propulsion Lab. (USA). . . . . [9143-128]

9:50: **The Transiting Exoplanet Survey Satellite (TESS) mission**, George R. Ricker Jr., Massachusetts Institute of Technology (USA) . . . . . [9143-83]

Coffee Break . . . . . Fri 10:10 to 10:40

10:40: **CHEOPS: a space telescope for ultra-high precision photometry of exoplanet transits**, Andrea Fortier, Univ. Bern (Switzerland); Udo J. Wehmeier, ETH Zürich (Switzerland) and Univ. Bern (Switzerland); Willy Benz, Christopher Broeg, Virginie Cessa, Univ. Bern (Switzerland); David Ehrenreich, Observatoire de Genèva (Switzerland); Nicolas Thomas, Univ. Bern (Switzerland) . . . . . [9143-84]

11:00: **Exo-C: a probe-scale space mission to directly image and spectroscopically characterize exoplanetary systems using an internal coronagraph**, Karl R. Stapelfeldt, NASA Goddard Space Flight Ctr. (USA); Michael P. Brenner, Keith R. Warfield, Jet Propulsion Lab. (USA); Ruslan Belikov, NASA Ames Research Ctr. (USA); Paul B. Brugarolas, Geoffrey Bryden, Jet Propulsion Lab. (USA); Kerri L. Cahoy, Massachusetts Institute of Technology (USA); Supriya Chakrabarti, Univ. of Massachusetts Lowell (USA); Frank G. Dekens, Serge Dubovitsky, Robert T. Effinger, Brian Hirsch, Andrew Kissil, John Krist, Jared J. Lang, Jet Propulsion Lab. (USA); Mark S. Marley, NASA Ames Research Ctr. (USA); Michael W. McElwain, NASA Goddard Space Flight Ctr. (USA); Victoria Meadows, Univ. of Washington (USA); Joel Nissen, Jeffrey M. Oseas, Eugene Serabyn, Eric T. Sunada, Wesley A. Traub, John T. Trauger, Stephen C. Unwin, Jet Propulsion Lab. (USA) . . . . . [9143-85]

11:20: **NEAT: ultra-precise differential astrometry to characterize planetary systems with Earth-mass exoplanets in the vicinity of our Sun**, Fabien Malbet, Antoine Crouzier, Institut de Planétologie et d'Astrophysique de Grenoble (France); Alain M. Léger, Institut d'Astrophysique Spatiale (France); Michael Shao, Renaud Goullioud, Jet Propulsion Lab. (USA); Jean-Michel Le Duigou, Ctr. National d'Études Spatiales (France). . . . . [9143-86]

11:40: **ASPIICS : an externally occulted coronograph for Proba-3 design evolution**, Etienne Renotte, Univ. de Liège (Belgium) . . . . . [9143-87]

Lunch Break . . . . . Fri 12:00 to 13:30

CONFERENCE 9143 · LOCATION: ROOM 519A

SESSION 16

LOCATION: ROOM 519A . . . . . FRI 13:30 TO 15:50

Exoplanets II

Session Chair: **Makenzie Lystrup,** Ball Aerospace & Technologies Corp. (USA)

13:30: **Nanosats as pathfinders for planetary detection: the lithium niobate path**, Sylvestre Lacour, Observatoire de Paris (France); Vincent Lapeyrere, Observatoire de Paris à Meudon (France); Lucien Gauchet, Observatoire de Paris (France); Guillermo Martin, Institut de Planétologie et d'Astrophysique de Grenoble (France); Guy S. Perrin, Elsa Huby, Observatoire de Paris à Meudon (France); Xavier Haubois, Observatoire de Paris à Meudon (France); Vincent Coudé du Foresto, Observatoire de Paris (France) [9143-88]

13:50: **Measurements of high-contrast starshade performance**, Tiffany Glassman, Suzanne Casement, Steven Warwick, Megan Novicki, Northrop Grumman Aerospace Systems (USA). . . . . [9143-89]

14:10: **Sensing and estimation for occulter formation flight**, Dan Sirbu, N. Jeremy Kasdin, Robert J. Vanderbei, Princeton Univ. (USA); Stefan R. Martin, Jet Propulsion Lab. (USA) . . . . . [9143-90]

14:30: **An analysis of technology gaps and priorities in support of probe-scale coronagraph and starshade missions**, Peter R. Lawson, Jet Propulsion Lab. (USA); Sara Seager, Massachusetts Institute of Technology (USA); Karl R. Stapelfeldt, NASA Goddard Space Flight Ctr. (USA); Michael P. Brenner, Douglas Lisman, Nicholas Siegler, Stephen C. Unwin, Keith R. Warfield, Jet Propulsion Lab. (USA) . . . . . [9143-91]

14:50: **MAPLE: reflected light of exoplanets with a 50-cm diameter stratospheric balloon telescope**, Christian Marois, National Research Council Canada (Canada); Colin Bradley, Univ. of Victoria (Canada); Jean-Pierre Véran, National Research Council Canada (Canada) . . . . . [9143-92]

15:10: **High-contrast visible nulling coronagraph for segmented and arbitrary telescope apertures**, Brian A. Hicks, Richard Lyon, Mark Clampin, Matthew R. Bolcar, NASA Goddard Space Flight Ctr. (USA); Peter Petrone III, Sigma Space Corp. (USA) . . . . . [9143-93]

15:30: **Laboratory demonstration of the ring-apodized vortex coronagraph**, Dimitri Mawet, European Southern Observatory (Chile); James K. Wallace, Bertrand Mennesson, Eugene Serabyn, Kurt M. Liewer, Jet Propulsion Lab. (USA); Laurent A. Pueyo, Space Telescope Science Institute (USA); Alexis Carlotti, Institut de Planétologie et d'Astrophysique de Grenoble (France). . . . . [9143-95]

CONFERENCE 9144 · LOCATION: ROOM 520B

Sunday–Thursday 22–26 June 2014 • Proceedings of SPIE Vol. 9144

Space Telescopes and Instrumentation 2014: Ultraviolet to Gamma Ray


(Takahashi)


(den Herder)


(Bautz)

Conference Chairs: **Tadayuki Takahashi,** Japan Aerospace Exploration Agency (Japan); **Jan-Willem A. den Herder,** SRON Netherlands Institute for Space Research (Netherlands); **Mark Bautz,** Massachusetts Institute of Technology (USA)

Program Committee: **Hisamitsu Awaki,** Ehime Univ. (Japan); **Didier Barret,** Institut de Recherche en Astrophysique et Planétologie (France); **Angela Bazzano,** INAF/Istituto di Astrofisica e Planetologia Spaziale (Italy); **Steven E. Boggs,** Univ. of California, Berkeley (USA); **João Braga,** Instituto Nacional de Pesquisas Espaciais (Brazil); **Carl Budtz-Jørgensen,** Technical Univ. of Denmark, DTU Space (Denmark); **Luigi Gallo,** Saint Mary's Univ. (Canada); **Neil A. Gehrels,** NASA Goddard Space Flight Ctr. (USA); **James C. Green,** Univ. of Colorado at Boulder (USA); **Fiona Harrison,** California Institute of Technology (USA); **W. Neil Johnson III,** U.S. Naval Research Lab. (USA); **Caroline A. Kilbourne,** NASA Goddard Space Flight Ctr. (USA); **Francois Lebrun,** APC, CEA/IRFU (France); **Kirpal Nandra,** Max-Planck-Institut für extraterrestrische Physik (Germany); **Takaya Ohashi,** Tokyo Metropolitan Univ. (Japan); **Giovanni Pareschi,** INAF - Osservatorio Astronomico di Brera (Italy); **Arvind N. Parmar,** European Space Research and Technology Ctr. (Netherlands); **Biswajit Paul,** Raman Research Institute (India); **Mikhail N. Pavlinsky,** Space Research Institute (Russian Federation); **Luigi Piro,** Istituto di Fisica dello Spazio Interplanetario (Italy); **Andrea E. Santangelo,** Eberhard Karls Univ. Tübingen (Germany); **Hiroshi Tsunemi,** Osaka Univ. (Japan); **Martin C. Weisskopf,** NASA Marshall Space Flight Ctr. (USA); **Nicholas E. White,** NASA Goddard Space Flight Ctr. (USA); **Richard Willingale,** Univ. of Leicester (United Kingdom); **Shuangnan Zhang,** Institute of High Energy Physics (China)

SUNDAY 22 JUNE

SESSION 1

LOCATION: ROOM 520B . . . . . SUN 9:30 TO 10:30

Ultraviolet Instruments and Missions I

Session Chair: **Steven E. Boggs,** Space Sciences Lab. (USA)

9:30: **Instrumentation of the WSO-UV project**, Mikhail Sachkov, Boris M. Shustov, Institute of Astronomy (Russian Federation); Ana Ines Gomez de Castro, Univ. Complutense de Madrid (Spain) . . . . . [9144-1]

9:45: **Update on CASTOR: the Cosmological Advanced Survey telescope for optical and UV Research**, Patrick Cote, National Research Council Canada (Canada) . . . . . [9144-2]

10:00: **Improved resolution in wide-field ultraviolet astronomical imaging**, Michael W. Davis, Thomas K. Greathouse, G. Randall Gladstone, Southwest Research Institute (USA) . . . . . [9144-3]

10:15: **SubLymE: The sub-Lyman alpha explorer**, James C. Green, Kevin France, Univ. of Colorado at Boulder (USA). . . . . [9144-4]

Coffee Break . . . . . Sun 10:30 to 11:00

SESSION 2

LOCATION: ROOM 520B . . . . . SUN 11:00 TO 11:30

Ultraviolet Instruments and Missions II

Session Chair: **Luigi Gallo,** Saint Mary's Univ. (Canada)

11:00: **The assembly, calibration, and preliminary results from the Colorado high-resolution Echelle stellar spectrograph (CHESS)**, Keri Hoadley, Kevin France, Nicholas Nell, Robert Kane, Univ. of Colorado at Boulder (USA); Ted B. Schultz, The Univ. of Iowa (USA); Matthew Beasley, Planetary Resources, Inc. (USA); James C. Green, Jennifer R. Kulow, Eliot Kersgaard, Brian T. Fleming, Univ. of Colorado at Boulder (USA) . . . . . [9144-5]

11:15: **The UVIT telescopes on board the ISRO Astrosat Observatory**, John B. Hutchings, National Research Council Canada (Canada). . . . . [9144-6]

SESSION 3

LOCATION: ROOM 520B . . . . . SUN 11:30 TO 12:15

Solar Instruments

Session Chair: **Luigi Gallo,** Saint Mary's Univ. (Canada)

11:30: **The extreme UV imager of solar orbiter: from detailed design to flight model**, Jean-Philippe A. Halain, Pierre L. P. M. Rochus, Etienne Renotte, Univ. de Liège (Belgium); Frédéric Auchère, Institut d'Astrophysique Spatiale (France); David Berghmans, Royal Observatory of Belgium (Belgium); Louise K. Hara, Univ. College London (United Kingdom); Udo H. Schühle, Max-Planck-Institut für Sonnensystemforschung (Germany); Werner K. Schmutz, Physikalisch-Meteorologisches Observatorium Davos (Switzerland); Andrei N. Zhukov, Royal Observatory of Belgium (Belgium); Regina Aznar Cuadrado, Max-Planck-Institut für Sonnensystemforschung (Germany); Franck Delmotte, Institut d'Optique Graduate School (France); Cydalise Dumesnil, Institut d'Astrophysique Spatiale (France); Manfred Gyo, Physikalisch-Meteorologisches Observatorium Davos (Switzerland); Thomas E. Kennedy, Univ. College London (United Kingdom); Raymond F. Mercier, Institut d'Optique Graduate School (France); Francis Verbeeck, Royal Observatory of Belgium (Belgium); Michel Thome, Univ. de Liège (Belgium); Klaus Heerlein, Max-Planck-Institut für Sonnensystemforschung (Germany); Aline Hermans, Lionel Jacques, Alexandra Mazzoli, Univ. de Liège (Belgium); Stefan Meining, Max-Planck-Institut für Sonnensystemforschung (Germany); Laurence Rossi, Univ. de Liège (Belgium); Jason A. Tandy, Philip J. Smith, Berend Winter, Univ. College London (United Kingdom). . . . . [9144-7]

11:45: **In-flight UV and polarized-VL radiometric calibrations of the solar orbiter/METIS imaging coronagraph**, Mauro Focardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Gerardo Capobianco, INAF - Osservatorio Astrofisico di Torino (Italy); Vincenzo Andretta, INAF - Osservatorio Astronomico di Capodimonte (Italy); Maurizio Pancrazzi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Marco Romoli, Univ. degli Studi di Firenze (Italy); Silvano Fineschi, INAF - Osservatorio Astrofisico di Torino (Italy); Federico Landini, INAF - Osservatorio Astrofisico di Arcetri (Italy); Alessandro Bemporad, INAF - Osservatorio Astrofisico di Torino (Italy); Michela C. Uslenghi, INAF - IASF Milano (Italy); Gianalfredo Nicolini, INAF - Osservatorio Astrofisico di Torino (Italy); Giampiero Naletto, Piergiorgio Nicolosi, Univ. degli Studi di Padova (Italy); Daniele Spadaro, INAF - Osservatorio Astrofisico di Catania (Italy); Ester Antonucci, INAF - Osservatorio Astrofisico di Torino (Italy); Clementina Sasso, INAF - Osservatorio Astronomico di Capodimonte (Italy)[9144-8]

12:00: **The focusing optics x-ray solar imager (FOXSI) sounding rocket program: results from the first flight and preparation for the second flight**, Säm Krucker, Lindsay Glesener, Univ. of California, Berkeley (USA); Steven D. Christe, NASA Goddard Space Flight Ctr. (USA); Brian D. Ramsey, NASA Marshall Space Flight Ctr. (USA); Shin-nosuke Ishikawa, National Astronomical Observatory of Japan (Japan); Tadayuki Takahashi, Institute of Space and Astronautical Science (Japan). . . . . [9144-9]

Lunch Break . . . . . Sun 12:15 to 13:45

CONFERENCE 9144 · LOCATION: ROOM 520B

SESSION 4

LOCATION: ROOM 520B . . . . . SUN 13:45 TO 15:15

Gamma-ray Telescopes, Optics and Instruments

Session Chair: **Tadayuki Takahashi,** Institute of Space and Astronautical Science (Japan)

13:45: **The Gamma Cube: a novel concept of gamma-ray telescope**, François Lebrun, Régis Terrier, AstroParticule et Cosmologie (France); Rémi Chipaux, CEA-IRFU (France); Philippe Laurent, Eric Bréelle, Damien Prêle, Christian Olivetto, Walter Bertoli, AstroParticule et Cosmologie (France) . . . . . [9144-10]

14:00: **The Nuclear Compton telescope ULDB science program**, Steven E. Boggs, Univ. of California, Berkeley (USA) . . . . . [9144-11]

14:15: **Prospects for Laue lenses made of self-focusing Si Laue components (SiLCs)**, Nicolas M. Barrière, Univ. of California, Berkeley (USA); Marcelo D. Ackermann, cosine Research B.V. (Netherlands); John A. Tomsick, Steven E. Boggs, Univ. of California, Berkeley (USA); Colin A. Wade, Lorraine Hanlon, Univ. College Dublin (Ireland); Peter von Ballmoos, Institut de Recherche en Astrophysique et Planétologie (France). . . . . [9144-12]

14:30: **Scientific motivations and technical design considerations for future high-energy gamma-ray telescopes in light of lessons learned from the Fermi Mission**, Eric Charles, SLAC National Accelerator Lab. (USA). . . . . [9144-13]

14:45: **PANGU: a high resolution Gamma-ray Space telescope**, Meng Su, Massachusetts Institute of Technology (USA); Xin Wu, Alessandro Bravar, Martin Pohl, Roland Walter, Univ. de Genève (Switzerland) . . . . . [9144-130]

15:00: **MeV gamma-ray Compton camera using a gaseous electron tracker for background-suppressed observation**, Atsushi Takada, Toru Tanimori, Hidetoshi Kubo, Joseph Parker, Tetsuya Mizumoto, Yoshitaka Mizumura, Tatsuya Sawano, Kiseki Nakamura, Yoshihiro Matsuoka, Shotaro Komura, Shogo Nakamura, Makoto Oda, Kyoto Univ. (Japan); Yuji Kishimoto, High Energy Accelerator Research Organization (Japan); Kentaro Miuchi, Kobe Univ. (Japan); Shunsuke Kurosawa, Tohoku Univ. (Japan). . . . . [9144-15]

Coffee Break . . . . . Sun 15:00 to 15:45

SESSION 5

LOCATION: ROOM 520B . . . . . SUN 15:45 TO 16:30

Gamma-ray Sky Surveys II

Session Chair: **François Lebrun,** AstroParticule et Cosmologie (France)

15:45: **All-sky Compton imager**, Peter von Ballmoos, Institut de Recherche en Astrophysique et Planétologie (France). . . . . [9144-16]

16:00: **COCOTE: a sensitive 100 keV-10 MeV all sky Compact Compton telescope**, Philippe Laurent, Commissariat à l'Énergie Atomique (France); Vincent Tatischeff, Nicolas de Sereville, Institut National de Physique Nucléaire et de Physique des Particules (France); Olivier Limousin, Commissariat à l'Énergie Atomique (France); Mohamad Khalil, Eric Bréelle, Walter Bertoli, AstroParticule et Cosmologie (France) . . . . . [9144-17]

16:15: **Sub-MeV all sky survey with a compact Si/CdTe Compton telescope**, Kazuhiro Nakazawa, The Univ. of Tokyo (Japan); Tadayuki Takahashi, Institute of Space and Astronautical Science (Japan); Shin Watanabe, Japan Aerospace Exploration Agency (Japan); Motohide Kokubun, Yuto Ichinohe, Takeshi Takashima, Takeshi Mitani, Institute of Space and Astronautical Science (Japan); Makoto S. Tashiro, Yukikatsu Terada, Saitama Univ. (Japan); Toru Tamagawa, RIKEN (Japan); Masaharu Nomachi, Osaka Univ. (Japan); Yasushi Fukazawa, Tsunefumi Mizuno, Hiroshima Univ. (Japan); Yasunobu Uchiyama, Rikkyo Univ. (Japan); Teruaki Enoto, RIKEN (Japan) . . . . . [9144-18]

SESSION 6

LOCATION: ROOM 520B . . . . . SUN 16:30 TO 17:45

Polarimetry Missions

Session Chair: **François Lebrun,** AstroParticule et Cosmologie (France)

16:30: **X-ray gamma-ray polarimetry small satellite Polaris**, Kiyoshi Hayashida, Osaka Univ. (Japan); Shuichi Gunji, Yamagata Univ. (Japan); Daisuke Yonetoku, Kanazawa Univ. (Japan); Tatehiro Mihara, Toru Tamagawa, RIKEN (Japan); Akihiro Furuzawa, Nagoya Univ. (Japan); Tadayasu Dotani, Institute of Space and Astronautical Science (Japan); Tsunefumi Mizuno, Hiromitsu Takahashi, Hiroshima Univ. (Japan); Yuji Kishimoto, High Energy Accelerator Research Organization (Japan); Yoichi Yatsu, Tokyo Institute of Technology (Japan); Takeshi Nakamori, Yamagata Univ. (Japan); Kenji Toma, Osaka Univ. (Japan); Shinpeo Shibata, Yamagata Univ. (Japan); Masaaki Sadamoto, Keigo Yoshinaga, Osaka Univ. (Japan); Hidetoshi Kubo, Kyoto Univ. (Japan); Hiroshi Tsunemi, Naohisa Anabuki, Osaka Univ. (Japan) . . . . . [9144-139]

16:45: **Pre-flight performance of a micro-satellite TSUBAME for x-ray polarimetry of gamma-ray bursts**, Yoichi Yatsu, Kei Ito, Shin Kurita, Makoto Arimoto, Nobuyuki Kawai, Takashi Kamiya, Shogo Kitamura, Masanori Matsushita, Tokyo Institute of Technology (Japan); Saburo Matsunaga, Japan Aerospace Exploration Agency (Japan); Masato Terakura, Shinichi Kimura, Tokyo Univ. of Science (Japan); Jun Kataoka, Waseda Univ. (Japan); Takeshi Nakamori, Yamagata Univ. (Japan); Shin Kubo, Clear Pulse Ltd. (Japan). . . . . [9144-20]

17:00: **The POLAR gamma-ray burst polarimeter onboard the Chinese Spacelab**, Silvio Orsi, Franck Cadoux, Catherine Leluc, Mercedes Paniccia, Martin Pohl, Divic Rapin, Univ. of Geneva (Switzerland); Tianwei Bao, Junying Chai, Yongwei Dong, Minnan Kong, Li Lu, Jiangtao Liu, Xin Liu, Haoli Shi, Jianchao Sun, Ruijie Wang, Xing Wen, Bobing Wu, Hualin Xiao, Hanhui Xu, Li Zhang, Laiyu Zhang, Shuangnan Zhang, Yongjie Zhang, Institute of High Energy Physics (China); Tadeusz Batsch, Aleksandra Rutczynska, Jacek Szabelski, Ania Zwolinska, National Ctr. for Nuclear Research (Poland); Ilia Britvich, Wojtek Hajdas, Radoslaw Marcinkowski, Paul Scherrer Institut (Switzerland); Dominik K. Rybka, Paul Scherrer Institut (Switzerland) and National Ctr. for Nuclear Research (Poland); Neal Gauvin, Nicolas Produit, Univ. of Geneva (Switzerland). . . . . [9144-21]

17:15: **X-ray polarization capabilities of a Small Explorer Mission**, Keith M. Jahoda, Joanne E. Hill, J. Kevin Black, Timothy R. Kallman, Craig B. Markwardt, Robert Petre, Tod E. Strohmayer, Yang Soong, Takashi Okajima, NASA Goddard Space Flight Ctr. (USA); Philip E. Kaaret, The Univ. of Iowa (USA); Toru Tamagawa, RIKEN (Japan); Yuzuru Tawara, Nagoya Univ. (Japan). . . . . [9144-22]

17:30: **POET: a SMEX mission for gamma ray burst polarimetry**, Mark L. McConnell, The Univ. of New Hampshire (USA); Matthew Baring, Rice Univ. (USA); Peter F. Bloser, The Univ. of New Hampshire (USA); Jochen Greiner, Max-Planck-Institut für extraterrestrische Physik (Germany); Alice K. Harding, NASA Goddard Space Flight Ctr. (USA); Dieter H. Hartmann, Clemson Univ. (USA); Joanne E. Hill, NASA Goddard Space Flight Ctr. (USA); Philip E. Kaaret, The Univ. of Iowa (USA); R. M. Kippen, Los Alamos National Lab. (USA); Mark Pearce, KTH Royal Institute of Technology (Sweden); Nicolas Produit, ISDC Data Ctr. for Astrophysics (Switzerland); James M. Ryan, The Univ. of New Hampshire (USA); Felix Ryde, KTH Royal Institute of Technology (Sweden); Takanori Sakamoto, Aoyama Gakuin Univ. (Japan); Kenji Toma, Osaka Univ. (Japan); Bing Zhang, Univ. of Nevada, Las Vegas (USA) . . . . . [9144-23]

MONDAY 23 JUNE

MONDAY PLENARY SESSION

LOCATION: ROOM 517D . . . . . MON 8:50 TO 10:00

Session Chair: **Luc Simard,** National Research Council of Canada - Herzberg Institute of Astrophysics (Canada)

08:50: **Welcome**

9:00: **James Webb Space Telescope: the road to first science observations** *(Plenary)*, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) [9143-501]

9:30: **The Square Kilometre Array: a physics machine for the 21st Century** *(Plenary)*, Philip Diamond, SKA Organisation (United Kingdom) . . [9143-502]

Coffee Break . . . . . Mon 10:00 to 10:30

SESSION 7

LOCATION: ROOM 520B . . . . . MON 10:30 TO 11:50

Fifteen Years of Chandra and XMM/Newton: Lessons Learned

Session Chair: **Marshall W. Bautz,** Massachusetts Institute of Technology (USA)

10:30: **Fifteen years of Chandra operation: scientific highlights and lessons learned** *(Invited Paper)*, Martin C. Weisskopf, NASA Marshall Space Flight Ctr. (USA) . . . . . [9144-24]

10:50: **Lessons we learned designing and building the Chandra telescope** *(Invited Paper)*, Jonathan W. Arenberg, Charles B. Atkinson, Scott C. Texter, Northrop Grumman Aerospace Systems (USA); Gary W. Matthews, Keith Havey Jr., Exelis Inc. (USA) . . . . . [9144-25]

11:10: **Fifteen years of experience with the RGS spectrometer on XMM-Newton** *(Invited Paper)*, Cor P. de Vries, Jan-Willem A. den Herder, SRON Netherlands Institute for Space Research (Netherlands); Rosario Gonzalez Riestra, Carlos Gabriel, European Space Astronomy Ctr. (Spain); Jelle S. Kaastra, Ton J. J. Raassen, SRON Netherlands Institute for Space Research (Netherlands); Frederik B. S. Paerels, Columbia Univ. (USA); Andrew M. T. Pollock, Aitor Ibarra Ibaibarriaga, European Space Astronomy Ctr. (Spain) . . . . . [9144-26]

11:30: **Development lessons from the AXAF/Chandra X-ray observatory** *(Invited Paper)*, Daniel A. Schwartz, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9144-27]

Lunch Break . . . . . Mon 11:50 to 13:10

SESSION 8

LOCATION: ROOM 520B . . . . . MON 13:10 TO 15:00

Future Directions in UV to Gamma-ray Space Astronomy and Perspectives from Agencies

Session Chair: **Jan-Willem A. den Herder,** SRON Netherlands Institute for Space Research (Netherlands)

13:10: **Space astronomy and astrophysics by ESA** *(Invited Paper)*, Fabio Favata, European Space Agency (Netherlands) . . . . . [9144-28]

13:25: **Space astronomy and astrophysics program by NASA** *(Invited Paper)*, Paul L. Hertz, NASA Headquarters (USA) . . . . . [9144-29]

13:40: **Space astronomy and astrophysics program by JAXA** *(Invited Paper)*, Tadayuki Takahashi, Institute of Space and Astronautical Science (ISAS)/JAXA (Japan) . . . . . [9144-30]

13:55: **Space astronomy and astrophysics program by CSA** *(Invited Paper)*, Denis G. Laurin, Alain Ouellet, Jean Dupuis, Ruth Ann Chicoine, Canadian Space Agency (Canada) . . . . . [9144-31]

Coffee Break . . . . . Mon 15:00 to 15:30

SESSION 9

LOCATION: ROOM 520B . . . . . MON 15:30 TO 15:45

Cosmic Ray Measurements in Space

Session Chair: **Jan-Willem A. den Herder,** SRON Netherlands Institute for Space Research (Netherlands)

15:30: **The high energy cosmic radiation detection (HERD) facility onboard China's Space Station**, Shuangnan Zhang, Institute of High Energy Physics (China) . . . . . [9144-32]

SESSION 10

LOCATION: ROOM 520B . . . . . MON 15:45 TO 17:30

Detectors for High-energy Astrophysics

Session Chair: **Caroline A. Kilbourne,** NASA Goddard Space Flight Ctr. (USA)

15:45: **Large high impedance silicon micro-calorimeters for spatial x-rays camera**, Jean-Luc Sauvageot, Claude Pigot, Xavier de la Broïse, Thomas Charvolin, Irina Groza, Francis Lugiez, Alain Le Coguie, Commissariat à l'Énergie Atomique (France) . . . . . [9144-33]

16:00: **Development of large arrays of small pixels for x-ray astrophysics**, Simon R. Bandler, NASA Goddard Space Flight Ctr. (USA) and Univ. of Maryland, College Park (USA); Joseph S. Adams, Sarah E. Busch, James A. Chervenak, Megan E. Eckart, Audrey J. Ewin, Fred M. Finkbeiner, Richard L. Kelley, Caroline A. Kilbourne, Sang-Jun Lee, Jan-Patrick Porst, Frederick S. Porter, John E. Sadleir, Stephen J. Smith, Edward J. Wassell, NASA Goddard Space Flight Ctr. (USA) . . . . . [9144-34]

16:15: **Advancements in SQUID-based readout technologies for large-format x-ray microcalorimeter arrays**, Carl D. Reintsema, Douglas A. Bennett, Justus A. Brevik, Edward V. Denison, William B. Doriese, Joseph W. Fowler, Johnathan D. Gard, Gene C. Hilton, John A. B. Mates, Galen C. O'Neil, Joel N. Ullom, National Institute of Standards and Technology (USA); Kent D. Irwin, Stanford Univ. (USA); Joseph S. Adams, Simon R. Bandler, Richard L. Kelley, Caroline A. Kilbourne, Frederick S. Porter, Stephen J. Smith, NASA Goddard Space Flight Ctr. (USA) . . . . . [9144-35]

16:30: **Current developments on DEPFET APS improving time resolution, count-rate capability, and throughput**, Alexander Bähr, Max-Planck-Institut für extraterrestrische Physik (Germany); Stefan Aschauer, PNSensor GmbH (Germany); Bettina Günther, Max-Planck-Institut für extraterrestrische Physik (Germany); Gerhard Lutz, Petra Majewski, PNSensor GmbH (Germany); Norbert Meidinger, Danilo Miessner, Matteo Porro, Max-Planck-Institut für extraterrestrische Physik (Germany); Rainer H. Richter, Gerhard Schaller, Florian Schopper, Max-Planck-Institut Halbleiterlabor (Germany); Lothar Strüder, Johannes F. Treis, PNSensor GmbH (Germany). . . . . [9144-36]

16:45: **Development and performance of Kyoto's x-ray astronomical SOI pixel sensor**, Takeshi G. Tsuru, Hideaki Matsumura, Shinya Nakashima, Takaaki Tanaka, Kyoto Univ. (Japan); Yasuo Arai, Ayaki Takeda, High Energy Accelerator Research Organization (Japan); Koji Mori, Yusuke Nishioka, Univ. of Miyazaki (Japan); Takayoshi Kohmura, Kogakuin Univ. (Japan) . . . . . [9144-37]

17:00: **ART-XC/SRG: status of the x-ray focal plane detector development**, Vasily A. Levin, Mikhail N. Pavlinsky, Valeriy V. Akimov, Maria M. Kuznetsova, Alexey Rotin, Alexander Krivchenko, Igor Y. Lapshov, Vladimir Oleinikov, Space Research Institute (Russian Federation) . . . . . [9144-188]

17:15: **Scintillators with silicon photomultiplier readouts for high-energy astrophysics and heliophysics**, Peter F. Bloser, Jason S. Legere, Christopher M. Bancroft, Mark L. McConnell, James M. Ryan, The Univ. of New Hampshire (USA) . . . . . [9144-39]

CONFERENCE 9144 · LOCATION: ROOM 520B

POSTER SESSION–MONDAY

LOCATION: ROOM 516 . . . . . MON 17:30 TO 19:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Monday. The interactive poster session with authors in attendance will be Monday evening from 17:30 to 19:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

High efficiency CCD detectors at UV wavelengths, Erika T. Hamden, Columbia Univ. (USA); April D. Jewell, Timothy M. Goodsall, John Hennessy, Michael E. Hoenk, Todd J. Jones, Shouleh Nikzad, Jet Propulsion Lab. (USA); David Schiminovich, Columbia Univ. (USA); Patrick Morrissey, D. Christopher Martin, California Institute of Technology (USA) . . . . . [9144-104]

Performance and validation of a suborbital FUV spatial heterodyne spectro-polarimeter optimized for wide-field observations of interplanetary hydrogen, Walter Harris, Jason Corliss, The Univ. of Arizona (USA) . . . . . [9144-105]

High efficiency detector arrays and high reflectivity optical coatings for efficient UV/optical systems, Shouleh Nikzad, Jet Propulsion Lab. (USA) . . . . . [9144-106]

Multi object spectrograph of the fireball balloon experiment, Robert Grange, Gerard R. Lemaitre, Samuel Quiret, Bruno Milliard, Sandrine Pascal, Lab. d'Astrophysique de Marseille (France) . . . . . [9144-107]

SUAVE: a UV telescope for space weather and UV solar variability studies, Luc Damé, Mustapha Meftah, Abdanour Irbah, Alain Sarkissian, LATMOS (France) . . . . . [9144-108]

The FIREBall-2 UV grating efficiency, Samuel Quiret, Bruno Milliard, Robert Grange, Aix-Marseille Univ. (France) . . . . . [9144-109]

Improved ground calibration results from Southwest Research Institute ultraviolet radiometric calibration facility (UV-RCF), Michael W. Davis, Thomas K. Greathouse, G. Randall Gladstone, Kurt D. Retherford, S. A. Stern, Maarten H. Versteeg, Southwest Research Institute (USA) . . . . . [9144-110]

An introduction to the IAAT ultraviolet MCP detector development, Stephan Hermanutz, Jürgen Barnstedt, Sebastian Diebold, Christoph Kalkuhl, Norbert Kappelmann, Marc Pfeifer, Thomas Schanz, Klaus Werner, Eberhard Karls Univ. Tübingen (Germany); Daniel M. Schaadt, TU Claustahl (Germany) . . . . . [9144-111]

New facilities for Al+MgF2 coating for 2-m class mirrors for UV, Valery Zhupanov, Luch Research and Production Association (Russian Federation); Oleg Vlasenko, Olga Bazhenova, Mikhail Sachkov, Institute of Astronomy (Russian Federation) . . . . . [9144-112]

LUCI: lunar ultraviolet cosmic imager, Joice Mathew, Jayant Murthy, Margarita Safonova, Rekhesh Mohan, Indian Institute of Astrophysics (India); Norbert Kappelmann, Eberhard Karls Univ. Tübingen (Germany) and Institute of Astronomy and Astrophysics (Germany); Noah Brosch, Tel Aviv Univ. (Israel); Arpit Sharma, Rahul Narayan, Axiom Research Labs. Private Ltd. (India); Sreejith A. G., Indian Institute of Astrophysics (India) . . . . . [9144-113]

Narrowband filters for the FUV range, Luis Rodríguez-De Marcos, Juan I. Larruquert, José A. Méndez, José A. Aznárez Candao, Manuela Vidal-Dasilva, Consejo Superior de Investigaciones Científicas (Spain); Liping Fu, Ctr. for Space Science and Applied Research (China) . . . . . [9144-114]

Characterisation of low power readout electronics for a UV microchannel plate detector with cross-strip readout, Marc Pfeifer, Jürgen Barnstedt, Sebastian Diebold, Stephan Hermanutz, Christoph Kalkuhl, Norbert Kappelmann, Thomas Schanz, Klaus Werner, Eberhard Karls Univ. Tübingen (Germany) . . . . . [9144-116]

Performance characterization of UV science cameras designed for the chromospheric Lyman-alpha spectro-polarimeter (CLASP), Patrick R. Champey, The Univ. of Alabama in Huntsville (USA); Ken Kobayashi, Amy R. Winebarger, Jonathan W. Cirtain, David Hyde, Bryan Robertson, Brent Beabout, Dyana Beabout, NASA Marshall Space Flight Ctr. (USA); Mike Stewart, The Univ. of Alabama in Huntsville (USA) . . . . . [9144-117]

High-throughput telescope and spectropolarimeter for the CLASP sounding rocket project, Noriyuki Narukage, Ryouhei Kano, Takamasa Bando, Ryoko Ishikawa, Masahito Kubo, Yukio Katsukawa, Shin-nosuke Ishikawa, Yoshinori Suematsu, Hirohisa Hara, Toshihiko Kobiki, National Astronomical Observatory of Japan (Japan); Saku Tsuneta, Taro Sakao, Japan Aerospace Exploration Agency (Japan); Kenta Miyagawa, The Univ. of Tokyo (Japan); Gabriel Giono, The Graduate Univ. for Advanced Studies (Japan); Ken Kobayashi, Amy R. Winebarger, NASA Marshall Space Flight Ctr. (USA); Frédéric Auchère, Institut d'Astrophysique Spatiale (France) . . . . . [9144-118]

UVMag: spatial UV and visible spectropolarimetry, Martin Pertenais, IRAP, Observatoire Midi-Pyrenees (France); Laurent P. Parès, IRAP, Observatoire Midi-Pyrénées (France) and Univ. Toulouse (France); Pascal M. Petit, IRAP, Observatoire Midi-Pyrenees (France) and Univ. Toulouse (France); Coralie Neiner, LESIA, Paris-Meudon Observatory (France) . . . . . [9144-119]

The Spectrometer telescope for imaging x-rays (STIX) onboard solar orbiter, Säm Krucker, Fachhochschule NordWestschweiz (Switzerland) and The STIX Consortium (Switzerland) . . . . . [9144-120]

The soft x-ray photon-counting telescope for solar observations, Taro Sakao, Japan Aerospace Exploration Agency (Japan); Noriyuki Narukage, Yoshinori Suematsu, National Astronomical Observatory of Japan (Japan); Kyoko Watanabe, Japan Aerospace Exploration Agency (Japan); Masumi Shimojo, National Astronomical Observatory of Japan (Japan); Shinsuke Imada, Nagoya Univ. (Japan); Shin-nosuke Ishikawa, National Astronomical Observatory of Japan (Japan); Edward E. DeLuca, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . [9144-121]

Current progress of CLASP's Ly-alpha optical elements alignment, Gabriel Giono, Ryoko Ishikawa, Yukio Katsukawa, Takamasa Bando, Ryouhei Kano, Yoshinori Suematsu, Noriyuki Narukage, National Astronomical Observatory of Japan (Japan); Frédéric Auchère, Institut d'Astrophysique Spatiale (France) . . . . . [9144-122]

Hardware and software architecture on board solar orbiter/METIS: an update, Maurizio Pancrazzi, Univ. degli Studi di Firenze (Italy) and INAF - Osservatorio Astrofisico di Arcetri (Italy); Mauro Focardi, INAF - Osservatorio Astrofisico di Arcetri (Italy) and Univ. degli Studi di Firenze (Italy); Michela C. Uslenghi, INAF - IASF Milano (Italy); Enrico Magli, Marco Ricci, Politecnico di Torino (Italy); Alessandro Bemporad, Gianalfredo Nicolini, INAF - Osservatorio Astronomico di Torino (Italy); Vincenzo Andretta, INAF - Osservatorio Astronomico di Capodimonte (Italy); Daniele Spadaro, INAF - Osservatorio Astrofisico di Catania (Italy); Federico Landini, Marco Romoli, INAF - Osservatorio Astrofisico di Arcetri (Italy); Ester Antonucci, Silvano Fineschi, INAF - Osservatorio Astronomico di Torino (Italy); Giampiero Naletto, Piergiorgio Nicolosi, Univ. degli Studi di Padova (Italy)[9144-123]

Complex of instrumentation KORTES for the EUV and x-ray imaging and spectroscopy of the solar corona, Sergey V. Shestov, Sergey V. Kuzin, Andrei A. Pertsov, Artem Ulyanov, P.N. Lebedev Physical Institute (Russian Federation) . . . . . [9144-124]

Solar simulation test up to 13 solar constants for the thermal balance of the Solar Orbiter EUI instrument, Laurence Rossi, Maria Zhukova, Lionel Jacques, Pierre Jamotton, Jean-Philippe A. Halain, Marie-Laure Hellin, Etienne Renotte, Pierre L. P. M. Rochus, Sylvie Liebecq, Alexandra Mazzoli, Univ. de Liège (Belgium) . . . . . [9144-125]

The dual-gain 10 µm back-thinned 3k × 3k CMOS-APS detector of the solar orbiter extreme UV imager, Jean-Philippe A. Halain, Arnaud Debaize, Jean-Marie Gillis, Lionel Jacques, Univ. de Liège (Belgium); Tine De Ridder, Lou Hermans, Manuel Koch, Guy Meynants, Gert Schippers, CMOSIS nv (Belgium) . . . [9144-126]

Cross strip anode readouts for large format, photon counting microchannel plate detectors: developing flight qualified prototypes of the detector and electronics, John V. Vallerga, Univ. of California, Berkeley (USA); Michael Cooney, Univ. of Hawai'i at Manoa (USA); Rick Raffanti, Techne Instruments (USA); Gary Varner, Univ. of Hawai'i at Manoa (USA); Oswald H. W. Siegmund, Jason McPhate, Anton Tremsin, Univ. of California, Berkeley (USA) . . . . . [9144-129]

The new event analysis of the Fermi Large Area telescope, Carmelo Sgrò, Istituto Nazionale di Fisica Nucleare (Italy) . . . . . [9144-131]

Integrated optomechanical modeling of large space based telescope Fresnel lenses, Mahdi Rahmani, Fouad Lakhdari, Karim Benmessai, Fares Kanouni, Recherche en Optique et Photonique (Algeria) . . . . . [9144-134]

Calibration of the Compton spectrometer and Imager in preparation for the 2014 balloon campaign, Carolyn Kierans, Steven E. Boggs, Alexander W. Lowell, John A. Tomsick, Andreas Zoglauer, Jeng-Lun Chiu, Univ. of California, Berkeley (USA); Mark S. Amman, Lawrence Berkeley National Lab. (USA); Hsiang-Kuang Chang, National Tsing Hua Univ. (Taiwan); Chih-Hsun Lin, Academia Sinica (Taiwan); Pierre Jean, Peter von Ballmoos, Institut de Recherche en Astrophysique et Planétologie (France); Yi Chou, Yuan-Hann Chang, National Central Univ. (Taiwan); Chien-Ying Yang, Jie-Rou Shang, National Tsing Hua Univ. (Taiwan); Chao-Hsiung Tseng, National Central Univ. (Taiwan) . . . . . [9144-136]

Monte Carlo simulations of gamma-ray space telescopes: a BoGEMMS multi-purpose application, Valentina Fioretti, Andrea A. Bulgarelli, INAF - IASF Bologna (Italy); Marco Tavani, Sabina Sabatini, Istituto di Astrofisica e Planetologia Spaziali (Italy); Giuseppe Malaguti, Massimo Trifoglio, Fulvio Gianotti, INAF - IASF Bologna (Italy) . . . . . [9144-137]

The x-ray timing and polarization satellite, Yongwei Dong, Institute of High Energy Physics (China) . . . . . [9144-140]

Current status of the GRAPE balloon program, Mark L. McConnell, Peter F. Bloser, Camden Ertley, Jason S. Legere, James M. Ryan, Sambid K. Wasti, The Univ. of New Hampshire (USA) . . . . . [9144-141]

Fifteen years of the advanced CCD imaging spectrometer, Catherine E. Grant, Marshall W. Bautz, Peter G. Ford, Massachusetts Institute of Technology (USA); Paul P. Plucinsky, Harvard-Smithsonian Ctr. for Astrophysics (USA). . . . [9144-142]

Research on ICCD for space observation of cosmic ray and dark matter, Bingliang Hu, Xi'an Institute of Optics and Precision Mechanics (China) . [9144-144]

Monte Carlo simulation of HERD calorimeter, Ming XU, Institute of High Energy Physics, CAS (China). . . . . [9144-145]

Current progress in the development of TES-based x-ray spectrometers, Joseph S. Adams, Simon R. Bandler, Gabriele L. Betancourt-Martinez, James A. Chervenak, Meng P. Chiao, Megan E. Eckart, Audrey J. Ewin, Fred M. Finkbeiner, Richard L. Kelley, Caroline A. Kilbourne, Sang-Jun Lee, Maurice A. Leutenegger, Frederick S. Porter, John E. Sadleir, Stephen J. Smith, Edward J. Wassell, NASA Goddard Space Flight Ctr. (USA); William B. Doriese, Joseph W. Fowler, Johnathan D. Gard, Gene C. Hilton, Carl D. Reintsema, Daniel R. Schmidt, Joel N. Ullom, National Institute of Standards and Technology (USA); Kent D. Irwin, Stanford Univ. (USA); Peter Beiersdorfer, Gregory V. Brown, Lawrence Livermore National Lab. (USA) . . . . . [9144-146]

The transition-edge EBIT microcalorimeter spectrometer, Gabriele L. Betancourt-Martinez, Univ. of Maryland, College Park (USA) and NASA Goddard Space Flight Ctr. (USA); Joseph S. Adams, Simon R. Bandler, NASA Goddard Space Flight Ctr. (USA); Peter Beiersdorfer, Gregory V. Brown, Lawrence Livermore National Lab. (USA); Megan E. Eckart, Richard L. Kelley, Caroline A. Kilbourne, Maurice A. Leutenegger, Frederick S. Porter, NASA Goddard Space Flight Ctr. (USA); Carl D. Reintsema, National Institute of Standards and Technology (USA); Stephen J. Smith, NASA Goddard Space Flight Ctr. (USA); Joel N. Ullom, National Institute of Standards and Technology (USA) . . . . . [9144-147]

Progress towards a double flux-locked-loop scheme for SQuID readout of TES detector arrays, Guido Torrioli, Istituto di Fotonica e Nanotecnologie (Italy); Luigi Piro, Claudio Macculi, Luca Colasanti, Istituto di Astrofisica e Planetologia Spaziali (Italy) . . . . . [9144-148]

Performance Improvement of x-ray CCDs by applying a magnetic field, Keisuke Kondo, Tadayasu Dotani, Masanobu Ozaki, Masachika Iwai, Japan Aerospace Exploration Agency (Japan) . . . . . [9144-149]

The use of Schottky CdTe detectors for high-energy astronomy: application to the detection plane of the instrument SVOM/ECLAIRs, Guillaume Nasser, Carine Amoros, Jean-Luc Atteia, Didier Barret, Institut de Recherche en Astrophysique et Planétologie (France); Bertrand Cordier, Institut de Recherche en Astrophysique et Planétologie (France) and CEA-Ctr. de SACLAY (France); Sandra Bordon, Institut de Recherche en Astrophysique et Planétologie (France); François Gonzalez, Ctr. National d'Études Spatiales (France); Baptiste Houret, Karine Lacombe, Pierre Mandrou, Wilfried Marty, Institut de Recherche en Astrophysique et Planétologie (France); Karine Mercier, Ctr. National d'Études Spatiales (France); Roger Pons, Damien Rambaud, Pascale Ramon, Gilbert Rouaix, Vincent Waegebaert, Olivier Godet, Institut de Recherche en Astrophysique et Planétologie (France) [9144-150]

A cadmium telluride 3D spectrometer for a hard x-ray balloon borne payload, Ezio Caroli, Natalia Auricchio, INAF - IASF Bologna (Italy); Carl Budtz-Jørgensen, DTU Space (Denmark); Rui M. Curado da Silva, Univ. de Coimbra (Portugal); Stefano Del Sordo, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Philippe R. Ferrando, AstroParticule et Cosmologie (France); Philippe Laurent, Olivier Limousin, CEA-Ctr. de SACLAY (France); José L. Galvèz, Margarita Hernanz, Jordi Isern, Consejo Superior de Investigaciones Científicas (Spain); Irfan Kuvvetli, DTU Space (Denmark); Jorge M. Maia, Univ. da Beira Interior (Portugal); Aline Meuris, CEA-Ctr. de SACLAY (France); Nicolas Produit, Univ. de Genève (Switzerland); John B. Stephen, INAF - IASF Bologna (Italy); Andrea Zappettini, Istituto dei Materiali per l Elettronica ed il Magnetismo (Italy). [9144-151]

SuperHERO: the next generation hard x-ray HEROES telescope, Jessica A. Gaskin, NASA Marshall Space Flight Ctr. (USA); Steven D. Christe, NASA Goddard Space Flight Ctr. (USA); Colleen Wilson-Hodge, NASA Marshall Space Flight Ctr. (USA); Albert Y. M. Shih, NASA Goddard Space Flight Ctr. (USA); Brian D. Ramsey, Allyn F. Tennant, Douglas A. Swartz, NASA Marshall Space Flight Ctr. (USA) . . . . . [9144-152]

Preserving accurate figures in coating and bonding mirrors for lightweight x-ray telescopes, Kai-Wing Chan, NASA Goddard Space Flight Ctr. (USA) and Univ. of Maryland, Baltimore County (USA); William W. Zhang, NASA Goddard Space Flight Ctr. (USA); Marton V. Sharpe, James R. Mazzarella, Ryan S. McClelland, Michael P. Biskach, SGT, Inc. (USA); Timo T. Saha, Linette D. Kolos, NASA Goddard Space Flight Ctr. (USA); Mao-Ling N. Hong, SGT, Inc. (USA) . . . . . [9144-153]

Process of constructing a lightweight x-ray flight mirror assembly, Ryan S. McClelland, SGT, Inc. (USA); William W. Zhang, NASA Goddard Space Flight Ctr. (USA); Michael P. Biskach, SGT, Inc. (USA); Timo T. Saha, Kai-Wing Chan, NASA Goddard Space Flight Ctr. (USA) . . . . . [9144-154]

Analysis of the optical surface properties in the indirect glass slumping, Anita Winter, Laura Proserpio, Peter Friedrich, Elias Breunig, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-156]

Mounting for fabrication, metrology, and assembly of full-shell grazing-incidence optics, Jacqueline M. Roche, Mikhail V. Gubarev, Jeffery J. Kolodziejczak, Stephen L. O'Dell, Martin C. Weisskopf, Brian D. Ramsey, Ronald F. Elsner, NASA Marshall Space Flight Ctr. (USA) . . . . . [9144-157]

Bendable x-ray optics for high resolution imaging, Mikhail V. Gubarev, Brian D. Ramsey, NASA Marshall Space Flight Ctr. (USA); Kiranmayee Kilaru, Universities Space Research Association (USA); Carolyn Atkins, The Univ. of Alabama in Huntsville (USA); David M. Broadway, NASA Marshall Space Flight Ctr. (USA) . . . . . [9144-158]

Fabrication of single crystal silicon mirror substrates for x-ray astronomical missions, Raul E. Riveros, Vincent T. Bly, Linette D. Kolos, NASA Goddard Space Flight Ctr. (USA); Kevin P. McKeon, James R. Mazzarella, SGT, Inc. (USA); Timothy M. Miller, William W. Zhang, NASA Goddard Space Flight Ctr. (USA) . . . [9144-160]

Alignment and integration of thin, lightweight x-ray optics into modules, Michael P. Biskach, SGT, Inc. (USA) and NASA Goddard Space Flight Ctr. (USA); Kai-Wing Chan, The Ctr. for Research and Exploration in Space Science and Technology (USA) and NASA Goddard Space Flight Ctr. (USA); James R. Mazzarella, Ryan S. McClelland, SGT, Inc. (USA) and NASA Goddard Space Flight Ctr. (USA); Timo T. Saha, NASA Goddard Space Flight Ctr. (USA); Mark J. Schofield, SGT, Inc. (USA) and NASA Goddard Space Flight Ctr. (USA); William W. Zhang, NASA Goddard Space Flight Ctr. (USA) . . . . . [9144-161]

Studies of lightweight x-ray telescope with CFRP, Satoshi Sugita, Hisamitsu Awaki, Daisen Kurihara, Kenya Yoshioka, Yuuki Tomita, Keiji Ogi, Ehime Univ. (Japan); Hideyo Kunieda, Hironori Matsumoto, Takuya Miyazawa, Nagoya Univ. (Japan); Toshihiro Iwase, Ehime Univ. (Japan); Tatsuya Hibino, Takashi Ishikawa, Nagoya Univ. (Japan); Takayoshi Hamada, Naoki Ishida, Tamagawa Engineering Co., Ltd. (Japan); Hiromichi Akiyama, Kazuaki Kishimoto, Mitsubishi Heavy Industries, Ltd. (Japan); Shin Utsunomiya, Tomohiro Kamiya, Japan Aerospace Exploration Agency (Japan). . . . . [9144-162]

Industrialization scenarios for x-ray telescopes production based on glass slumping, Laura Proserpio, Elias Breunig, Peter Friedrich, Anita Winter, Max-Planck-Institut für extraterrestrische Physik (Germany); Thorsten Doehring, Hochschule Aschaffenburg (Germany) . . . . . [9144-163]

Characterising x-ray mirror deformations with a phase measuring deflectometry system, Elias Breunig, Peter Friedrich, Anita Winter, Laura Proserpio, Max-Planck-Institut für extraterrestrische Physik (Germany) . [9144-164]

Upgrade of the thirty-meter x-ray pencil beam line at the institute of space and astronautical science, Takayuki Hayashi, Institute of Space and Astronautical Science (Japan); Toshiki Sato, Institute of Space and Astronautical Science (Japan) and Tokyo Metropolitan Univ. (Japan); Kazuki Tomikawa, Japan Aerospace Exploration Agency (Japan) and Tokyo Metropolitan Univ. (Japan); Naomichi Kikuchi, Takuro Sato, Institute of Space and Astronautical Science (Japan) and Tokyo Metropolitan Univ. (Japan); Ryo Iizuka, Institute of Space and Astronautical Science (Japan); Yoshitomo Maeda, Tokyo Metropolitan Univ. (Japan); Manabu Ishida, Institute of Space and Astronautical Science (Japan). . . . . [9144-165]

Alignment and Integration of slumped glass x-Ray mirror at MPE, Elias Breunig, Peter Friedrich, Anita Winter, Laura Proserpio, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-166]

A high resolution large x-ray mission based on thin glass: optomechanical design, Stefano Basso, Enrico Buratti, Giovanni Pareschi, Marta M. Civitani, Mauro Ghigo, Bianca Salmaso, Daniele Spiga, Gianpiero Tagliaferri, INAF - Osservatorio Astronomico di Brera (Italy). . . . . [9144-167]

Fine figure correction of thin silicon and glass substrates using ion implantation, Brandon Chalifoux, Ralf K. Heilmann, Mark L. Schattenburg, Massachusetts Institute of Technology (USA) . . . . . [9144-168]

Monte-Carlo simulations of x-ray tracing based on geant4 and xrtg4 for the wide field x-ray telescope on-board the Einstein probe satellite, Donghua Zhao, Chen Zhang, Shuangnan Zhang, Weimin Yuan, National Astronomical Observatories (China) . . . . . [9144-169]

Manufacture of aspherical molding dies for x-ray telescopes after ASTRO-H, Yoshiharu Namba, Anthony T. H. Beaucamp, Chubu Univ. (Japan); Hironori Matsumoto, Keisuke Tamura, Yuzuru Tawara, Hideyo Kunieda, Nagoya Univ. (Japan); Tadayuki Takahashi, Institute of Space and Astronautical Science (Japan). . . . . [9144-170]

Enhanced far-ultraviolet reflectance of MgF2 over-coated Al mirror coatings, Manuel A. Quijada, Javier G. Del Hoyo, Stephen H. Rice, NASA Goddard Space Flight Ctr. (USA). . . . . [9144-171]

Recent developments and results of new ultraviolet reflective mirror coatings, Christopher S. Moore, Univ. of Colorado at Boulder (USA); John Hennessy, April D. Jewell, Shouleh Nikzad, Jet Propulsion Lab. (USA); Kevin France, Univ. of Colorado at Boulder (USA); Matthew Beasley, Planetary Resources, Inc. (USA); Frank Greer, Intermolecular, Inc. (USA) . . . . . [9144-172]

Data acquisition system and ground calibration of polarized gamma-ray observer (PoGOLite), Hiromitsu Takahashi, Hiroshima Univ. (Japan). . . [9144-175]

The development of gamma-ray burst polarimeter for a small satellite, Shuichi Gunji, Takeshi Nakamori, Mitsumasa Sakano, Jun Katagiri, Tatsuya Kishikawa, Koki Kato, Sayaka Kimura, Yamagata Univ. (Japan). . . . . [9144-176]

Simulation results of a GEM TPC based soft x-ray polarimeter, Rakhee Kushwah, ISRO Satellite Ctr. (India) and Univ. of Calicut (India); V. Koushal, V. Radhakrishna, ISRO Satellite Ctr. (India); Vinodkumar A. M., Univ. of Calicut (India). . . . . [9144-178]

Monte-Carlo estimation of the infligt performance of the GEMS satellite x-ray polarimeter, Takao Kitaguchi, Toru Tamagawa, Asami Hayato, RIKEN (Japan); Teruaki Enoto, RIKEN (Japan) and NASA Goddard Space Flight Ctr. (USA); Akifumi Yoshikawa, Kenta Kaneko, Yoko Takeuchi, RIKEN (Japan) and Tokyo Univ. of Science (Japan); J. Kevin Black, Joanne E. Hill, Keith M. Jahoda, John F. Krizmanic, Steven J. Sturner, NASA Goddard Space Flight Ctr. (USA); Scott Griffiths, Philip E. Kaaret, Hannah R. Marlowe, The Univ. of Iowa (USA) . . . . . [9144-181]

Performance verification of the GEMS satellite x-ray polarimeter, Teruaki Enoto, RIKEN (Japan) and NASA Goddard Space Flight Ctr. (USA); J. Kevin Black, NASA Goddard Space Flight Ctr. (USA); Takao Kitaguchi, RIKEN (Japan); Joanne E. Hill, Keith M. Jahoda, David Kenward, NASA Goddard Space Flight Ctr. (USA); Toru Tamagawa, Asami Hayato, RIKEN (Japan); Kenta Kaneko, Yoko Takeuchi, Akifumi Yoshikawa, RIKEN (Japan) and Tokyo Univ. of Science (Japan); Scott Griffiths, Philip E. Kaaret, Hannah R. Marlowe, The Univ. of Iowa (USA); Syed Khalid, Brookhaven National Lab. (USA). . . . . [9144-182]

Properties of the flight model gas electron multiplier for the GEMS mission, Yoko Takeuchi, RIKEN (Japan) and Tokyo Univ. of Science (Japan); Toru Tamagawa, Takao Kitaguchi, Asami Hayato, RIKEN (Japan); Fumi Asami, Akifumi Yoshikawa, Kenta Kaneko, RIKEN (Japan) and Tokyo Univ. of Science (Japan); Teruaki Enoto, RIKEN (Japan) and NASA Goddard Space Flight Ctr. (USA); J. Kevin Black, Joanne E. Hill, Keith M. Jahoda, NASA Goddard Space Flight Ctr. (USA) . . . . . [9144-183]

Development of CCDs for REXIS on OSIRIS-REx, Kevin K. Ryu, Barry E. Burke, Harry R. Clark, Renee D. Lambert, Peter O'Brien, Vyshnavi Suntharalingam, Christopher M. Ward, Keith Warner, MIT Lincoln Lab. (USA); Marshall W. Bautz, Richard P. Binzel, Steven E. Kissel, Rebecca A. Masterson, Massachusetts Institute of Technology (USA) . . . . . [9144-199]

Effect of a magnetic field generated by permanent magnets on the GPD polarization sensitivity, Paolo Soffitta, Enrico Costa, INAF - IASF Roma (Italy); Alfredo Morbidini, Fabio Muleri, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Daniele Spiga, INAF - Osservatorio Astronomico di Brera (Italy); Ronaldo Bellazzini, Alessandro Brez, Luca de Ruvo, Massimo Minuti, Michele Pinchera, Gloria Spandre, Istituto Nazionale di Fisica Nucleare (Italy) . . . . . [9144-245]

TUESDAY 24 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . TUE 8:50 TO 10:00

Session Chair: **Gillian S. Wright,** UK Astronomy Technology Ctr. (United Kingdom)

8:50: **SPIE Fellows Awards** presented by H. Philip Stahl, President of SPIE. The following individuals will be recognized for their contributions to SPIE and the scientific community: **Mark Clampin,** NASA Goddard Space Flight Ctr. (United States); **Gary Matthews,** Exelis Inc. (United States); **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (United States)

9:00: **Gaia: scientific in-orbit performance** *(Plenary),* Timo Prusti, European Space Agency (Netherlands) . . . . . [9143-503]

9:30: **ALMA Update** *(Plenary)*, Pierre Cox, Joint ALMA Observatory (Chile); Stuartt A. Corder, National Radio Astronomy Observatory (Chile) [9143-504]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 11

LOCATION: ROOM 520B . . . . . TUE 10:30 TO 12:00

X-ray Optics I

Session Chair: **Richard Willingale,** Univ. of Leicester (United Kingdom)

10:30: **Lightweight and high-resolution optics for next generation x-ray observatories**, William W. Zhang, NASA Goddard Space Flight Ctr. (USA)[9144-40]

10:45: **High angular resolution x-ray telescopes based on glass foils: achievements and perspectives**, Marta M. Civitani, Stefano Basso, Mauro Ghigo, Giovanni Pareschi, Bianca Salmaso, Daniele Spiga, Gianpiero Tagliaferri, Gabriele Vecchi, INAF - Osservatorio Astronomico di Brera (Italy); Vadim Burwitz, Gisela Hartner, Benedikt Menz, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-41]

11:00: **The new generation of x-ray reflection gratings**, Randall L. McEntaffer, The Univ. of Iowa (USA) . . . . . [9144-42]

11:15: **Optical design for a survey x-ray telescope**, Timo T. Saha, William W. Zhang, NASA Goddard Space Flight Ctr. (USA); Ryan S. McClelland, NASA Goddard Space Flight Ctr. (USA) and SGT, Inc. (USA). . . . . [9144-43]

11:30: **Next generation very hard x-ray optic design and implementation**, Nicolai F. Brejnholt, Marie-Anne Descalle, Regina Soufli, Michael J. Pivovaroff, Lawrence Livermore National Lab. (USA) . . . . . [9144-44]

11:45: **Fabrication of large-area critical-angle x-ray transmission gratings**, Ralf K. Heilmann, MIT Kavli Institute for Astrophysics and Space Research (USA); Alexander R. Bruccoleri, Izentis LLC (USA); Dong Guan, Mark L. Schattenburg, MIT Kavli Institute for Astrophysics and Space Research (USA) . . . . . [9144-45]

Lunch Break . . . . . Tue 12:00 to 13:10

SESSION 12

LOCATION: ROOM 520B . . . . . TUE 13:10 TO 14:55

X-ray Optics II

Session Chair: **Hisamitsu Awaki,** Ehime Univ. (Japan)

13:10: **Manufacture and x-ray measurement of novel generation of bent Silicon Laue lens components**, Marcelo D. Ackermann, cosine Research B.V. (Netherlands); Nicolas M. Barrière, Univ. of California, Berkeley (USA); Ramses Guenther, cosine Research B.V. (Netherlands); Jeroen Haneveld, Micronit Microfluidics B.V. (Netherlands); Colin A. Wade, Univ. of California, Berkeley (USA); Giuseppe Vacanti, Maximilien Collon, Marco W. Beijersbergen, cosine Research B.V. (Netherlands) . . . . . [9144-46]

13:25: **Progress on indirect glass slumping for future x-ray telescope optics**, Anita Winter, Laura Proserpio, Peter Friedrich, Elias Breunig, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-47]

13:40: **Measuring the performance of adjustable x-ray optics with wavefront sensing**, Ryan Allured, Vincenzo Cotroneo, Stuart McMuldroch, Paul B. Reid, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9144-48]

13:55: **Development of the x-ray timing and polarization telescope optics**, Zhanshan Wang, Zhengxiang Shen, Baozhong Mu, Xin Wang, Li Jiang, Zhong Zhang, Bin Ma, Tongji Univ. (China) . . . . . [9144-49]

14:10: **Miniature lightweight x-ray optics (MiXO) for solar system exploration**, Jae Sub Hong, Jonathan E. Grindlay, Suzanne E. Romaine, Harvard-Smithsonian Ctr. for Astrophysics (USA); Brian D. Ramsey, NASA Marshall Space Flight Ctr. (USA); Richard P. Binzel, Massachusetts Institute of Technology (USA); William V. Boynton, The Univ. of Arizona (USA); Paul Gorenstein, Ralph P. Kraft, Martin Elvis, Scott J. Wolk, Randall K. Smith, Almus T. Kenter, Harvard-Smithsonian Ctr. for Astrophysics (USA); Lucy Lim, NASA Goddard Space Flight Ctr. (USA); Carey Lisse, Johns Hopkins Univ. (USA); Graziella Branduardi-Raymont, Univ. College London (United Kingdom); Branden T. Allen, Julia Lee, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9144-50]

14:25: **Soft x-ray spectroscopy with the off-plane grating rocket experiment (OGRE)**, Casey T. DeRoo, Randall L. McEntaffer, Ted B. Schultz, The Univ. of Iowa (USA); William W. Zhang, NASA Goddard Space Flight Ctr. (USA); Neil J. Murray, James H. Tutt, The Open Univ. (United Kingdom); Stephen L. O'Dell, NASA Marshall Space Flight Ctr. (USA); Webster Cash, Univ. of Colorado at Boulder (USA) . . . . . [9144-51]

14:40: **Development of light weight replicated x-ray optics: II**, Suzanne E. Romaine, Ricardo Bruni, Harvard-Smithsonian Ctr. for Astrophysics (USA); Brian Choi, ReliaCoat Technologies, LLC (USA); Paul Gorenstein, Harvard-Smithsonian Ctr. for Astrophysics (USA); Christopher Jensen, ReliaCoat Technologies, LLC (USA); Brian D. Ramsey, National Space Science and Technology Ctr. (USA); Sanjay Sampath, Stony Brook Univ. (USA) . . . . . [9144-52]

Coffee Break . . . . . Tue 14:55 to 15:25

SESSION 13

LOCATION: ROOM 520B . . . . . TUE 15:25 TO 16:55

Instrumentation for Polarimetry

Session Chair: **Martin C. Weisskopf,** NASA Marshall Space Flight Ctr. (USA)

15:25: **A high energy Compton polarimeter for the POET SMEX mission**, Peter F. Bloser, Mark L. McConnell, Jason S. Legere, Camden Ertley, The Univ. of New Hampshire (USA); Joanne E. Hill, NASA Goddard Space Flight Ctr. (USA); James M. Ryan, The Univ. of New Hampshire (USA) . . . . . [9144-53]

15:40: **WPOL: a DSSD-based hard x-ray wide field imager and polarimeter**, Philippe Laurent, Olivier Limousin, François Lebrun, Commissariat à l'Énergie Atomique (France); Walter Bertoli, Mohamad Khalil, Eric Bréelle, AstroParticule et Cosmologie (France) . . . . . [9144-54]

15:55: **The use of laterally graded multilayer mirrors for soft x-ray polarimetry**, Herman L. Marshall, Brian Remlinger, Massachusetts Institute of Technology (USA); David L. Windt, Reflective X-Ray Optics LLC (USA); Eric M. Gullikson, Lawrence Berkeley National Lab. (USA); Norbert S. Schulz, Massachusetts Institute of Technology (USA) . . . . . [9144-55]

16:10: **Development of the depth-graded multilayers for x-ray timing and polarization mission**, Li Jiang, Runze Qi, Mingwu Wen, Bin Ma, Zhong Zhang, Zhanshan Wang, Tongji Univ. (China); Yuhong Bai, Changchun Institute of Optics, Fine Mechanics and Physics (China). . . . . [9144-56]

16:25: **HARPO: a TPC as a gamma-ray telescope and polarimeter**, Denis Bernard, Philippe Bruel, Mickael Frotin, Yannick Geerebaert, Berrie Giebels, Philippe Gros, Deirdre Horan, Marc Louzir, Patrick Poilleux, Igor Semeniouk, Shaobo Wang, Lab. Leprince-Ringuet (France); Shebli Anvar, David Attié, Alain Delbart, CEA-IRFU (France); Patrick Sizun, CEA-Ctr. de SACLAY (France); Paul Colas, CEA-IRFU (France); Diego Götz, CEA-Ctr. de SACLAY (France) and Univ. Paris 7-Denis Diderot (France) . . . . . [9144-57]

16:40: **Design improvements and x-ray performance of a time projection chamber polarimeter for persistent astronomical sources**, Joanne E. Hill, NASA Goddard Space Flight Ctr. (USA); J. Kevin Black, NASA Goddard Space Flight Ctr. (USA) and Rock Creek Scientific (USA); Keith M. Jahoda, Thomas J. Emmett, NASA Goddard Space Flight Ctr. (USA); David S. Nolan, SGT, Inc. (USA); Toru Tamagawa, Takao Kitaguchi, RIKEN (Japan) . . . . . [9144-58]

SESSION 14

LOCATION: ROOM 520B . . . . . TUE 16:55 TO 17:55

MAXI and NuStar

Session Chair: **Mikhail N. Pavlinsky,** Space Research Institute (Russian Federation)

16:55: **MAXI: all-sky observation from the International Space Station**, Tatehiro Mihara, Mutsumi Sugizaki, Masaru Matsuoka, RIKEN (Japan); Hiroshi Tomida, Shiro Ueno, Japan Aerospace Exploration Agency (Japan); Hitoshi Negoro, Nihon Univ. (Japan); Atsumasa Yoshida, Aoyama Gakuin Univ. (Japan); Hiroshi Tsunemi, Osaka Univ. (Japan); Motoki Nakajima, Nihon Univ. (Japan); Yoshihiro Ueda, Kyoto Univ. (Japan); Makoto Yamauchi, Univ. of Miyazaki (Japan) . . . . . [9144-59]

17:10: **The nuclear spectroscopic telescope array (NuSTAR) high-energy x-ray mission**, Kristin K. Madsen, Fiona A. Harrison, California Institute of Technology (USA); Finn E. Christensen, DTU Space (Denmark); William W. Craig, Univ. of California, Berkeley (USA); Charles J. Hailey, Columbia Univ. (USA); William W. Zhang, NASA Goddard Space Flight Ctr. (USA); Steven E. Boggs, Univ. of California, Berkeley (USA); Daniel K. Stern, Jet Propulsion Lab. (USA); Hongjun An, McGill Univ. (Canada); Walter R. Cook, Karl Forster, Felix Fuerst, Brian W. Grefenstette, California Institute of Technology (USA); Takao Kitaguchi, RIKEN (Japan); Craig B. Markwardt, NASA Goddard Space Flight Ctr. (USA); Peter H. Mao, Hiromasa Miyasaka, Vikram R. Rana, California Institute of Technology (USA); Andreas Zoglauer, Univ. of California, Berkeley (USA); Dominic J. Walton, California Institute of Technology (USA); Niels Joergen S. Westergaard, DTU Space (Denmark) . . . . . [9144-60]

17:25: **PSF calibration of the hard x-ray optics of the Nuclear Spectroscopic telescope Array**, Hongjun An, McGill Univ. (Canada); Kristin K. Madsen, California Institute of Technology (USA); Niels Joergen S. Westergaard, Technical Univ. of Denmark (Denmark); Jason E. Koglin, Kavli Institute for Particle Astrophysics & Cosmology (USA); Steven E. Boggs, Univ. of California, Berkeley (USA); Finn E. Christensen, Technical Univ. of Denmark (Denmark); William W. Craig, Lawrence Livermore National Lab. (USA); Charles J. Hailey, Columbia Univ. (USA); Fiona A. Harrison, California Institute of Technology (USA); Victoria M. Kaspi, McGill Univ. (Canada); Daniel K. Stern, Jet Propulsion Lab. (USA); William W. Zhang, NASA Goddard Space Flight Ctr. (USA) . . . . . [9144-61]

17:40: **Inflight performance and calibration of the NuSTAR CdZnTe pixel detectors**, Takao Kitaguchi, RIKEN (Japan); Hongjun An, McGill Univ. (Canada); Mislav Balokovic, Eric C. Bellm, California Institute of Technology (USA); Varun Bhalerao, Inter-Univ. Ctr. for Astronomy and Astrophysics (India); Steven E. Boggs, Univ. of California, Berkeley (USA); Walter R. Cook, California Institute of Technology (USA); Finn E. Christensen, DTU Space (Denmark); William W. Craig, Lawrence Livermore National Lab. (USA) and Univ. of California, Berkeley (USA); Karl Forster, Felix Fuerst, Brian W. Grefenstette, Fiona A. Harrison, California Institute of Technology (USA); Charles J. Hailey, Columbia Univ. (USA); Kristin K. Madsen, Peter H. Mao, California Institute of Technology (USA); Craig B. Markwardt, NASA Goddard Space Flight Ctr. (USA); Hiromasa Miyasaka, Vikram R. Rana, California Institute of Technology (USA); Daniel K. Stern, Jet Propulsion Lab. (USA); Dominic J. Walton, California Institute of Technology (USA); Daniel R. Wik, William W. Zhang, NASA Goddard Space Flight Ctr. (USA); Andreas Zoglauer, Univ. of California, Berkeley (USA) . . . . . [9144-62]

CONFERENCE 9144 · LOCATION: ROOM 520B

WEDNESDAY 25 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . WED 9:00 TO 10:00

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

9:00: **Highlights from the Multi Unit Spectroscopic Explorer (MUSE): a 2nd generation VLT instrument for the VLT** *(Plenary)*, Roland M. Bacon, Observatoire de Lyon (France). . . . . [9147-506]

9:30: **Canadian Space Astronomy: past, present and future** *(Plenary)*, John B. Hutchings, NRC - Herzberg Institute of Astrophysics (Canada) [9143-505]

Coffee Break . . . . . Wed 10:00 to 10:30

SESSION 15

LOCATION: ROOM 520B . . . . . WED 10:30 TO 12:05

Future Missions I: Astrosat and Spektrum-Roentgen Gamma

Session Chair: **Kirpal Nandra,** Max-Planck-Institut für extraterrestrische Physik (Germany)

10:30: **The ASTROSAT Mission** *(Invited Paper)*, Kulinder Pal Singh, Tata Institute of Fundamental Research (India). . . . . [9144-63]

10:50: **eROSITA on SRG**, Peter Predehl, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-64]

11:05: **Status of ART-XC/SRG instrument**, Mikhail N. Pavlinsky, Valeriy V. Akimov, Vasily A. Levin, Igor Y. Lapshov, Alexey V. Tkachenko, Nikolay P. Semena, Mikhail Buntov, Alexander Glushenko, Vadim A. Arefiev, Alexander Yaskovich, Space Research Institute (Russian Federation); Rashid Sunyaev, Eugene Churazov, Marat Gilfanov, Space Research Institute (Russian Federation) and Max-Planck-Institut für Astrophysik (Germany); Sergey Grebenev, Sergey Sazonov, Mikhail G. Revnivtsev, Alexander A. Lutovinov, Sergey Molkov, Mikhail Kudelin, Tatyana Drozdova, Space Research Institute (Russian Federation); Sergey G. Garanin, Sergey V. Grigorovich, Dmitri N. Litvin, Valeriy P. Lazarchuk, Igor Roiz, Mikhail Garin, Russian Federal Nuclear Ctr. - All-Russian Research Institute of Experimental Physics (Russian Federation); Vladimir Babyshkin, Ilya Lomakin, Dmitriy Moskvinov, NPO Lavochkin (Russian Federation); Mikhail V. Gubarev, Brian D. Ramsey, Kiranmayee Kilaru, Stephen L. O'Dell, Jeffery J. Kolodziejczak, Ronald F. Elsner, NASA Marshall Space Flight Ctr. (USA). . . . . [9144-65]

11:20: **ART-XC/SRG: status of the x-ray optics development**, Mikhail V. Gubarev, Brian D. Ramsey, NASA Marshall Space Flight Ctr. (USA); Vyacheslav E. Zavlin, Douglas A. Swartz, Universities Space Research Association (USA); Ronald F. Elsner, Stephen L. O'Dell, NASA Marshall Space Flight Ctr. (USA); Kiranmayee Kilaru, Universities Space Research Association (USA); Carolyn Atkins, The Univ. of Alabama in Huntsville (USA); Jeffery E. McCracken, NASA Marshall Space Flight Ctr. (USA); Mikhail N. Pavlinsky, Alexey V. Tkachenko, Igor Y. Lapshov, Space Research Institute (Russian Federation) . . . . . [9144-66]

11:35: **Report on the eROSITA camera system**, Norbert Meidinger, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-67]

11:50: **The calibration and testing of the eROSITA x-ray mirror assemblies**, Vadim Burwitz, Peter Predehl, Heinrich Bräuninger, Peter Friedrich, Josef Eder, Wolfgang Burkert, Konrad Dennerl, Maria Fürmetz, Max-Planck-Institut für extraterrestrische Physik (Germany); Gabriele Grisoni, Media Lario Technologies (Italy); Gisela Hartner, Max-Planck-Institut für extraterrestrische Physik (Germany); Fabio Marioni, Media Lario Technologies (Italy); Benedikt Menz, Elmar Pfeffermann, Max-Planck-Institut für extraterrestrische Physik (Germany); Giuseppe Valsecchi, Media Lario Technologies (Italy) . . . . . [9144-68]

Lunch/Exhibition Break . . . . . Wed 12:05 to 13:25

SESSION 16

LOCATION: ROOM 520B . . . . . WED 13:25 TO 15:10

Future Missions II: Neutron Stars to Gamma-ray Bursts

Session Chair: **João Braga,** Instituto Nacional de Pesquisas Espaciais (Brazil)

13:25: **The IGM Project: searching for IGM emission from missing cosmic baryons over 0< z<7 with FIREBALL, ISTOS, and CWI**, D. Christopher Martin, California Institute of Technology (USA); David Schiminovich, Columbia Univ. (USA); Partick Morrissey, Mateusz Matuszewski, California Institute of Technology (USA); Shouleh Nikzad, Jet Propulsion Lab. (USA); Bruno Milliard, Observatoire Astronomique de Marseille-Provence (France) . . . . . [9144-69]

13:40: **Estimation of observation possibility of the x-ray interferometer with a x-ray beamsplitter**, Shunji Kitamoto, Shuzo Ogawa, Takato Komatsu, Rika Umezu, Juri Sugimoto, Hiroo Suzuki, Daisuke Nanbu, Hiroki Tsumura, Hiromi Seta, Akio Hoshino, Rikkyo Univ. (Japan) . . . . . [9144-70]

13:55: **The neutron star interior composition explorer (NICER): mission formulation**, Zaven Arzoumanian, NASA Goddard Space Flight Ctr. (USA) and The Ctr. for Research and Exploration in Space Science and Technology (USA) and Universities Space Research Association (USA); Keith C. Gendreau, Charles L. Baker, Phyllis Hestnes, Steven J. Kenyon, Robert P. Kozon, Kuo-Chia Liu, Sridhar S. Manthripragada, Alissa L. Mitchell, Jason W. Mitchell, Charles A. Monroe, Takashi Okajima, Daniel F. Powers, Bruce J. Savadkin, Luke B. Winternitz, Philip T. C. Chen, Michael R. Wright, NASA Goddard Space Flight Ctr. (USA); Gregory Y. Prigozhin, MIT Kavli Institute for Astrophysics and Space Research (USA); John P. Doty, Noqsi Aerospace, Ltd. (USA); Richard F. Foster, Ronald Remillard, MIT Kavli Institute for Astrophysics and Space Research (USA) . . . . . [9144-71]

14:10: **Introduction to the hard x-ray modulation telescope (HXMT) mission**, Shu Zhang, Institute of High Energy Physics (China) . . . . . [9144-72]

14:25: **The French payload on-board the SVOM French-Chinese mission**, Karine Mercier, François Gonzalez, Martine Jouret, Ctr. National d'Études Spatiales (France); Jean-Luc Atteia, Univ. de Toulouse (France); Stéphane Basa, Lab. d'Astrophysique de Marseille (France); Bertrand Cordier, Commissariat à l'Énergie Atomique (France); Diego Götz, CEA-Ctr. de SACLAY (France); Jianyan Wei, National Astronomical Observatories (China); Shuangnan Zhang, Institute of High Energy Physics (China) . . . . . [9144-73]

14:40: **The Microchannel X-ray telescope for the Gamma-Ray Burst mission SVOM**, Diego Götz, Commissariat à l'Énergie Atomique (France); Julian P. Osborne, Univ. of Leicester (United Kingdom); Bertrand Cordier, Jacques Paul, Commissariat à l'Énergie Atomique (France); Paul O'Brien, Phil Evans, George W. Fraser, Adrian Martindale, Univ. of Leicester (United Kingdom); Stéphane Basa, Lab. d'Astrophysique de Marseille (France); Christelle Rossin, Observatoire Astronomique de Marseille-Provence (France); Olivier Godet, Nathalie Webb, Institut de Recherche en Astrophysique et Planétologie (France); Jochen Greiner, Kirpal Nandra, Max-Planck-Institut für extraterrestrische Physik (Germany); Emanuele Perinati, Andrea E. Santangelo, Eberhard Karls Univ. Tübingen (Germany); Karine Mercier, François Gonzalez, Ctr. National d'Études Spatiales (France) . . . . . [9144-74]

14:55: **The X-/gamma-ray camera ECLAIRs for the gamma-ray burst mission SVOM**, Olivier Godet, Guillaume Nasser, Carine Amoros, Jean-Luc Atteia, Didier Barret, Sandra Bordon, Institut de Recherche en Astrophysique et Planétologie (France); Bertrand Cordier, Olivier Gevin, Commissariat à l'Énergie Atomique (France); François Gonzalez, Ctr. National d'Études Spatiales (France); Baptiste Houret, Institut de Recherche en Astrophysique et Planétologie (France); Cyril Lachaud, AstroParticule et Cosmologie (France); Karine Lacombe, Pierre Mandrou, Wilfried Marty, Institut de Recherche en Astrophysique et Planétologie (France); Karine Mercier, Ctr. National d'Études Spatiales (France); Roger Pons, Damien Rambaud, Pascale Ramon, Gilbert Rouaix, Institut de Recherche en Astrophysique et Planétologie (France); Stéphane Schanne, Commissariat à l'Énergie Atomique (France); Vincent Waegebaert, Institut de Recherche en Astrophysique et Planétologie (France); Henri E. Triou, Commissariat à l'Énergie Atomique (France) . . . . . [9144-75]

Coffee Break . . . . . Wed 15:10 to 15:40

SESSION 17

LOCATION: ROOM 520B . . . . . WED 15:40 TO 17:40

Future Missions III: ASTRO-H

Session Chair: **Didier Barret,** Institut de Recherche en Astrophysique et Planétologie (France)

15:40: **The ASTRO-H X-ray astronomy satellite**, Tadayuki Takahashi, Kazuhisa Mitsuda, Institute of Space and Astronautical Science (Japan); Richard L. Kelley, NASA Goddard Space Flight Ctr. (USA) . . . . . [9144-76]

15:55: **ASTRO-H Hard X-ray telescope (HXT)**, Hisamitsu Awaki, Ehime Univ. (Japan); Hideyo Kunieda, Nagoya Univ. (Japan); Manabu Ishida, Institute of Space and Astronautical Science (Japan); Hironori Matsumoto, Akihiro Furuzawa, Kazunori Ishibashi, Takuya Miyazawa, Hideyuki Mori, Keisuke Tamura, Yuzuru Tawara, Nagoya Univ. (Japan); Yoshito Haba, Aichi Univ. of Education (Japan); Ryo Iizuka, Yoshitomo Maeda, Institute of Space and Astronautical Science (Japan); Masayuki Itoh, Kobe Univ. (Japan); Keiji Ogi, Ehime Univ. (Japan); Tatsuro Kosaka, Kochi Univ. of Technology (Japan); Yoshiharu Namba, Chubu Univ. (Japan); Yasushi Ogasaka, Koujun Yamashita, Japan Science and Technology Agency (Japan); Takashi Okajima, NASA Goddard Space Flight Ctr. (USA); Yoshio Suzuki, Kentaro Uesugi, Japan Synchrotron Radiation Research Institute (Japan); Shigeo Yamauchi, Nara Women's Univ. (Japan); Takayuki Hayashi, Institute of Space and Astronautical Science (Japan); Satoshi Sugita, Ehime Univ. (Japan); Hosei Nagano, Nagoya Univ. (Japan) . . . . . [9144-77]

16:10: **The hard x-ray imager (HXI) for the ASTRO-H mission**, Goro Sato, RIKEN (Japan); Motohide Kokubun, Institute of Space and Astronautical Science (Japan); Kazuhiro Nakazawa, The Univ. of Tokyo (Japan); Teruaki Enoto, RIKEN (Japan); Yasushi Fukazawa, Hiroshima Univ. (Japan); Atsushi Harayama, Katsuhiro Hayashi, Institute of Space and Astronautical Science (Japan); Jun Kataoka, Waseda Univ. (Japan); Madoka Kawaharada, Institute of Space and Astronautical Science (Japan); Philippe Laurent, François Lebrun, Olivier Limousin, CEA-Ctr. de SACLAY (France); Kazuo Makishima, The Univ. of Tokyo (Japan); Tsunefumi Mizuno, Hiroshima Univ. (Japan); Kunishiro Mori, Institute of Space and Astronautical Science (Japan); Takeshi Nakamori, Yamagata Univ. (Japan); Hirofumi Noda, The Univ. of Tokyo (Japan); Hirokazu Odaka, Institute of Space and Astronautical Science (Japan); Masanori Ohno, Hiroshima Univ. (Japan); Masayuki Ohta, Rie Sato, Institute of Space and Astronautical Science (Japan); Hiroyasu Tajima, Nagoya Univ. (Japan); Hiromitsu Takahashi, Hiroshima Univ. (Japan); Tadayuki Takahashi, Shin'ichiro Takeda, Institute of Space and Astronautical Science (Japan); Takaaki Tanaka, Kyoto Univ. (Japan); Yukikatsu Terada, Saitama Univ. (Japan); Hideki Uchiyama, Shizuoka Univ. (Japan); Yasunobu Uchiyama, Rikkyo Univ. (Japan); Shin Watanabe, Japan Aerospace Exploration Agency (Japan); Kazutaka Yamaoka, Nagoya Univ. (Japan); Yoichi Yatsu, Tokyo Institute of Technology (Japan); Takayuki Yuasa, Institute of Space and Astronautical Science (Japan). . . . . [9144-78]

16:25: **ASTRO-H Soft X-ray telescope (SXT)**, Yang Soong, NASA Goddard Space Flight Ctr. (USA) and The Ctr. for Research and Exploration in Space Science and Technology (USA); Takashi Okajima, Peter J. Serlemitsos, NASA Goddard Space Flight Ctr. (USA); Manabu Ishida, Yoshitomo Maeda, Ryo Iizuka, Takayuki Hayashi, Institute of Space and Astronautical Science (Japan); Yuzuru Tawara, Akihiro Furuzawa, Hideyuki Mori, Takuya Miyazawa, Hideyo Kunieda, Nagoya Univ. (Japan); Hisamitsu Awaki, Satoshi Sugita, Ehime Univ. (Japan); Keisuke Tamura, Kazunori Ishibashi, Nagoya Univ. (Japan); Takanori Izumiya, Chuo Univ. (Japan); Sari Minami, Nara Women's Univ. (Japan); Toshiki Sato, Institute of Space and Astronautical Science (Japan); Kazuki Tomikawa, Naomichi Kikuchi, Tokyo Metropolitan Univ. (Japan); Toshihiro Iwase, Nagoya Univ. (Japan). . . . . [9144-79]

16:40: **Soft X-ray Imager (SXI) onboard ASTRO-H satellite**, Kiyoshi Hayashida, Hiroshi Tsunemi, Hiroshi Nakajima, Osaka Univ. (Japan); Takeshi G. Tsuru, Takaaki Tanaka, Kyoto Univ. (Japan); Tadayasu Dotani, Masayuki Ozaki, Institute of Space and Astronautical Science (Japan); Hiroshi Tomida, Masashi Kimura, Japan Aerospace Exploration Agency (Japan); Junko S. Hiraga, The Univ. of Tokyo (Japan); Takayoshi Kohmura, Kogakuin Univ. (Japan); Hiroshi Murakami, Tohoku Gakuin Univ. (Japan); Koji Mori, Makoto Yamauchi, Isamu Hatsukade, Univ. of Miyazaki (Japan); Aya Bamba, Aoyama Gakuin Univ. (Japan) and ASTRO-H SXI Team, Institute of Space and Aeronautical Science (Japan). . . . . [9144-80]

16:55: **Soft x-ray spectrometer (SXS): the high-resolution cryogenic spectrometer onboard ASTRO-H**, Kazuhisa Mitsuda, Japan Aerospace Exploration Agency (Japan); Richard L. Kelley, NASA Goddard Space Flight Ctr. (USA); Hiroki Akamatsu, SRON Netherlands Institute for Space Research (Netherlands); Kevin R. Boyce, NASA Goddard Space Flight Ctr. (USA); Gregory V. Brown, Lawrence Livermore National Lab. (USA); Meng P. Chiao, NASA Goddard Space Flight Ctr. (USA); Elisa Costantini, Jan-Willem A. den Herder, Cor P. de Vries, SRON Netherlands Institute for Space Research (Netherlands); Megan E. Eckart, NASA Goddard Space Flight Ctr. (USA); Yuichiro Ezoe, Tokyo Metropolitan Univ. (Japan); Ryuichi Fujimoto, Kanazawa Univ. (Japan); Daniel Haas, SRON Netherlands Institute for Space Research (Netherlands); Akio Hoshino, Rikkyo Univ. (Japan); Kumi Ishikawa, RIKEN (Japan); Yoshitaka Ishisaki, Tokyo Metropolitan Univ. (Japan); Naoko Iyomoto, Kyushu Univ. (Japan); Caroline A. Kilbourne, NASA Goddard Space Flight Ctr. (USA); Shunji Kitamoto, Rikkyo Univ. (Japan); Saori Konami, Tokyo Metropolitan Univ. (Japan); Maurice A. Leutenegger, NASA Goddard Space Flight Ctr. (USA); Daniel McCammon, Univ. of Wisconsin-Madison (USA); Ikuyuki Mitsuishi, Tokyo Metropolitan Univ. (Japan); Hiroshi Murakami, Tohoku Gakuin Univ. (Japan); Masahide Murakami, Univ. of Tsukuba (Japan); Mina Ogawa, Japan Aerospace Exploration Agency (Japan); Takaya Ohashi, Tokyo Metropolitan Univ. (Japan); Atsushi Okamoto, Japan Aerospace Exploration Agency (Japan); Naomi Ota, Nara Women's Univ. (Japan); Stéphane Paltani, Univ. de Genève (Switzerland); Frederick S. Porter, NASA Goddard Space Flight Ctr. (USA); Kosuke Sato, Tokyo Univ. of Science (Japan); Yohichi Sato, Japan Aerospace Exploration Agency (Japan); Makoto Sawada, Aoyama Gakuin Univ. (Japan); Hiromi Seta, Rikkyo Univ. (Japan); Keisuke Shinozaki, Hiroyuki Sugita, Japan Aerospace Exploration Agency (Japan); Andrew E. Szymkowiak, Yale Univ. (USA); Yoh Takei, Japan Aerospace Exploration Agency (Japan); Toru Tamagawa, RIKEN (Japan); Makoto S. Tashiro, Yukikatsu Terada, Saitama Univ. (Japan); Masahiro Tsujimoto, Japan Aerospace Exploration Agency (Japan); Shinya Yamada, RIKEN (Japan); Noriko Y. Yamasaki, Japan Aerospace Exploration Agency (Japan) . . . . . [9144-81]

17:10: **Detector system ground calibration of the astro-H soft x-ray spectrometer**, Megan E. Eckart, NASA Goddard Space Flight Ctr. (USA); Joseph S. Adams, NASA Goddard Space Flight Ctr. (USA) and The Ctr. for Research and Exploration in Space Science and Technology (USA); Kevin R. Boyce, NASA Goddard Space Flight Ctr. (USA); Meng P. Chiao, NASA Goddard Space Flight Ctr. (USA) and The Ctr. for Research and Exploration in Space Science and Technology (USA); Richard L. Kelley, Caroline A. Kilbourne, NASA Goddard Space Flight Ctr. (USA); Maurice A. Leutenegger, NASA Goddard Space Flight Ctr. (USA) and The Ctr. for Research and Exploration in Space Science and Technology (USA); Frederick S. Porter, NASA Goddard Space Flight Ctr. (USA); Tomomi Watanabe, NASA Goddard Space Flight Ctr. (USA) and The Ctr. for Research and Exploration in Space Science and Technology (USA); Naomi Ota, Nara Women's Univ. (Japan); Kosuke Sato, Tokyo Univ. of Science (Japan); Hiromi Seta, Rikkyo Univ. (Japan). . . . . [9144-82]

17:25: **Soft gamma-ray detector (SGD) onboard the ASTRO-H mission**, Yasushi Fukazawa, Hiroshima Univ. (Japan); Hiroyasu Tajima, Nagoya Univ. (Japan); Shin Watanabe, Institute of Space and Astronautical Science (Japan); Roger D. Blandford, Kavli Institute for Particle Astrophysics & Cosmology (USA) and Stanford Univ. (USA); Katsuhiro Hayashi, Institute of Space and Astronautical Science (Japan); Jun Kataoka, Waseda Univ. (Japan); Madoka Kawaharada, Motohide Kokubun, Institute of Space and Astronautical Science (Japan); Philippe Laurent, François Lebrun, Olivier Limousin, CEA-Ctr. de SACLAY (France); Grzegorz M. Madejski, Kavli Institute for Particle Astrophysics & Cosmology (USA) and Stanford Univ. (USA); Kazuo Makishima, The Univ. of Tokyo (Japan); Tsunefumi Mizuno, Hiroshima Univ. (Japan); Kunishiro Mori, Institute of Space and Astronautical Science (Japan); Takeshi Nakamori, Yamagata Univ. (Japan); Kazuhiro Nakazawa, Hirofumi Noda, The Univ. of Tokyo (Japan); Hirokazu Odaka, Institute of Space and Astronautical Science (Japan); Masanori Ohno, Hiroshima Univ. (Japan); Masayuki Ohta, Goro Sato, Rie Sato, Shin'ichiro Takeda, Institute of Space and Astronautical Science (Japan); Hiromitsu Takahashi, Hiroshima Univ. (Japan); Tadayuki Takahashi, Institute of Space and Astronautical Science (Japan); Yasuyuki Tanaka, Hiroshima Univ. (Japan); Yukikatsu Terada, Saitama Univ. (Japan); Atsushi Harayama, Institute of Space and Astronautical Science (Japan); Hideki Uchiyama, Shizuoka Univ. (Japan); Yasunobu Uchiyama, Rikkyo Univ. (Japan); Kazutaka Yamaoka, Nagoya Univ. (Japan); Yoichi Yatsu, Tokyo Institute of Technology (Japan); Daisuke Yonetoku, Kanazawa Univ. (Japan); Takayuki Yuasa, Institute of Space and Astronautical Science (Japan). . . . . [9144-83]

CONFERENCE 9144 · LOCATION: ROOM 520B

THURSDAY 26 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . .THU 9:00 TO 10:00

Session Chair: **Masanori Iye,** National Astronomical Observatory of Japan (Japan)

9:00: **Hyper Suprime-Cam for Weak Gravitational Lensing Survey** *(Plenary)*, Satoshi Miyazaki, National Astronomical Observatory of Japan (Japan) . . . . . [9143-507]

9:30: **Transiting Exoplanet Survey Satellite (TESS)** *(Plenary)*, George R. Ricker Jr., Massachusetts Institute of Technology (USA) . . . . . [9143-508]

Coffee Break . . . . . Thu 10:00 to 10:30

SESSION 18

LOCATION: ROOM 520B . . . . . .THU 10:30 TO 11:55

The Next Generation: Athena I

Session Chair: **Giovanni Pareschi,** INAF - Osservatorio Astronomico di Brera (Italy)

10:30: **Athena: exploring the hot and energetic universe** *(Invited Paper)*, Kirpal Nandra, Max-Planck-Institut für extraterrestrische Physik (Germany); Didier Barret, Institut de Recherche en Astrophysique et Planétologie (France); Xavier Barcons, Univ. de Cantabria (Spain); Andrew C. Fabian, Univ. of Cambridge (United Kingdom); Jan-Willem A. den Herder, SRON Netherlands Institute for Space Research (Netherlands); Luigi Piro, Istituto di Astrofisica e Planetologia Spaziali (Italy); Michael G. Watson, Univ. of Leicester (United Kingdom). . . . . [9144-84]

10:50: **Science requirements and optimization of the silicon pore optics design for the Athena mirror**, Richard Willingale, Univ. of Leicester (United Kingdom); Giovanni Pareschi, INAF - Osservatorio Astronomico di Brera (Italy); Finn E. Christensen, DTU Space (Denmark); Jan-Willem A. den Herder, SRON Netherlands Institute for Space Research (Netherlands); Desiree Della Monica Ferreira, Anders C. Jakobsen, DTU Space (Denmark); Maximilien Collon, cosine Research B.V. (Netherlands); Marcos Bavdaz, European Space Research and Technology Ctr. (Netherlands) . . . . . [9144-85]

11:05: **Preparing the optics technology to observe the hot universe** *(Invited Paper)*, Marcos Bavdaz, Eric Wille, Kotska Wallace, Brian Shortt, Sebastiaan Fransen, European Space Research and Technology Ctr. (Netherlands); Maximilien Collon, Marcelo D. Ackermann, Giuseppe Vacanti, Ramses Guenther, cosine Research B.V. (Netherlands); Jeroen Haneveld, Mark B. Olde Riekerink, Micronit Microfluidics B.V. (Netherlands); Coen van Baren, SRON Netherlands Institute for Space Research (Netherlands); Dirk Kampf, Karl-Heinz Zuknik, Kayser-Threde GmbH (Germany); Finn E. Christensen, Desiree Della Monica Ferreira, Anders C. Jakobsen, DTU Space (Denmark); Michael Krumrey, Peter Mueller, Physikalisch-Technische Bundesanstalt (Germany); Vadim Burwitz, Max-Planck-Institut für extraterrestrische Physik (Germany); Giovanni Pareschi, Mauro Ghigo, INAF - Osservatorio Astronomico di Brera (Italy) . . . . . [9144-86]

11:25: **Making the ATHENA+ optics using silicon pore optics**, Maximilien Collon, Marcelo D. Ackermann, Ramses Guenther, Abdelhakim Chatbi, cosine Research B.V. (Netherlands); Giuseppe Vacanti, Mark Vervest, cosine Science & Computing B.V. (Netherlands); Marco W. Beijersbergen, cosine Research B.V. (Netherlands); Marcos Bavdaz, Eric Wille, Kotska Wallace, European Space Research and Technology Ctr. (Netherlands); Jeroen Haneveld, Mark B. Olde Riekerink, Arenda Koelewijn, Micronit Microfluidics B.V. (Netherlands); Coen van Baren, SRON Netherlands Institute for Space Research (Netherlands); Peter Mueller, Michael Krumrey, Physikalisch-Technische Bundesanstalt (Germany); Vadim Burwitz, Max-Planck-Institut für extraterrestrische Physik (Germany); Giorgia Sironi, Mauro Ghigo, INAF - Osservatorio Astronomico di Brera (Italy) . . . . . [9144-87]

11:40: **Qualification of silicon pore optics**, Eric Wille, Marcos Bavdaz, Sebastiaan Fransen, European Space Research and Technology Ctr. (Netherlands); Maximilien Collon, Marcelo D. Ackermann, Ramses Guenther, Abdelhakim Chatbi, cosine Research B.V. (Netherlands); Giuseppe Vacanti, Mark Vervest, cosine Science & Computing B.V. (Netherlands); Coen van Baren, SRON Netherlands Institute for Space Research (Netherlands); Jeroen Haneveld, Mark B. Olde Riekerink, Arenda Koelewijn, Micronit Microfluidics B.V. (Netherlands); Dirk Kampf, Karl-Heinz Zuknik, Arnd Reutlinger, Kayser-Threde GmbH (Germany). . . . . [9144-88]

Lunch/Exhibition Break . . . . . Thu 11:55 to 13:25

SESSION 19

LOCATION: ROOM 520B . . . . . .THU 13:25 TO 15:20

The Next Generation: Athena II

Session Chair: **Takaya Ohashi,** Tokyo Metropolitan Univ. (Japan)

13:25: **Investigation of novel coating methods for the ATHENA mission**, Anders C. Jakobsen, Desiree Della Monica Ferreira, Finn E. Christensen, DTU Space (Denmark); Brian Shortt, European Space Research and Technology Ctr. (Netherlands) . . . . . [9144-89]

13:40: **The wide field imager instrument for Athena** *(Invited Paper)*, Norbert Meidinger, Kirpal Nandra, Arne Rau, Matteo Porro, Markus P. Plattner, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-90]

14:00: **Prospects and limitations of DePFET active pixel sensors as high speed spectroscopic x-ray imager for the ATHENA wide field imager**, Stefan Aschauer, PNSensor GmbH (Germany); Alexander Bähr, Max-Planck-Institut für extraterrestrische Physik (Germany); Gerhard Lutz, Petra Majewski, Lothar Strüder, PNSensor GmbH (Germany) . . . . . [9144-91]

14:15: **The x-ray integral field unit for the Athena X-ray Observatory** *(Invited Paper)*, Didier Barret, Institut de Recherche en Astrophysique et Planétologie (France); Jan-Willem A. den Herder, SRON Netherlands Institute for Space Research (Netherlands); Luigi Piro, INAF - IASF Roma (Italy); Laurent Ravera, Institut de Recherche en Astrophysique et Planétologie (France); Rodolphe Clédassou, Ctr. National d'Études Spatiales (France); Etienne Pointecouteau, Institut de Recherche en Astrophysique et Planétologie (France); Monique Arnaud, Claude Pigot, CEA-IRFU (France); Lionel Duband, Commissariat à l'Énergie Atomique (France); Christophe Cara, CEA-IRFU (France); Roland H. den Hartog, Luciano Gottardi, Hiroki Akamatsu, Jan van der Kuur, Henk J. van Weers, Jelle de Plaa, SRON Netherlands Institute for Space Research (Netherlands); Claudio Macculi, Simone Lotti, Istituto di Astrofisica e Planetologia Spaziali (Italy); Guido Torrioli, Istituto di Fotonica e Nanotecnologie (Italy); Flavio Gatti, Univ. degli Studi di Genova (Italy); Luca Valenziano, INAF - IASF Bologna (Italy); Marco Barbera, Univ. degli Studi di Palermo (Italy) and INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy); Xavier Barcons, Maite Teresa Ceballos, Univ. de Cantabria (Spain); Lourdes Fàbrega, Institut de Ciencia de Materiales de Barcelona (Spain); José Miguel Mas-Hesse, Consejo Superior de Investigaciones Científicas (Spain); Mathew J. Page, Phillip R. Guttridge, Univ. College London (United Kingdom); Richard Willingale, George W. Fraser, Univ. of Leicester (United Kingdom); Stéphane Paltani, Ludovic Genolet, Univ. of Geneva (Switzerland); Gregor Rauw, Etienne Renotte, Univ. de Liège (Belgium); Jörn Wilms, Christian Schmid, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany) . . . . . [9144-92]

14:35: **Development of TES-based detectors array for the x-ray integral field unit (X-IFU) on the future x-ray observatory ATHENA**, Luciano Gottardi, Hiroki Akamatsu, SRON Netherlands Institute for Space Research (Netherlands); Didier Barret, Institut de Recherche en Astrophysique et Planétologie (France); Marcel P. Bruin, Roland H. den Hartog, Jan-Willem A. den Herder, Henk F. C. Hoevers, Jan van der Kuur, Madhusudhanan Jambunathan, Marcel L. Ridder, SRON Netherlands Institute for Space Research (Netherlands). . . . . [9144-93]

14:50: **Fabrication and Test of 50-mK large area TES based XIFU anti-coincidence for ATHENA+**, Flavio Gatti, Michele Biasotti, Dario Corsini, Univ. degli Studi di Genova (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); Matteo De Gerone, Istituto Nazionale di Fisica Nucleare (Italy); Elisa Fumagalli, Giulio Pizzigoni, Univ. degli Studi di Genova (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); Luigi Piro, INAF - IASF Roma (Italy); Marco Barbera, Univ. degli Studi di Palermo (Italy); Claudio Macculi, Istituto di Astrofisica e Planetologia Spaziali (Italy); Guido Torrioli, Istituto di Fotonica e Nanotecnologie (Italy). . . . . [9144-94]

15:05: **Background simulations for the ATHENA+ X-IFU instrument: impact on design and scientific performances**, Simone Lotti, Claudio Macculi, Istituto di Astrofisica e Planetologia Spaziali (Italy); Donatella Cea, Univ. degli Studi di Roma La Sapienza (Italy); Teresa Mineo, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Emanuele Perinati, Eberhard Karls Univ. Tübingen (Germany); Luca Colasanti, Lorenzo Natalucci, Luigi Piro, Istituto di Astrofisica e Planetologia Spaziali (Italy) . . . . . [9144-95]

Coffee Break . . . . . Thu 15:20 to 15:50

SESSION 20

LOCATION: ROOM 520B . . . . . THU 15:50 TO 16:50

The Next Generation: Small Mission Concepts

Session Chair: **Shuangnan Zhang,** Institute of High Energy Physics (China)

15:50: **Wide-field MAXI: soft x-ray transient monitor on the ISS**, Nobuyuki Kawai, Tokyo Institute of Technology (Japan); Hiroshi Tomida, Japan Aerospace Exploration Agency (Japan); Tatehiro Mihara, RIKEN (Japan); Yoichi Yatsu, Tokyo Institute of Technology (Japan); Shiro Ueno, Masashi Kimura, Japan Aerospace Exploration Agency (Japan); Motoko Serino, RIKEN (Japan); Hiroshi Tsunemi, Osaka Univ. (Japan); Makoto Arimoto, Tokyo Institute of Technology (Japan); Takanori Sakamoto, Atsumasa Yoshida, Aoyama Gakuin Univ. (Japan); Takayoshi Kohmura, Kogakuin Univ. (Japan); Hitoshi Negoro, Nihon Univ. (Japan); Yoshihiro Ueda, Kyoto Univ. (Japan). . . . . [9144-96]

16:05: **DIOS: the dark baryon exploring mission**, Takaya Ohashi, Yoshitaka Ishisaki, Yuichiro Ezoe, Tokyo Metropolitan Univ. (Japan); Yuzuru Tawara, Nagoya Univ. (Japan); Kazuhisa Mitsuda, Noriko Y. Yamasaki, Yoh Takei, Japan Aerospace Exploration Agency (Japan). . . . . [9144-97]

16:20: **Formation Flight Astronomical Survey telescope (FFAST) mission in hard x-ray**, Hiroshi Tsunemi, Osaka Univ. (Japan) and FFAST Team, JAXA (Japan); Hiroshi Nakajima, Naohisa Anabuki, Ryo Nagino, Osaka Univ. (Japan); Hideyo Kunieda, Hironori Matsumoto, Nagoya Univ. (Japan); Masayuki Itoh, Kobe Univ. (Japan); Isao Kawano, Toshinori Ikenaga, Shinji Mitani, Toru Yamamoto, Masanobu Ozaki, Japan Aerospace Exploration Agency (Japan); Koji Mori, Univ. of Miyazaki (Japan); Yoshihiro Ueda, Kyoto Univ. (Japan); Takayoshi Kohmura, Kogakuin Univ. (Japan) and For the FFAST Team (Japan). . . . . [9144-98]

16:35: **High-z gamma-ray bursts for unraveling the dark ages mission (HiZ-GUNDAM)**, Daisuke Yonetoku, Kanazawa Univ. (Japan); Tatehiro Mihara, RIKEN (Japan); Nobuyuki Kawai, Tokyo Institute of Technology (Japan); Hirokazu Ikeda, Japan Aerospace Exploration Agency (Japan); Takanori Sakamoto, Aoyama Gakuin Univ. (Japan); Motoko Serino, Japan Aerospace Exploration Agency (Japan); Shunsuke Kurosawa, Tohoku Univ. (Japan); Shuichi Gunji, Yamagata Univ. (Japan); Toru Tanimori, Kyoto Univ. (Japan); Toshio Murakami, Kanazawa Univ. (Japan); Yoichi Yatsu, Tokyo Institute of Technology (Japan); Kazutaka Yamaoka, Nagoya Univ. (Japan); Atsumasa Yoshida, Aoyama Gakuin Univ. (Japan); Koji S. Kawabata, Hiroshima Univ. (Japan); Toshio Matsumoto, National Taiwan Univ. (Taiwan); Shuji Matsuura, Koji Tsumura, Mai Shirahata, Institute of Space and Astronautical Science (Japan); Kenshi Yanagisawa, National Astronomical Observatory of Japan (Japan); Michitoshi Yoshida, Hiroshima Univ. (Japan); Hirofumi Okita, Tohoku Univ. (Japan); Kentaro Motohara, National Astronomical Observatory of Japan (Japan); Neil A. Gehrels, NASA Goddard Space Flight Ctr. (USA) . . . . . [9144-99]

SESSION 21

LOCATION: ROOM 520B . . . . . THU 16:50 TO 17:50

The Next Generation: LOFT

Session Chair: **Hiroshi Tsunemi,** Osaka Univ. (Japan)

16:50: **The Large Observatory for x-ray timing**, Marco Feroci, Istituto di Astrofisica e Planetologia Spaziali (Italy); Jan-Willem A. den Herder, SRON Netherlands Institute for Space Research (Netherlands); Michiel van der Klis, Univ. van Amsterdam (Netherlands); Luigi Stella, INAF - Osservatorio Astronomico di Roma (Italy); Enrico Bozzo, ISDC Data Ctr. for Astrophysics (Switzerland)[9144-100]

17:05: **The large-area linear silicon drift detector design for LOFT**, Alexandre Rachevski, Gianluigi Zampa, Istituto Nazionale di Fisica Nucleare (Italy); Nicola Zampa, INFN - Istituto Nazionale di Fisica Nucleare, Sezione di Trieste (Italy); Riccardo Campana, INAF IASF Bologna - Istituto di Astrofisica Spaziale e Fisica Cosmica di Bologna (Italy) and INFN - Istituto Nazionale di Fisica Nucleare, Sezione di Bologna (Italy); Yuri Evangelista, INAF IAPS - Istituto di Astrofisica e Planetologia Spaziali (Italy) and INFN - Istituto Nazionale di Fisica Nucleare, Sezione di Roma Tor Vergata (Italy); Gabriele Giacomini, Antonino Picciotto, Pierluigi Bellutti, FBK, Fondazione Bruno Kessler (Italy); Marco Feroci, INAF IAPS - Istituto di Astrofisica e Planetologia Spaziali (Italy) and INFN - Istituto Nazionale di Fisica Nucleare, Sezione di Roma Tor Vergata (Italy); Claudio Labanti, INAF IASF Bologna - Istituto di Astrofisica Spaziale e Fisica Cosmica di Bologna (Italy) and INFN - Istituto Nazionale di Fisica Nucleare, Sezione di Bologna (Italy); Claudio Piemonte, FBK, Fondazione Bruno Kessler (Italy); Andrea Vacchi, INFN - Istituto Nazionale di Fisica Nucleare, Sezione di Trieste (Italy) . . . . . [9144-101]

17:20: **The design of the wide field monitor for the LOFT mission**, Søren K. Brandt, DTU Space (Denmark); Margarita Hernanz, Consejo Superior de Investigaciones Científicas (Spain); Marco Feroci, Istituto di Astrofisica e Planetologia Spaziali (Italy) . . . . . [9144-102]

17:35: **The large area detector of LOFT: the large observatory for x-ray timing**, Silvia Zane, Univ. College London (United Kingdom), On behalf of the LOFT-LAD team (United Kingdom) . . . . . [9144-103]

POSTER SESSION–THURSDAY

LOCATION: ROOM 516 . . . . . THU 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Thursday. The interactive poster session with authors in attendance will be Thursday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

The new SCOS-based EGSE of the EPIC flight-spare on-ground cameras, Nicola La Palombara, INAF - IASF Milano (Italy); Anthony F. Abbey, Univ. of Leicester (United Kingdom); Fernando Insinga, Thales Alenia Space (Italy); Pedro Calderon-Riano, Mauro Casale, European Space Astronomy Ctr. (Spain); Marcus G. F. Kirsch, Jim Martin, European Space Operations Ctr. (Germany); Ramon Munoz, European Space Astronomy Ctr. (Spain); Maddalena Palazzo, Mauro Poletti, Thales Alenia Space (Italy); Steven F. Sembay, Univ. of Leicester (United Kingdom); Juan C. Vallejo, European Space Astronomy Ctr. (Spain); Gabriele E. Villa, INAF - IASF Milano (Italy) . . . . . [9144-143]

The eROSITA x-ray baffle, Peter Friedrich, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-185]

Soft proton scattering measurements on eROSITA mirrors, Sebastian Diebold, Josef Jochum, Eckhard Kendziorra, Emanuele Perinati, Andrea E. Santangelo, Christoph Tenzer, Eberhard Karls Univ. Tübingen (Germany) . . . . . [9144-186]

ART-XC/SRG: results of thermo-vacuum tests, Nikolay P. Semena, Mikhail N. Pavlinsky, Mikhail Buntov, Dmitry Serbinov, Ekaterina Gurova, Vladislav Tambov, Space Research Institute (Russian Federation); Igor Roiz, Mikhail Garin, Valeriy P. Lazarchuk, Russian Federal Nuclear Ctr. - All-Russian Research Institute of Experimental Physics (Russian Federation); Alexey Zaytcev, Vitaly Martunov, Alexander Shabarchin, NPO Lavochkin (Russian Federation); Alexander Sokolov, NPO Molniya (Russian Federation) . . . . . [9144-187]

Calibration of the ART-XC/SRG x-ray mirror modules, Mikhail V. Gubarev, Brian D. Ramsey, Jeffery J. Kolodziejczak, Ronald F. Elsner, NASA Marshall Space Flight Ctr. (USA); Vyacheslav E. Zavlin, Universities Space Research Association (USA); Mikhail N. Pavlinsky, Alexey V. Tkachenko, Igor Y. Lapshov, Space Research Institute (Russian Federation) . . . . . [9144-189]

Proton-tracing study of the eROSITA telescope, Emanuele Perinati, Sebastian Diebold, Eberhard Karls Univ. Tübingen (Germany); Michael J. Freyberg, Max-Planck-Institut für extraterrestrische Physik (Germany); Teresa Mineo, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Andrea E. Santangelo, Christoph Tenzer, Eberhard Karls Univ. Tübingen (Germany) . . . . . [9144-190]

Bumber-filter against micrometeoroids for eROSITA, Emanuele Perinati, Eberhard Karls Univ. Tübingen (Germany); Sebastian Bugiel, Max-Planck-Institut für Kernphysik (Germany); Michael J. Freyberg, Max-Planck-Institut für extraterrestrische Physik (Germany); Andrea E. Santangelo, Eberhard Karls Univ. Tübingen (Germany); Ralf Srama, Max-Planck-Institut für Kernphysik (Germany); Christoph Tenzer, Eberhard Karls Univ. Tübingen (Germany); Andreas von Kienlin, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-191]

The x-ray telescope eROSITA: qualification of the thermal control system, Maria Fürmetz, Peter Predehl, Elmar Pfeffermann, Josef Eder, Lars Tiedemann, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-192]

The X-ray grating explorer: an ISS-attached high-resolution X-ray grating spectrometer, Randall K. Smith, Jay A. Bookbinder, Harvard-Smithsonian Ctr. for Astrophysics (USA); Randall L. McEntaffer, The Univ. of Iowa (USA); Marshall W. Bautz, Massachusetts Institute of Technology (USA); Robert Petre, Andrew Ptak, NASA Goddard Space Flight Ctr. (USA); David N. Burrows, Abraham D. Falcone, The Pennsylvania State Univ. (USA); Nancy Susan Brickhouse, Adam R. Foster, Peter Daigneau, Harvard-Smithsonian Ctr. for Astrophysics (USA); Jörn Wilms, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Richard Willingale, Univ. of Leicester (United Kingdom); Joel Bregman, Univ. of Michigan (USA) . [9144-193]

The camera of the Microchannel X-ray telescope onboard the SVOM mission, Aline Meuris, Frédéric Pinsard, Eric Doumayrou, Thierry Tourrette, Mickael Carty, Modeste Donati, Alain Goetschy, François Nico, Luc Dumaye, Diego Götz, CEA-Ctr. de SACLAY (France); Norbert Meidinger, Danilo Miessner, Max-Planck-Institut für extraterrestrische Physik (Germany); Karine Mercier, Ctr. National d'Études Spatiales (France) . . . . . [9144-194]

CONFERENCE 9144 · LOCATION: ROOM 520B

SVOM gamma ray monitor: scheme and performance, Bobing Wu, Institute of High Energy Physics (China) . . . . . [9144-195]

ECLAIRs detection plane current state of development, Roger Pons, Karine Lacombe, Carine Amoros, Jean-Luc Atteia, Didier Barret, Institut de Recherche en Astrophysique et Planétologie (France); Marc Billot, Ctr. National d'Études Spatiales (France); Sandra Bordon, Institut de Recherche en Astrophysique et Planétologie (France); Bertrand Cordier, Olivier Gevin, Commissariat à l'Énergie Atomique (France); Olivier Godet, Institut de Recherche en Astrophysique et Planétologie (France); François Gonzalez, Ctr. National d'Études Spatiales (France); Baptiste Houret, Institut de Recherche en Astrophysique et Planétologie (France); Karine Mercier, Ctr. National d'Études Spatiales (France); Pierre Mandrou, Wilfried Marty, Guillaume Nasser, Damien Rambaud, Pascale Ramon, Gilbert Rouaix, Vincent Waegebaert, Institut de Recherche en Astrophysique et Planétologie (France) . . . . . [9144-196]

OGRESS: a sounding rocket payload for observations of the Cygnus Loop, Thomas D. Rogers, Univ. of Colorado at Boulder (USA); Randall L. McEntaffer, Ted B. Schultz, The Univ. of Iowa (USA); Benjamin R. Zeiger, NASA Goddard Space Flight Ctr. (USA); Phillip H. Oakley, National Ctr. for Atmospheric Research (USA); Webster Cash, Univ. of Colorado at Boulder (USA) . . . . . [9144-197]

Engineering design of the Regolith x-ray imaging spectrometer (REXIS) instrument: an OSIRIS-REx student collaboration, Michael P. Jones, Mark A. Chodas, Matthew W. Smith, Rebecca A. Masterson, David W. Miller, Massachusetts Institute of Technology (USA) . . . . . [9144-198]

Performance of the x-ray concentrators onboard the NICER ISS payload, Erin R. Balsamo, Univ. of Maryland, Baltimore County (USA); Teruaki Enoto, RIKEN (Japan); Takashi Okajima, Keith C. Gendreau, NASA Goddard Space Flight Ctr. (USA); Zaven Arzoumanian, Yang Soong, Universities Space Research Association (USA); Peter J. Serlemitsos, NASA Goddard Space Flight Ctr. (USA); Lalit Jalota, The Ctr. for Research and Exploration in Space Science and Technology (USA); Lawrence G. Olsen, NASA Goddard Space Flight Ctr. (USA); Richard G. Koenecke, ADNET Systems, Inc. (USA); John D. Kearney, Sean P. Fitzsimmons, SGT, Inc. (USA); Steven J. Kenyon, NASA Goddard Space Flight Ctr. (USA); Ai Numata, SGT, Inc. (USA). . . . . [9144-200]

The x-ray facilities currently in-building for calibrations of HXMT, Shu Zhang, Institute of High Energy Physics (China) . . . . . [9144-202]

The Canadian astro-H metrology system, Luigi Gallo, Saint Mary's Univ. (Canada); Stephane Gagnon, Martin Guibert, Neptec Design Group Ltd. (Canada); Alexander S. Koujelev, Canadian Space Agency (Canada); Casey Lambert, Saint Mary's Univ. (Canada) . . . . . [9144-203]

Recent progress in the ground calibration of the ASTRO-H Hard X-ray telescope (HXT-2), Hideyuki Mori, Yuji Kuroda, Takuya Miyazawa, Nagoya Univ. (Japan); Hisamitsu Awaki, Ehime Univ. (Japan); Yasunori Babazaki, Akihiro Furuzawa, Tatsuya Hibino, Nagoya Univ. (Japan); Ryo Iizuka, Institute of Space and Astronautical Science (Japan); Kazunori Ishibashi, Toshihiro Iwase, Hideyo Kunieda, Nagoya Univ. (Japan); Daichi Kurihara, Ehime Univ. (Japan); Hironori Matsumoto, Yusuke Miyata, Shigetaka Saji, Nagoya Univ. (Japan); Satoshi Sugita, Ehime Univ. (Japan); Yoshio Suzuki, Japan Synchrotron Radiation Research Institute (Japan); Sasagu Tachibana, Keisuke Tamura, Yuzuru Tawara, Nagoya Univ. (Japan); Kentaro Uesugi, Japan Synchrotron Radiation Research Institute (Japan) . . . . . [9144-205]

Ground-based x-ray calibration of the Astro-H soft x-ray telescopes, Ryo Iizuka, Takayuki Hayashi, Yoshitomo Maeda, Manabu Ishida, Institute of Space and Astronautical Science (Japan); Kazuki Tomikawa, Toshiki Sato, Naomichi Kikuchi, Japan Aerospace Exploration Agency (Japan) and Tokyo Metropolitan Univ. (Japan); Takashi Okajima, Yang Soong, Peter J. Serlemitsos, NASA Goddard Space Flight Ctr. (USA); Hideyuki Mori, Nagoya Univ. (Japan); Takanori Izumiya, Chuo Univ. (Japan); Sari Minami, Nara Women's Univ. (Japan). . . . . [9144-206]

Revealing a detailed performance of the soft x-ray telescopes of the ASTRO-H mission, Toshiki Sato, Institute of Space and Astronautical Science (Japan) and Tokyo Metropolitan Univ. (Japan); Ryo Iizuka, Takayuki Hayashi, Yoshitomo Maeda, Manabu Ishida, Institute of Space and Astronautical Science (Japan); Kazuki Tomikawa, Naomichi Kikuchi, Institute of Space and Astronautical Science (Japan) and Tokyo Metropolitan Univ. (Japan); Takashi Okajima, Yang Soong, Peter J. Serlemitsos, NASA Goddard Space Flight Ctr. (USA); Hideyuki Mori, Nagoya Univ. (Japan); Takanori Izumiya, Chuo Univ. (Japan); Saori Minami, Nara Women's Univ. (Japan). . . . . [9144-207]

X-ray transmission of the Astro-H soft x-ray spectrometer optical blocking filters, Maurice A. Leutenegger, NASA Goddard Space Flight Ctr. (USA); Gregory V. Brown, Lawrence Livermore National Lab. (USA); Sarah E. Busch, Megan E. Eckart, NASA Goddard Space Flight Ctr. (USA); Natalie Hell, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Richard L. Kelley, Caroline A. Kilbourne, NASA Goddard Space Flight Ctr. (USA); Daniel McCammon, Univ. of Wisconsin-Madison (USA); Jan-Patrick Porst, Frederick S. Porter, NASA Goddard Space Flight Ctr. (USA) . . . . . [9144-208]

Performance verification and system integration tests of the pulse shape processor for the soft x-ray spectrometer onboard ASTRO-H, Sawako Takeda, Makoto S. Tashiro, Saitama Univ. (Japan); Yoshitaka Ishisaki, Tokyo Metropolitan Univ. (Japan); Masahiro Tsujimoto, Japan Aerospace Exploration Agency (Japan); Hiromi Seta, Rikkyo Univ. (Japan); Yuya Shimoda, Sunao Yamaguchi, Saitama Univ. (Japan); Sho Uehara, Tokyo Metropolitan Univ. (Japan); Yukikatsu Terada, Saitama Univ. (Japan); Ryuichi Fujimoto, Kanazawa Univ. (Japan); Kazuhisa Mitsuda, Japan Aerospace Exploration Agency (Japan) . . . . . [9144-209]

Performance of the astro-H/SXS calorimeter spectrometer insert, Frederick S. Porter, Meng P. Chiao, Michael J. DiPirro, Megan E. Eckart, Richard L. Kelley, Caroline A. Kilbourne, Mark O. Kimball, Maurice A. Leutenegger, Peter Shirron, Gary A. Sneiderman, Tomomi Watanabe, NASA Goddard Space Flight Ctr. (USA) . . . . . [9144-210]

Soft x-ray transmission of contamination blocking filter for SXI onboard ASTRO-H, Takayoshi Kohmura, Kento Miyakawa, Shoma Ikeda, Kazunari Yabe, Kogakuin Univ. (Japan); Kenta Kaneko, Tokyo Univ. of Science (Japan); Tadayasu Dotani, Masanobu Ozaki, Hiroshi Tomida, Masashi Kimura, Institute of Space and Astronautical Science (Japan); Hiroshi Tsunemi, Kiyoshi Hayashida, Ryo Nagino, Shota Inoue, Daiki Uchida, Shuhei Katada, Osaka Univ. (Japan); Takeshi G. Tsuru, Kyoto Univ. (Japan) . . . . . [9144-211]

Thermal design of the hard x-ray imager and soft gamma-ray detector onboard ASTRO-H, Hirofumi Noda, Kazuhiro Nakazawa, The Univ. of Tokyo (Japan); Kazuo Makishima, The Univ. of Tokyo (Japan) and RIKEN (Japan); Naoko Iwata, Institute of Space and Astronautical Science (Japan) and Japan Aerospace Exploration Agency (Japan); Madoka Kawaharada, Motohide Kokubun, Institute of Space and Astronautical Science (Japan); Hiroyuki Ogawa, Japan Aerospace Exploration Agency (Japan); Masayuki Ohta, Institute of Space and Astronautical Science (Japan); Goro Sato, RIKEN (Japan); Tadayuki Takahashi, Shin Watanabe, Institute of Space and Astronautical Science (Japan); Yasushi Fukazawa, Masanori Ohno, Hiroshima Univ. (Japan); Hiroyasu Tajima, Nagoya Univ. (Japan); Hideki Uchiyama, Shizuoka Univ. (Japan); Shuji Itho, Keita Fukuzawa, Mitsubishi Heavy Industries, Ltd. (Japan) . . . . . [9144-212]

Development and calibration of fine collimators for the soft gamma-ray detector onboard ASTRO-H, Tsunefumi Mizuno, Daisuke Kimura, Toshiaki Tanabe, Takanori Hayashi, Yuiko Kitamura, Koji S. Kawabata, Yasushi Fukazawa, Hiroshima Univ. (Japan); Hiroyasu Tajima, Nagoya Univ. (Japan); Kazuhiro Nakazawa, Kazuo Makishima, The Univ. of Tokyo (Japan); Masayuki Ohta, Shin Watanabe, Kosei Ishimura, Tadayuki Takahashi, Institute of Space and Astronautical Science (Japan); Hironori Matsumoto, Kazunori Ishibashi, Hideyuki Mori, Takuya Miyazawa, Michito Sakai, Karin Sakanobe, Nagoya Univ. (Japan). . . . . [9144-213]

Development and verification of signal processing system of BGO active shield onboard Astro-H, Masanori Ohno, Shin'ya Tokuda, Hiromitsu Takahashi, Yasushi Fukazawa, Hiroshima Univ. (Japan); Hiroaki Murakami, Syogo Kobayashi, Soki Sakurai, Makoto Sasano, Shunsuke Torii, Kazuhiro Nakazawa, Kazuo Makishima, The Univ. of Tokyo (Japan); Kouichi Hagino, Takayuki Yuasa, Hirokazu Odaka, Rie Sato, Institute of Space and Astronautical Science (Japan); Goro Sato, RIKEN (Japan); Shin Watanabe, Motohide Kokubun, Tadayuki Takahashi, Institute of Space and Astronautical Science (Japan); Kazutaka Yamaoka, Hiroyasu Tajima, Nagoya Univ. (Japan) . . . . . [9144-214]

Developing, testing, and calibrating ATHENA+ optics at the PANTER X-ray test facility, Vadim Burwitz, Max-Planck-Institut für extraterrestrische Physik (Germany); Marcos Bavdaz, European Space Research and Technology Ctr. (Netherlands); Giovanni Pareschi, INAF - Osservatorio Astronomico di Brera (Italy); Maximilien Collon, cosine Research B.V. (Netherlands); Daniele Spiga, INAF - Osservatorio Astronomico di Brera (Italy); Marcelo D. Ackermann, cosine Research B.V. (Netherlands); Benedikt Menz, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-215]

The BEaTriX X-ray facility to test modular elements of the ATHENA+ mirror modules, Daniele Spiga, Giovanni Pareschi, Carlo Pelliciari, Gianpiero Tagliaferri, INAF - Osservatorio Astronomico di Brera (Italy) . . . . . [9144-216]

Studying ATHENA+ optics with divergent and collimated x-ray beams, Benedikt Menz, Heinrich Bräuninger, Vadim Burwitz, Gisela Hartner, Peter Predehl, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-217]

Characterization and testing of x-ray mirrors for the ATHENA mission, Desiree Della Monica Ferreira, Anders C. Jakobsen, Finn E. Christensen, DTU Space (Denmark); Brian Shortt, European Space Research and Technology Ctr. (Netherlands); Michael Krumrey, Physikalisch-Technische Bundesanstalt (Germany); Jørgen Garnaes, Danish Fundamental Metrology Ltd. (Denmark) . . . . . [9144-218]

Alternative optical design for Athena X-ray telescope based on slumped mirror segments, Laura Proserpio, Elias Breunig, Peter Friedrich, Anita Winter, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-219]

High time resolution capabilities of the wide field imager for Athena, Arne Rau, Norbert Meidinger, Max-Planck-Institut für extraterrestrische Physik (Germany); Christian Schmid, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Kirpal Nandra, Max-Planck-Institut für extraterrestrische Physik (Germany); Andrea E. Santangelo, Christoph Tenzer, Eberhard Karls Univ. Tübingen (Germany)[9144-220]

VERITAS 2.0 a multi channel readout ASIC suitable for the DEPFET arrays of the WFI for ATHENA, Matteo Porro, Max-Planck-Institut für extraterrestrische Physik (Germany); Davide Bianchi, Politecnico di Milano (Italy); Giulio de Vita, Max-Planck-Institut für extraterrestrische Physik (Germany); Sven Herrmann, SLAC National Accelerator Lab. (USA); Andreas Wassatsch, Max-Planck-Institut Halbleiterlabor (Germany); Alexander Bähr, Bettina Bergbauer, Sabine Ott, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9144-221]

A digital event-preprocessing concept for the Athena wide field imager, Christoph Tenzer, Henning Wende, Thomas Schanz, Andrea E. Santangelo, Eberhard Karls Univ. Tübingen (Germany) . . . . . [9144-222]

Towards Mo/Au based TES detectors for Athena/X-IFU, Lourdes Fàbrega, Consejo Superior de Investigaciones Científicas (Spain); Agustín Camón, Instituto de Ciencia de Materiales de Aragon (Spain); José Luís Costa-Krämer, Instituto de Microelectrónica de Madrid (Spain); Carlos Pobes, Instituto de Ciencia de Materiales de Aragon (Spain); Rosa Jáudenes, Instituto de Microelectrónica de Madrid (Spain); Xavier Barcons, Univ. de Cantabria (Spain); Luciano Gottardi, Jan-Willem A. den Herder, SRON Netherlands Institute for Space Research (Netherlands); Didier Barret, Institut de Recherche en Astrophysique et Planétologie (France) . . . . . [9144-223]

Requirements for the read-out of the detector system of ATHENA X-IFU, Roland H. den Hartog, Luciano Gottardi, Jan van der Kuur, Bert-Joost van Leeuwen, Dennis van Loon, Alec J. McCalden, Jan-Willem A. den Herder, Brian D. Jackson, SRON Netherlands Institute for Space Research (Netherlands); Laurent Ravera, Didier Barret, Antoine Clénet, Institut de Recherche en Astrophysique et Planétologie (France). . . . . [9144-224]

TES-detector based focal plane assembly key-technology developments for ATHENA and SAFARI, Henk J. van Weers, Jan-Willem A. den Herder, Brian D. Jackson, Peter Paul Kooijman, SRON Netherlands Institute for Space Research (Netherlands) . . . . . [9144-225]

The Cryogenic AntiCoincidence detector for ATHENA+: the progress towards the final solution, Claudio Macculi, Luigi Piro, Donatella Cea, Luca Colasanti, Simone Lotti, Lorenzo Natalucci, INAF - IASF Roma (Italy); Flavio Gatti, Daniela Bagliani, Michele Biasotti, Dario Corsini, Giulio Pizzigoni, Univ. degli Studi di Genova (Italy); Guido Torrioli, Istituto di Fotonica e Nanotecnologie (Italy); Marco Barbera, Univ. degli Studi di Palermo (Italy); Teresa Mineo, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Emanuele Perinati, Eberhard Karls Univ. Tübingen (Germany) . . . . . [9144-226]

The DRE: the digital readout electronics for ATHENA X-IFU, Laurent Ravera, Institut de Recherche en Astrophysique et Planétologie (France) and Univ. de Toulouse (France); Xavier Barcons, Univ. de Cantabria (Spain); Didier Barret, Institut de Recherche en Astrophysique et Planétologie (France) and Univ. de Toulouse (France); Christophe Cara, Commissariat à l'Énergie Atomique (France); Rodolphe Clédassou, Ctr. National d'Études Spatiales (France); Maite Teresa Ceballos, Univ. de Cantabria (Spain); Antoine Clénet, Institut de Recherche en Astrophysique et Planétologie (France) and Univ. de Toulouse (France); Beatriz Cobo, Univ. de Cantabria (Spain); Eric Doumayrou, Commissariat à l'Énergie Atomique (France); Roland H. den Hartog, Bert-Joost van Leeuwen, Dennis van Loon, SRON Netherlands Institute for Space Research (Netherlands); José Miguel Mas-Hesse, Consejo Superior de Investigaciones Científicas (Spain); Etienne Pointecouteau, Institut de Recherche en Astrophysique et Planétologie (France) and Univ. de Toulouse (France) . . . . . [9144-227]

Baseline design of the thermal blocking filters for the X-IFU detector on board ATHENA+, Marco Barbera, Univ. degli Studi di Palermo (Italy) and INAF - Osservatorio Astronomico di Palermo (Italy); Alfonso Collura, INAF - Osservatorio Astronomico di Palermo (Italy); Flavio Gatti, Univ. degli Studi di Genova (Italy); Ugo Lo Cicero, INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy); Claudio Macculi, Istituto di Astrofisica e Planetologia Spaziali (Italy); Luigi Piro, INAF - IASF Roma (Italy); Etienne Renotte, Univ. de Liège (Belgium); Salvatore Sciortino, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy) [9144-228]

ATHENA+ X-IFU detector cooling chain, Moritz Branco, Air Liquide Advanced Technologies (France); Ivan Charles, Commissariat à l'Énergie Atomique (France) . . . . . [9144-229]

Cooler developments for the Athena+ cryogenic chain, Lionel Duband, Ivan Charles, Jean-Marc Duval, Commissariat à l'Énergie Atomique (France) [9144-230]

Athena end-to-end simulations, Jörn Wilms, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Didier Barret, Institut de Recherche en Astrophysique et Planétologie (France); Tobias Beuchert, Thorsten Brand, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Jan-Willem A. den Herder, SRON Netherlands Institute for Space Research (Netherlands); Ingo Kreykenbohm, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Simone Lotti, Istituto di Astrofisica e Planetologia Spaziali (Italy); Kirpal Nandra, Max-Planck-Institut für extraterrestrische Physik (Germany); Luigi Piro, Istituto di Astrofisica e Planetologia Spaziali (Italy); Arne Rau, Max-Planck-Institut für extraterrestrische Physik (Germany); Christian Schmid, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Randall K. Smith, Harvard-Smithsonian Ctr. for Astrophysics (USA); Christoph Tenzer, Eberhard Karls Univ. Tübingen (Germany); Michael Wille, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Richard Willingale, Univ. of Leicester (United Kingdom). . . . . [9144-231]

The background simulations for ATHENA+: sources of charged particles at L-2 and the influence of solar conditions, Emanuele Perinati, Andrea E. Santangelo, Christoph Tenzer, Eberhard Karls Univ. Tübingen (Germany) . . . . . [9144-232]

Development of hard x-ray monitor onboard WF-MAXI, Makoto Arimoto, Nobuyuki Kawai, Yoichi Yatsu, Tokyo Institute of Technology (Japan); Hirokazu Ikeda, Japan Aerospace Exploration Agency (Japan); Tadayuki Takahashi, Institute of Space and Astronautical Science (Japan); Shin'ichiro Takeda, Japan Aerospace Exploration Agency (Japan); Atsushi Harayama, Institute of Space and Astronautical Science (Japan); Hiroshi Tomida, Shiro Ueno, Masashi Kimura, Japan Aerospace Exploration Agency (Japan); Tatehiro Mihara, Motoko Serino, RIKEN (Japan); Hiroshi Tsunemi, Osaka Univ. (Japan); Atsumasa Yoshida, Takanori Sakamoto, Aoyama Gakuin Univ. (Japan); Takayoshi Kohmura, Kogakuin Univ. (Japan); Hitoshi Negoro, Nihon Univ. (Japan); Yoshihiro Ueda, Kyoto Univ. (Japan) . . . . . [9144-233]

Development of soft x-ray large solid angle camera onboard WF-MAXI, Masashi Kimura, Hiroshi Tomida, Shiro Ueno, Japan Aerospace Exploration Agency (Japan); Nobuyuki Kawai, Yoichi Yatsu, Makoto Arimoto, Tokyo Institute of Technology (Japan); Tatehiro Mihara, Motoko Serino, RIKEN (Japan); Hiroshi Tsunemi, Osaka Univ. (Japan); Atsumasa Yoshida, Takanori Sakamoto, Aoyama Gakuin Univ. (Japan); Takayoshi Kohmura, Kogakuin Univ. (Japan); Hitoshi Negoro, Nihon Univ. (Japan); Yoshihiro Ueda, Kyoto Univ. (Japan) . . . . . [9144-234]

Development of the Four-stage X-ray telescope for the DIOS mission, Yuzuru Tawara, Ikuya Sakurai, Nagoya Univ. (Japan); Satoshi Sugita, Ehime Univ. (Japan); Shunya Takizawa, Yasunori Babazaki, Nagoya Univ. (Japan); Naoki Ishida, Nagoya Univ. (Japan) and Tamagawa Engineering Co., Ltd. (Japan) . . . . . [9144-235]

Optimisation of the design for the LOFT large area detector module, David M. Walton, Berend Winter, Silvia Zane, Univ. College London (United Kingdom) . . . . . [9144-236]

A mixed technology ASIC developed for charge detection in the frame of LOFT program, Alain L. Cros, Damien Rambaud, Emmanuel Moutaye, Laurent Ravera, Didier Barret, Institut de Recherche en Astrophysique et Planétologie (France); Philippe Cais, Lab. d'Astrophysique de Bordeaux (France); Rodolphe Clédassou, Pierre Bodin, Jean Yves Seyler, Ctr. National d'Études Spatiales (France); Marco Feroci, INAF - IASF Roma (Italy); Claudio Labanti, INAF - IASF Bologna (Italy); Yuri Evangelista, Istituto di Astrofisica e Planetologia Spaziali (Italy). . . . . [9144-237]

Radiation tests of the silicon drift detectors for LOFT, Ettore Del Monte, Istituto di Astrofisica e Planetologia Spaziali (Italy); Philipp Azzarello, Enrico Bozzo, Univ. of Geneva (Switzerland); Sebastian Bugiel, Max-Planck-Institut für Kernphysik (Germany); Sebastian Diebold, Eberhard Karls Univ. Tübingen (Germany); Yuri Evangelista, Istituto di Astrofisica e Planetologia Spaziali (Italy); Eckhard Kendziorra, Eberhard Karls Univ. Tübingen (Germany); Fabio Muleri, Istituto di Astrofisica e Planetologia Spaziali (Italy); Emanuele Perinati, Eberhard Karls Univ. Tübingen (Germany); Alexandre Rachevski, Gianluigi Zampa, Nicola Zampa, Istituto Nazionale di Fisica Nucleare (Italy); Marco Feroci, Istituto di Astrofisica e Planetologia Spaziali (Italy); Martin Pohl, Univ. of Geneva (Switzerland); Andrea E. Santangelo, Eberhard Karls Univ. Tübingen (Germany); Andrea Vacchi, Istituto Nazionale di Fisica Nucleare (Italy). . . . . [9144-238]

CONFERENCE 9144 · LOCATION: ROOM 520B

CONFERENCE 9145 · LOCATION: ROOM 517D

Sunday–Friday 22–27 June 2014 • Proceedings of SPIE Vol. 9145

Ground-based and Airborne Telescopes V


(Stepp)


(Gilmozzi)


(Hall)

Conference Chairs: **Larry M. Stepp,** Thirty Meter Telescope Observatory Corp. (USA); **Roberto Gilmozzi,** European Southern Observatory (Germany); **Helen J. Hall,** SOFIA / USRA (USA)

Program Committee: **Matthew Colless,** Research School of Astronomy & Astrophysics, The Australian National Univ. (Australia); **Jean-Gabriel Cuby,** Lab. d'Astrophysique de Marseille (France); **Xiangqun Cui,** Nanjing Institute of Astronomical Optics & Technology (China); **Frank W. Kan,** Simpson Gumpertz & Heger Inc. (USA); **Victor L. Krabbendam,** Large Synoptic Survey Telescope (USA); **Jeffrey R. Kuhn,** Univ. of Hawai'i (USA); **Heather K. Marshall,** National Solar Observatory (USA); **Göran Sandell,** SOFIA / USRA (USA); **Jason Spyromilio,** European Southern Observatory (Germany); **Tomonori Usuda,** National Astronomical Observatory of Japan (Japan)

SUNDAY 22 JUNE

SESSION 1

LOCATION: ROOM 517D . . . . . SUN 8:40 TO 10:30

Project Reviews I

Session Chair: **Roberto Gilmozzi,** European Southern Observatory (Germany)

8:40: **The large binocular telescope: binocular all the time**, John M. Hill, David S. Ashby, Joar G. Brynnel, Julian C. Christou, John K. Little, Douglas M. Summers, Christian Veillet, R. Mark Wagner, Large Binocular Telescope Observatory (USA) . . . . . [9145-1]

9:00: **The 3.6 meter Devsathal optical telescope and associated instrumentation** *(Invited Paper)*, Amitesh Omar, Brijesh Kumar, Aryabhatta Research Institute of Observational Sciences (India) . . . . . [9145-2]

9:30: **Solaris: a global network of autonomous observatories in the southern hemisphere**, Stanislaw K. Kozlowski, Piotr W. Sybilski, Maciej Konacki, Rafal Pawlaszek, Milena Ratajczak, Krzysztof G. Helminiak, Nicolaus Copernicus Astronomical Ctr. (Poland) . . . . . [9145-3]

9:50: **PLANETS: a unique telescope project for planetary and exoplanetary sciences**, Shoichi Okano, Jeffrey R. Kuhn, Univ. of Hawai'i (USA); Svetlana Berdyugina, Kiepenheuer-Institut für Sonnenphysik (Germany); Masato Kagitani, Tohoku Univ. (Japan); Joe Ritter, Univ. of Hawai'i (USA) . . . . . [9145-4]

10:10: **Deployment of the Hobby-Eberly telescope wide field upgrade**, Gary J. Hill, Niv Drory, John M. Good, Hanshin Lee, Brian L. Vattiat, The Univ. of Texas at Austin (USA); Hermanus Kriel, The Univ. of Texas at Austin (USA) and Hobby-Eberly Telescope (USA); Randy Bryant, Hobby-Eberly Telescope (USA); Linda Elliot, Martin Landriau, Ronnie Leck, David Perry, Jason Ramsey, Richard Savage, The Univ. of Texas at Austin (USA); George Damm, James R. Fowler, Hobby-Eberly Telescope (USA); Karl Gebhardt, Phillip J. MacQueen, The Univ. of Texas at Austin (USA); Jerry Martin, Hobby-Eberly Telescope (USA); Lawrence W. Ramsey, The Pennsylvania State Univ. (USA); Matthew Shetrone, Emily Schroeder, Hobby-Eberly Telescope (USA); Mark E. Cornell, MIT Lincoln Lab. (USA); John A. Booth, The Univ. of Texas at Austin (USA); Michael P. Smith, Univ. of Wisconsin-Madison (USA); Walter Moreira, The Univ. of Texas at Austin (USA) . . . . . [9145-5]

Coffee Break . . . . . Sun 10:30 to 11:00

SESSION 2

LOCATION: ROOM 517D . . . . . SUN 11:00 TO 11:50

Project Reviews II

Session Chair: **Helen Hall,** SOFIA / USRA (USA)

11:00: **Overview of University of Tokyo Atacama Observatory 6.5m telescope project** *(Invited Paper)*, Yuzuru Yoshii, Tsutomu Aoki, Mamoru Doi, The Univ. of Tokyo (Japan); Toshihiro Handa, Kagoshima Univ. (Japan); Takafumi Kamizuka, Natsuko M. Kato, Kimiaki Kawara, Kotaro Kohno, Masahiro Konishi, The Univ. of Tokyo (Japan); Shintaro Koshida, Pontificia Univ. Católica de Chile (Chile); Takeo Minezaki, Takashi Miyata, Tomoki Morokuma, Kentaro Motohara, Shigeyuki Sako, Takao Soyano, Hidenori Takahashi, Yoichi Tamura, Toshihiko Tanabe, Masuo Tanaka, Ken'ichi Tarusawa, The Univ. of Tokyo (Japan); Leonardo Bronfman, Maria T. Ruiz, Mario Hamuy, Rene A. Mendez, Univ. de Chile (Chile) . . . . . [9145-6]

11:30: **The Cherenkov telescope array single-mirror small size telescope project: status and prospect**, Domenico della Volpe, Univ. of Geneva (Switzerland) . . . . . [9145-111]

Lunch Break . . . . . Sun 11:50 to 13:20

SESSION 3

LOCATION: ROOM 517D . . . . . SUN 13:20 TO 14:20

Upgrades to Existing Observatories

Session Chair: **Matthew Colless,** The Australian National Univ. (Australia)

13:20: **System alignment and performance test of a wide field corrector for the Hobby-Eberly telescope**, Chang Jin Oh, Eric Frater, Chunyu Zhao, James H. Burge, College of Optical Sciences, The Univ. of Arizona (USA); Hanshin Lee, Gary J. Hill, The Univ. of Texas at Austin (USA). . . . . [9145-8]

13:40: **Conceptual design study to determine optimal enclosure vent configuration for the Maunakea Spectroscopic Explorer (MSE)**, Kei Szeto, NRC - Herzburg Institute of Astrophysics (Canada); Konstantinos Vogiatzis, Thirty Meter Telescope Observatory Corp. (USA); Horia Hangan, Chowdhury M. Jubayer, Western Univ. Canada (Canada); Craig Breckenridge, Nathan Loewen, Dynamic Structures Ltd. (Canada); Steven E. Bauman, Derrick Salmon, Canada-France-Hawaii Telescope (USA) . . . . . [9145-9]

14:00: **The RadioAstron Green Bank Earth Station**, H. Alyson Ford, Robert Anderson, National Radio Astronomy Observatory (USA); Konstantin Belousov, Astro Space Ctr. (Russian Federation); Joseph J. Brandt, John M. Ford, National Radio Astronomy Observatory (USA); Boris Kanevsky, Anatoliy Kovalenko, Yuri Y. Kovalev, Astro Space Ctr. (Russian Federation); Ronald J. Maddalena, National Radio Astronomy Observatory (USA); Sergey Sergeev, Lavochkin Association (Russian Federation); Alexander Smirnov, Astro Space Ctr. (Russian Federation); Galen Watts, Timothy L. Weadon, National Radio Astronomy Observatory (USA) . . . . . [9145-10]

CONFERENCE 9145 · LOCATION: ROOM 517D

SESSION 4

LOCATION: ROOM 517D . . . . . SUN 14:20 TO 15:00

Site Characterization and Testing

Session Chair: **Jason Spyromilio,** European Southern Observatory (Germany)

14:20: **Assessing VLT-UT science image quality from active optics Shack-Hartmann spot patterns**, Marc S. Sarazin, Johann Kolb, Miska Le Louarn, European Southern Observatory (Germany); Gianluca Lombardi, Julio Navarrete, European Southern Observatory (Chile) . . . . . [9145-11]

14:40: **Sky stability in far infrared measured with the IRAIT-ITM telescope and the camistic camera at Dome C**, Gilles A. Durand, CEA-Ctr. de SACLAY (France); Pascal Tremblin, Univ. of Exeter (United Kingdom); Vincent Minier, Yann Reinert, CEA-Ctr. de SACLAY (France); Christophe Le Roy-Dos Santos, Univ. degli Studi di Perugia (Italy); Xavier Joffrin, Eric Doumayrou, Michel Lortholary, CEA-Ctr. de SACLAY (France); Maurizio Busso, Univ. degli Studi di Perugia (Italy); Mauro Dolci, INAF - Osservatorio Astronomico di Teramo (Italy); Carlos Abia, Univ. de Granada (Spain); Oscar Straniero, Univ. di Teramo (Italy); Gino Tosti, Univ. degli Studi di Perugia (Italy); Daniele Tavagnacco, Univ. di Teramo (Italy); Louis Cadelis, Emmanuel Gregoire, CEA-Ctr. de SACLAY (France); Angelo Valentini, Univ. di Teramo (Italy). . . . . [9145-12]

Coffee Break . . . . . Sun 15:00 to 15:30

SESSION 5

LOCATION: ROOM 517D . . . . . SUN 15:30 TO 17:00

Design of Telescopes for Extreme Environments

Session Chair: **Xiangqun Cui,** Nanjing Institute of Astronomical Optics & Technology (China)

15:30: **Kunlun Dark Universe Survey telescope** *(Invited Paper)*, Yongtian Zhu, Xiangqun Cui, Nanjing Institute of Astronomical Optics & Technology (China); Dingqiang Su, Nanjing Univ. (China); Lifan Wang, Purple Mountain Observatory (China); Xiangyan Yuan, Xinnan Li, Bozhong Gu, Xuefei Gong, Shihai Yang, Fujia Du, Lingzhe Xu, Yongjun Qi, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9145-13]

16:00: **The AST3 project: Antarctic survey telescopes from Dome A**, Xiangyan Yuan, Xiangqun Cui, Nanjing Institute of Astronomical Optics & Technology (China); Lifan Wang, Purple Mountain Observatory (China); Bozhong Gu, Shihai Yang, Fujia Du, Xiaoyan Li, Daxing Wang, Xinnan Li, Xuefei Gong, Haikun Wen, Zhengyang Li, Haiping Lu, Lingzhe Xu, Ru Zhang, Nanjing Institute of Astronomical Optics & Technology (China); Yi Zhang, Nanjing Univ. of Science and Technology (China); Zhaohui Shang, Tianjin Normal Univ. (China) . . . . . [9145-14]

16:20: **The Greenland telescope (GLT): antenna status and future plans**, Philippe Raffin, Institute of Astronomy and Astrophysics (Taiwan); Keiichi Asada, Academia Sinica (Taiwan); Raymond Blundell, Roberto L. Burgos, Smithsonian Astrophysical Observatory (USA); Ming-Tang Chen, Institute of Astronomy and Astrophysics (Taiwan); Robert Christensen, Institute of Astronomy and Astrophysics (USA); Paul K. Grimes, Smithsonian Astrophysical Observatory (USA); Johnson Han, Institute of Astronomy and Astrophysics (Taiwan); Paul T. P. Ho, Harvard-Smithsonian Ctr. for Astrophysics (USA) and Academia Sinica (Taiwan); Yau-De Huang, Makoto Inoue, Patrick M. Koch, Institute of Astronomy and Astrophysics (Taiwan); Derek Y. Kubo, Institute of Astronomy and Astrophysics (USA); Steve Leiker, Harvard-Smithsonian Ctr. for Astrophysics (USA); Ching-Tang Liu, Chung-Shan Institute of Science and Technology (Taiwan); Pierre L. Martin-Cocher, Institute of Astronomy and Astrophysics (Taiwan); Satoki Matsushita, Hiroaki Nishioka, Academia Sinica (Taiwan); George Nystrom, Institute of Astronomy and Astrophysics (Taiwan); Scott N. Paine, Nimesh A. Patel, Harvard-Smithsonian Ctr. for Astrophysics (USA); Hui-Yu Shen, Institute of Astronomy and Astrophysics (Taiwan); William Snow, Academia Sinica (Taiwan); Tirupati K. Sridharan, Harvard-Smithsonian Ctr. for Astrophysics (USA); Ranjani Srinivasan, Academia Sinica (Taiwan); Edward C. Tong, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9145-15]

16:40: **New results from the first exoplanet survey in the Canadian High Arctic**, Nicholas M. Law, The Univ. of North Carolina at Chapel Hill (USA); Raymond Carlberg, Univ. of Toronto (Canada); Eric Steinbring, NRC - Herzburg Institute of Astrophysics (Canada); Wayne Ngan, Univ. of Toronto (Canada); Suresh Sivanandam, Jérôme Maire, Dunlap Institute for Astronomy & Astrophysics (Canada) . . . . . [9145-16]

SESSION 6

LOCATION: ROOM 517D . . . . . SUN 17:00 TO 17:40

Telescopes to Image Orbiting Objects

Session Chair: **Göran Sandell,** SOFIA / USRA (USA)

17:00: **Ground based astronomical instrument for planetary protection**, Richard L. Kendrick, Dave Bennett, Matthew Bold, Lockheed Martin Space Systems Co. (USA) . . . . . [9145-17]

17:20: **Lockheed Martin SPOT facility**, Robert Shivitz, Lockheed Martin Space Systems Co. (USA) . . . . . [9145-18]

MONDAY 23 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . MON 8:50 TO 10:00

Session Chair: **Luc Simard,** National Research Council of Canada - Herzberg Institute of Astrophysics (Canada)

08:50: **Welcome**

9:00: **James Webb Space Telescope: the road to first science observations** *(Plenary)*, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) [9143-501]

9:30: **The Square Kilometre Array: a physics machine for the 21st Century** *(Plenary)*, Philip Diamond, SKA Organisation (United Kingdom) . . [9143-502]

Coffee Break . . . . . Mon 10:00 to 10:30

SESSION 7

LOCATION: ROOM 517D . . . . . MON 10:30 TO 12:00

Cherenkov Telescopes I

Session Chair: **Jean-Gabriel Cuby,** Lab. d'Astrophysique de Marseille (France)

10:30: **Status of the Cherenkov telescope array project** *(Invited Paper)*, Stefan Schlenstedt, Deutsches Elektronen-Synchrotron (Germany) . . . . . [9145-19]

11:00: **The ASTRI SST-2M prototype for the next generation of Cherenkov telescope array: prototype technologies, goals, and strategies for the future SST**, Gianpietro Marchiori, Andrea Busatta, Stefano Giacomel, European Industrial Engineering s.r.l. (Italy); Rodolfo Canestrari, INAF - Isituto Nazionale di Astrofisica (Italy); Giovanni Pareschi, Luca Stringhetti, Gino Tosti, INAF - Istituto Nazionale di Astrofisica (Italy) . . . . . [9145-20]

11:20: **The ASTRI SST-2M prototype for the Cherenkov telescope array: manufacturing of the structure and of the mirrors**, Rodolfo Canestrari, INAF - Osservatorio Astronomico di Brera (Italy) and ASTRI Collaboration (Italy) and CTA Consortium (Germany); Giacomo Bonnoli, INAF - Osservatorio Astronomico di Brera (Italy); Enrico Cascone, INAF - Osservatorio Astronomico di Capodimonte (Italy); Paolo Conconi, Giuseppe Crimi, INAF - Osservatorio Astronomico di Brera (Italy); Mauro Fiorini, INAF - IASF Milano (Italy); Enrico Giro, INAF - Osservatorio Astronomico di Padova (Italy); Nicola La Palombara, INAF - IASF Milano (Italy); Giovanni Pareschi, Luca Perri, INAF - Osservatorio Astronomico di Brera (Italy); Gabriele Rodeghiero, INAF - Osservatorio Astronomico di Padova (Italy); Giorgia Sironi, INAF - Osservatorio Astronomico di Brera (Italy); Luca Stringhetti, INAF - IASF Milano (Italy); Giorgio Toso, INAF - Osservatorio Astronomico di Brera (Italy); Gino Tosti, Univ. degli Studi di Perugia (Italy); Carlo Pelliciari, INAF - Osservatorio Astronomico di Brera (Italy). . . . . [9145-21]

11:40: **The ASTRI/CTA mini-array of small size telescopes dual-mirror: a first seed for the Cherenkov telescope array**, Giovanni Pareschi, INAF - Osservatorio Astronomico di Brera (Italy); Markus Boettcher, North-West Univ. (South Africa); Rodolfo Canestrari, INAF - Osservatorio Astronomico di Brera (Italy); Patrizia A. Caraveo, INAF - IASF Milano (Italy); Osvaldo Catalano, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Mauro Fiorini, INAF - IASF Milano (Italy); Enrico Giro, INAF - Osservatorio Astronomico di Padova (Italy); Elisabethe M. de Gouveia Dal Pino, Univ. de São Paulo (Brazil); Nicola La Palombara, INAF - IASF Milano (Italy); Maria C. Maccarone, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Rachele Millul, INAF - Osservatorio Astronomico di Brera (Italy); Antonio Stamerra, INAF - Osservatorio Astrofisico di Torino (Italy); Luca Stringhetti, INAF - IASF Milano (Italy); Gino Tosti, Univ. degli Studi di Perugia (Italy); Stefano Vercellone, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy) . . . . . [9145-22]

Lunch Break . . . . . Mon 12:00 to 13:20

SESSION 8

LOCATION: ROOM 517D . . . . . MON 13:20 TO 14:00

Cherenkov Telescopes II

Session Chair: **Helen Hall,** SOFIA / USRA (USA)

13:20: **Medium-sized telescopes for the Cherenkov telescope array**, Stefan Schlenstedt, Deutsches Elektronen-Synchrotron (Germany) . . . . . [9145-23]

13:40: **The CTA large size telescope**, Riccardo Paoletti, Istituto Nazionale di Fisica Nucleare (Italy). . . . . [9145-24]

SESSION 9

LOCATION: ROOM 517D . . . . . MON 14:00 TO 15:10

Airborne Telescopes I

Session Chair: **Helen Hall,** SOFIA / USRA (USA)

14:00: **General investigator science program on SOFIA** *(Invited Paper)*, Erick T. Young, B. G. Andersson, Eric E. Becklin, William T. Reach, Ravi Sankrit, SOFIA / USRA (USA); Alfred Krabbe, Hans Zinnecker, Deutsches SOFIA Institut (Germany) . . . . . [9145-25]

14:30: **The balloon-borne large-aperture submillimeter telescope for polarimetry-BLASTPol: performance and results from the 2012 Antarctic flight**, Nicholas Galitzki, Univ. of Pennsylvania (USA); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Francesco E. Angilè, Univ. of Pennsylvania (USA); Steven J. Benton, Univ. of Toronto (Canada); Mark J. Devlin, Brad J. Dober, Univ. of Pennsylvania (USA); Laura M. Fissel, Northwestern Univ. (USA) and Univ. of Toronto (Canada); Yasuo Fukui, Nagoya Univ. (Japan); Natalie N. Gandilo, Univ. of Toronto (Canada); Jeffrey M. Klein, Univ. of Pennsylvania (USA); Andrei L. Korotkov, Brown Univ. (USA); Tristan G. Matthews, Northwestern Univ. (USA); Lorenzo Moncelsi, California Institute of Technology (USA); Calvin B. Netterfield, Univ. of Toronto (Canada); Giles Novak, Northwestern Univ. (USA); David Nutter, Enzo Pascale, Cardiff Univ. (United Kingdom); Frédérick Poidevin, Instituto de Astrofísica de Canarias (Spain); Giorgio Savini, Univ. College London (United Kingdom); Douglas Scott, The Univ. of British Columbia (Canada); Jamil A. Shariff, Univ. of Toronto (Canada); Juan D. Soler, Institut d'Astrophysique Spatiale (France) and Univ. of Toronto (Canada); Carole E. Tucker, Cardiff Univ. (United Kingdom); Gregory S. Tucker, Brown Univ. (USA); Derek Ward-Thompson, Cardiff Univ. (United Kingdom). . . . . [9145-26]

14:50: **SOFIA pointing history**, Hans J. Kärcher, Martin Süß, MT Mechatronics GmbH (Germany); Alfred Krabbe, Jörg Wagner, Deutsches SOFIA Institut (Germany); Pasquale Temi, NASA Ames Research Ctr. (USA) . . . . . [9145-27]

Coffee Break . . . . . Mon 15:10 to 15:40

SESSION 10

LOCATION: ROOM 517D . . . . . MON 15:40 TO 17:00

Airborne Telescopes II

Session Chair: **Göran Sandell,** SOFIA / USRA (USA)

15:40: **A light-weight gondola structure for the balloon-borne telescope Spider**, Juan D. Soler, Institut d'Astrophysique Spatiale (France) and Univ. of Toronto (Canada); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Mandana Amiri, The Univ. of British Columbia (Canada); Steven J. Benton, Univ. of Toronto (Canada); James J. Bock, Jet Propulsion Lab. (USA); J. Richard Bond, Canadian Institute for Theoretical Astrophysics, Inc. (Canada); Joseph A. Bonetti, Jet Propulsion Lab. (USA); Sean A. Bryan, Case Western Reserve Univ. (USA); Cynthia Chiang, Princeton Univ. (USA) and Univ. of KwaZulu-Natal (South Africa); Carlo R. Contaldi, Imperial College London (United Kingdom); Brendan P. Crill, Olivier P. Doré, Jet Propulsion Lab. (USA); Marzieh Farhang, Canadian Institute for Theoretical Astrophysics, Inc. (Canada); Jeffrey P. Filippini, California Institute of Technology (USA); Laura M. Fissel, Northwestern Univ. (USA) and Univ. of Toronto (Canada); Aurelien A. Fraisse, Anne E. Gambrel, Princeton Univ. (USA); Matthew Hasselfield, Princeton Univ. (USA) and The Univ. of British Columbia (Canada); Natalie N. Gandilo, Univ. of Toronto (Canada); Gene C. Hilton, National Institute of Standards and Technology (USA); Jon E. Gudmundsson, Princeton Univ. (USA); Mark Halpern, The Univ. of British Columbia (Canada); Warren A. Holmes, Jet Propulsion Lab. (USA); Viktor V. Hristov, California Institute of Technology (USA); Kent D. Irwin, National Institute of Standards and Technology (USA); William C. Jones, Zigmund D. Kermish, Princeton Univ. (USA); Krikor G. Megerian, Jet Propulsion Lab. (USA); Lorenzo Moncelsi, California Institute of Technology (USA); Peter V. Mason, Tracy A. Morford, California Institute of Technology (USA); Thomas E. Montroy, Case Western Reserve Univ. (USA); Carolyn J. MacTavish, Univ. of Cambridge (United Kingdom); Johanna M. Nagy, Case Western Reserve Univ. (USA); Calvin B. Netterfield, Univ. of Toronto (Canada); Alexandra S. Rahlin, Princeton Univ. (USA); Carl D. Reintsema, National Institute of Standards and Technology (USA); John E. Ruhl, Case Western Reserve Univ. (USA); Rebecca S. Tucker, California Institute of Technology (USA); Anthony D. Turner, Marcus C. Runyan, Jet Propulsion Lab. (USA); Jamil A. Shariff, Univ. of Toronto (Canada); Alexis C. Weber, Amy Trangsrud, Jet Propulsion Lab. (USA); Carole E. Tucker, Cardiff Univ. (United Kingdom); Donald V. Wiebe, The Univ. of British Columbia (Canada); Edward Y. Young, Princeton Univ. (USA) . . . . . [9145-28]

16:00: **BIUE: balloon ultraviolet experiment**, Sreejith A. G., Jayant Murthy, Rekhesh Mohan, Margarita Safonova, Indian Institute of Astrophysics (India). . . . . [9145-29]

16:20: **BLASTbus electronics: general-purpose readout and control for balloon-borne experiments**, Steven J. Benton, Univ. of Toronto (Canada); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Mandana Amiri, The Univ. of British Columbia (Canada); Francesco E. Angilè, Univ. of Pennsylvania (USA); James J. Bock, Jet Propulsion Lab. (USA); J. Richard Bond, Canadian Institute for Theoretical Astrophysics, Inc. (Canada); Sean A. Bryan, Case Western Reserve Univ. (USA); Hsin C. Chiang, Univ. of KwaZulu-Natal (South Africa); Carlo R. Contaldi, Imperial College London (United Kingdom); Brendan P. Crill, Jet Propulsion Lab. (USA); Greg Davis, The Univ. of British Columbia (Canada); Mark J. Devlin, Brad J. Dober, Univ. of Pennsylvania (USA); Olivier P. Doré, Jet Propulsion Lab. (USA); Marzieh Farhang, Canadian Institute for Theoretical Astrophysics, Inc. (Canada); Jeffrey P. Filippini, California Institute of Technology (USA); Laura M. Fissel, Northwestern Univ. (USA) and Univ. of Toronto (Canada); Aurelien A. Fraisse, Princeton Univ. (USA); Yasuo Fukui, Nagoya Univ. (Japan); Anne E. Gambrel, Princeton Univ. (USA); Natalie N. Gandilo, Univ. of Toronto (Canada); Jon E. Gudmundsson, Princeton Univ. (USA); Mark Halpern, The Univ. of British Columbia (Canada); Matthew Hasselfield, Princeton Univ. (USA); Gene C. Hilton, National Institute of Standards and Technology (USA); Warren A. Holmes, Jet Propulsion Lab. (USA); Viktor V. Hristov, California Institute of Technology (USA); Kent D. Irwin, Stanford Univ. (USA); William C. Jones, Zigmund D. Kermish, Princeton Univ. (USA); Jeffrey M. Klein, Univ. of Pennsylvania (USA); Andrei L. Korotkov, Brown Univ. (USA); Carolyn J. MacTavish, Kavli Institute for Cosmological Physics (United Kingdom); Peter V. Mason, California Institute of Technology (USA); Tristan G. Matthews, Northwestern Univ. (USA); Krikor G. Megerian, Jet Propulsion Lab. (USA); Lorenzo Moncelsi, California Institute of Technology (USA); Thomas E. Montroy, Case Western Reserve Univ. (USA); Tracy A. Morford, Anthony K. Mroczkowski, California Institute of Technology (USA); Johanna M. Nagy, Case Western Reserve Univ. (USA); Calvin B. Netterfield, Univ. of Toronto (Canada); Giles Novak, Northwestern Univ. (USA); David Nutter, Enzo Pascale, Cardiff Univ. (United Kingdom); Frédérick Poidevin, Instituto de Astrofísica de Canarias (Spain); Alexandra S. Rahlin, Princeton Univ. (USA); Carl D. Reintsema, National Institute of Standards and Technology (USA); John E. Ruhl, Case Western Reserve Univ. (USA); Marcus C. Runyan, Jet Propulsion Lab. (USA); Giorgio Savini, Univ. College London (United Kingdom); Douglas Scott, The Univ. of British Columbia (Canada); Jamil A. Shariff, Univ. of Toronto (Canada); Juan D. Soler, Institut d'Astrophysique Spatiale (France) and Univ. of Toronto (Canada); Nicholas E. Thomas, Univ. of Miami (USA); Amy Trangsrud, Jet Propulsion Lab. (USA); Matthew D. P. Truch, Univ. of Pennsylvania (USA); Carole E. Tucker, Cardiff Univ. (United Kingdom); Gregory S. Tucker, Brown Univ. (USA); Rebecca S. Tucker, California Institute of Technology (USA); Anthony D. Turner, Jet Propulsion Lab. (USA); Derek Ward-Thompson, Univ. of Central Lancashire (United Kingdom); Alexis C. Weber, Jet Propulsion Lab. (USA); Donald V. Wiebe, The Univ. of British Columbia (Canada); Edward Y. Young, Princeton Univ. (USA) . . . . . [9145-30]

16:40: **Upgrade of the SOFIA target acquisition and tracking cameras**, Jürgen Wolf, Manuel Wiedemann, Enrico Pfüller, Michael Lachenmann, NASA Ames Research Ctr. (USA) and Univ. Stuttgart (Germany); Helen Hall, NASA Ames Research Ctr. (USA) and SOFIA / USRA (USA); Hans-Peter Röser, Univ. Stuttgart (Germany) . . . . . [9145-31]

SESSION 11

LOCATION: ROOM 517D . . . . . MON 17:00 TO 17:20

Airborne Telescopes III

Session Chair: **Göran Sandell,** SOFIA / USRA (USA)

17:00: **Characterization of two InGaAs-based cameras for astronomical applications using a new VIS-NIR-SWIR detector test bench**, Karsten Schindler, Max-Planck-Institut für Sonnensystemforschung (Germany) and SOFIA / USRA (Germany); Jürgen Wolf, SOFIA / USRA (Germany); Alfred Krabbe, Deutsches SOFIA Institut (Germany). . . . . [9145-104]

CONFERENCE 9145 · LOCATION: ROOM 517D

POSTER SESSION–MONDAY

LOCATION: ROOM 516 . . . . . MON 17:30 TO 19:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Monday. The interactive poster session with authors in attendance will be Monday evening from 17:30 to 19:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Modeling and simulation of a 6-DOF parallel platform for telescope secondary mirror, Zhongyu Yue, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9145-96]

Active optics operations at the Large Binocular telescope, Douglas L. Miller, John M. Hill, Taras Golota, Large Binocular Telescope Observatory (USA) [9145-97]

A laser tracker active optics system for the Large Binocular telescope, Lee Dettmann, David S. Ashby, John M. Hill, Amjad Chatila, Large Binocular Telescope Observatory (USA). . . . . [9145-98]

Active optics control development at the LBT, David S. Ashby, Christopher Biddick, John M. Hill, Large Binocular Telescope Observatory (USA) . . . . [9145-99]

Optomechanical conceptual design of CIDRE: a small experimental balloon experiment for measuring the Deuterium, Jean-Laurent Dournaux, Observatoire de Paris à Meudon (France); Christophe Berthod, Institut National des Sciences de l'Univers (France); David Horville, Observatoire de Paris à Meudon (France); Jean-Michel Huet, LESIA - Observatoire de Paris (France); Philippe Laporte, Alexia Romanow, Observatoire de Paris à Meudon (France); Jean-Michel Krieg, Laurent Pagani, Martina Wiedner, Observatoire de Paris (France); Jean Evrard, Albert Gomes, Martine Jouret, Ctr. National d'Études Spatiales (France) . . . . . [9145-100]

Attitude determination for balloon-borne experiments, Natalie N. Gandilo, Univ. of Toronto (Canada); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Mandana Amiri, The Univ. of British Columbia (Canada); Francesco E. Angilè, Univ. of Pennsylvania (USA); Steven J. Benton, Univ. of Toronto (Canada); James J. Bock, Jet Propulsion Lab. (USA); J. Richard Bond, Canadian Institute for Theoretical Astrophysics, Inc. (Canada); Joseph A. Bonetti, Jet Propulsion Lab. (USA); Sean A. Bryan, Case Western Reserve Univ. (USA); Cynthia Chiang, Princeton Univ. (USA) and Univ. of KwaZulu-Natal (South Africa); Carlo R. Contaldi, Imperial College London (United Kingdom); Brendan P. Crill, Jet Propulsion Lab. (USA); Mark J. Devlin, Brad J. Dober, Univ. of Pennsylvania (USA); Olivier P. Doré, Jet Propulsion Lab. (USA); Marzieh Farhang, Canadian Institute for Theoretical Astrophysics, Inc. (Canada); Jeffrey P. Filippini, California Institute of Technology (USA); Laura M. Fissel, Northwestern Univ. (USA) and Univ. of Toronto (Canada); Aurelien A. Fraisse, Princeton Univ. (USA); Yasuo Fukui, Nagoya Univ. (Japan); Anne E. Gambrel, Jon E. Gudmundsson, Princeton Univ. (USA); Mark Halpern, The Univ. of British Columbia (Canada); Matthew Hasselfield, Princeton Univ. (USA); Gene C. Hilton, National Institute of Standards and Technology (USA); Warren A. Holmes, Jet Propulsion Lab. (USA); Viktor V. Hristov, California Institute of Technology (USA); Kent D. Irwin, Stanford Univ. (USA); William C. Jones, Zigmund D. Kermish, Princeton Univ. (USA); Jeffrey M. Klein, Univ. of Pennsylvania (USA); Krikor G. Megerian, Jet Propulsion Lab. (USA); Andrei L. Korotkov, Brown Univ. (USA); Lorenzo Moncelsi, Cardiff Univ. (USA); Thomas E. Montroy, Case Western Reserve Univ. (USA); Carolyn J. MacTavish, Univ. of Cambridge (United Kingdom); Tracy A. Morford, Peter V. Mason, Anthony K. Mroczkowski, California Institute of Technology (USA); Tristan G. Matthews, Northwestern Univ. (USA); Johanna M. Nagy, Case Western Reserve Univ. (USA); Calvin B. Netterfield, Univ. of Toronto (Canada); Giles Novak, Northwestern Univ. (USA); David Nutter, Enzo Pascale, Cardiff Univ. (United Kingdom); Frédérick Poidevin, Instituto de Astrofísica de Canarias (Spain); Alexandra S. Rahlin, Princeton Univ. (USA); Carl D. Reintsema, National Institute of Standards and Technology (USA); John E. Ruhl, Case Western Reserve Univ. (USA); Marcus C. Runyan, Jet Propulsion Lab. (USA); Giorgio Savini, Univ. College London (United Kingdom); Douglas Scott, The Univ. of British Columbia (Canada); Jamil A. Shariff, Univ. of Toronto (Canada); Juan D. Soler, Institut d'Astrophysique Spatiale (France) and Univ. of Toronto (Canada); Nicholas E. Thomas, Univ. of Miami (USA); Amy Trangsrud, Jet Propulsion Lab. (USA); Matthew D. P. Truch, Univ. of Pennsylvania (USA); Carole E. Tucker, Cardiff Univ. (United Kingdom); Gregory S. Tucker, Brown Univ. (USA); Rebecca S. Tucker, California Institute of Technology (USA); Anthony D. Turner, Jet Propulsion Lab. (USA); Derek Ward-Thompson, Univ. of Central Lancashire (United Kingdom); Alexis C. Weber, Jet Propulsion Lab. (USA); Donald V. Wiebe, The Univ. of British Columbia (Canada); Edward Y. Young, Princeton Univ. (USA) . . . . . [9145-101]

Pointing control for the Spider balloon-borne telescope, Jamil A. Shariff, Univ. of Toronto (Canada); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Mandana Amiri, The Univ. of British Columbia (Canada); Steven J. Benton, Univ. of Toronto (Canada); James J. Bock, Jet Propulsion Lab. (USA); J. Richard Bond, Canadian Institute for Theoretical Astrophysics, Inc. (Canada); Joseph A. Bonetti, Jet Propulsion Lab. (USA); Sean A. Bryan, Case Western Reserve Univ. (USA); Hsin C. Chiang, Univ. of KwaZulu-Natal (South Africa); Carlo R. Contaldi, Imperial College London (United Kingdom); Brendan P. Crill, Olivier P. Doré, Jet Propulsion Lab. (USA); Marzieh Farhang, Canadian Institute for Theoretical Astrophysics, Inc. (Canada) and Univ. of Toronto (Canada); Jeffrey P. Filippini, California Institute of Technology (USA); Laura M. Fissel, Northwestern Univ. (USA) and Univ. of Toronto (Canada); Aurelien A. Fraisse, Anne E. Gambrel, Jon E. Gudmundsson, Princeton Univ. (USA); Natalie N. Gandilo, Univ. of Toronto (Canada); Mark Halpern, The Univ. of British Columbia (Canada); Matthew Hasselfield, Princeton Univ. (USA); Gene C. Hilton, National Institute of Standards and Technology (USA); Warren A. Holmes, Jet Propulsion Lab. (USA); Viktor V. Hristov, California Institute of Technology (USA); Kent D. Irwin, Stanford Univ. (USA); William C. Jones, Zigmund D. Kermish, Princeton Univ. (USA); Carolyn J. MacTavish, Univ. of Cambridge (United Kingdom); Peter V. Mason, California Institute of Technology (USA); Krikor G. Megerian, Jet Propulsion Lab. (USA); Lorenzo Moncelsi, California Institute of Technology (USA); Thomas E. Montroy, Case Western Reserve Univ. (USA); Tracy A. Morford, California Institute of Technology (USA); Johanna M. Nagy, Case Western Reserve Univ. (USA); Calvin B. Netterfield, Univ. of Toronto (Canada); Alexandra S. Rahlin, Princeton Univ. (USA); Carl D. Reintsema, National Institute of Standards and Technology (USA); John E. Ruhl, Case Western Reserve Univ. (USA); Juan D. Soler, Institut d'Astrophysique Spatiale (France) and Univ. of Toronto (Canada); Marcus C. Runyan, Jet Propulsion Lab. (USA); Amy Trangsrud, Jet Propulsion Lab. (USA); Carole E. Tucker, Cardiff Univ. (United Kingdom); Rebecca S. Tucker, California Institute of Technology (USA); Anthony D. Turner, Jet Propulsion Lab. (USA); Alexis C. Weber, Jet Propulsion Lab. (USA); Donald V. Wiebe, The Univ. of British Columbia (Canada); Edward Y. Young, Princeton Univ. (USA) . . . . . [9145-102]

Environmental testing for new SOFIA flight hardware, Michael Lachenmann, Jürgen Wolf, Univ. Stuttgart (Germany) and NASA Ames Research Ctr. (USA); Rainer Strecker, Univ. Stuttgart (Germany) and NASA Dryden Flight Research Ctr. (USA); Benedikt Weckenmann, Fritz F. Trimpe, Univ. Stuttgart (Germany) and NASA Ames Research Ctr. (USA); Helen Hall, SOFIA / USRA (USA) . . . . . [9145-103]

BRRISON IR Camera (BIRC), Ryan T. McMichael, Johns Hopkins Univ. Applied Physics Lab., LLC (USA) . . . . . [9145-105]

The real-time analysis prototype of the Cherenkov telescope array, Andrea A. Bulgarelli, Valentina Fioretti, Andrea Zoli, INAF - IASF Bologna (Italy); Alessio Aboudan, Univ. degli Studi di Padova (Italy); J. J. Rodríguez-Vázquez, Ctr. de Investigaciones Energéticas, Medioambientales y Tecnológicas (Spain); Gernot Maier, Deutsches Elektronen-Synchrotron (Germany); Etienne Lyard, Univ. of Geneva (Switzerland); Denis Bastieri, Univ. degli Studi di Padova (Italy); Gino Tosti, Univ. degli Studi di Perugia (Italy); Adriano De Rosa, INAF - IASF Bologna (Italy); Sonia Bergamaschi, M. Interlandi, Domenico Beneventano, Univ. degli Studi di Modena e Reggio Emilia (Italy); G. Lamanna, Jean Jacquemier, Lab. d'Annecy-le-Vieux de Physique des Particules (France); Karl Kosack, Commissariat à l'Énergie Atomique (France); Angelo L. Antonelli, INAF - Osservatorio Astronomico di Roma (Italy); Catherine Boisson, Observatoire de Paris (France); J. Burkowsky, Nicolaus Copernicus Astronomical Ctr. (Poland); Sara Buson, Univ. degli Studi di Padova (Italy); Alessandro Carosi, INAF - Osservatorio Astronomico di Roma (Italy); Vito Conforti, INAF - IASF Bologna (Italy); J. L. Contreras, Univ. Complutense de Madrid (Spain); Raquel de los Reyes, Max-Planck-Institut für Kernphysik (Germany); J. Dumm, Univ. of Iowa (USA); P. A. Evans, Univ. of Leicester (United Kingdom); L. Fortson, Univ. of Iowa (USA); Matthias Fuessling, Deutsches Elektronen-Synchrotron (Germany); Fulvio Gianotti, P. Grandi, INAF - IASF Bologna (Italy); Jim Hinton, Univ. of Leicester (United Kingdom); Thomas B. Humensky, Columbia Univ. (USA); Jürgen Knödlseder, Institut de Recherche en Astrophysique et Planétologie (France); Saverio Lombardi, INAF - Osservatorio Astronomico di Roma (Italy); Giuseppe Malaguti, Martino Marisaldi, INAF - IASF Bologna (Italy); Nadine Neyroud, CNRS/IN2P3, Univ. de Sávoie (France); Luciano Nicastro, INAF - IASF Bologna (Italy); S. Ohm, J. Osborne, S. Rosen, Univ. of Leicester (United Kingdom); Alessandro Tacchini, INAF - IASF Bologna (Italy); Vincenzo Testa, INAF - Osservatorio Astronomico di Roma (Italy); Massimo Trifoglio, INAF - IASF Bologna (Italy); Amanda Weinstein, Iowa State Univ. (USA) . . . . . [9145-107]

SST-GATE telescope: an innovative dual-mirror prototype for the Cherenkov telescope array, Jean-Michel Huet, LESIA - Observatoire de Paris (France); Delphine Dumas, Philippe Laporte, Jean-laurent Dournaux, Jean-Philippe Amans, Gilles Fasola, Fatima de Frondat, Frederic N. Sayède, Cameron Rulten, Andréas Zech, Hélène Sol, Observatoire de Paris à Meudon (France); Simon Blake, Jurgen Schmoll, Durham Univ. (United Kingdom). . . . . [9145-108]

SST dual-mirror telescopes for Cherenkov telescope array, Delphine Dumas, Philippe Laporte, Hélène Sol, Observatoire de Paris à Meudon (France); Jean-Michel Huet, LESIA - Observatoire de Paris (France); Jean-Laurent Dournaux, Gilles Fasola, Jean-Philippe Amans, Andréas Zech, Observatoire de Paris à Meudon (France); Simon Blake, Durham Univ. (United Kingdom); Tim Greenshaw, Univ. of Liverpool (United Kingdom); Jurgen Schmoll, Durham Univ. (United Kingdom); Richard White, Jim Hinton, Univ. of Leicester (United Kingdom); Michael Daniel, Univ. of Liverpool (United Kingdom); Anthony M. Brown, Durham Univ. (United Kingdom); Giovanni Pareschi, Rodolfo Canestrari, INAF - Osservatorio Astronomico di Brera (Italy); Luca Stringhetti, INAF - IASF Milano (Italy); Osvaldo Catalano, Stefano Vercellone, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Gino Tosti, Univ. degli Studi di Perugia (Italy); Massimo Trifoglio, INAF - IASF Bologna (Italy); Enrico Giro, INAF - Osservatorio Astronomico di Padova (Italy); Maria C. Maccarone, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy). . . . . [9145-109]

Performance of the small size telescope sub-array of the Cherenkov telescope array observatory, Rafal Moderski, Nicolaus Copernicus Astronomical Ctr. (Poland) . . . . . [9145-110]

Status of the photomultiplier-based FlashCam camera for the Cherenkov telescope array, Gerd Puehlhofer, Eberhard Karls Univ. Tübingen (Germany) and for the CTA consortium: (Germany); Christian Bauer, Max-Planck-Institut für Kernphysik (Germany); Felix Eisenkolb, Eberhard Karls Univ. Tübingen (Germany); Daniel Florin, Univ. of Zürich (Switzerland); Christian Foehr, Max-Planck-Institut für Kernphysik (Germany); Arno Gadola, Univ. of Zürich (Switzerland); Frank Garrecht, German Hermann, Max-Planck-Institut für Kernphysik (Germany); Ira Jung, Oleg Kalekin, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Christoph Kalkuhl, Eberhard Karls Univ. Tübingen (Germany); Jerzy Kasperek, AGH Univ. of Science and Technology (Poland); Thomas Kihm, Max-Planck-Institut für Kernphysik (Germany); Jerzy Koziol, Jagiellonian Univ. in Krakow (Poland); Robert Lahmann, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Aaron Manalaysay, Univ. of Zürich (Switzerland); Adam Marszalek, Jagiellonian Univ. in Krakow (Poland); Pawel J. Rajda, AGH Univ. of Science and Technology (Poland); Olaf Reimer, Univ. of Innsbruck (Austria); Wojciech Romaszkan, Marcin Rupiński, AGH Univ. of Science and Technology (Poland); Thomas Schanz, Eberhard Karls Univ. Tübingen (Germany); Thomas Schwab, Max-Planck-Institut für Kernphysik (Germany); Stefan Steiner, Ueli Straumann, Univ. of Zürich (Switzerland); Christoph Tenzer, Eberhard Karls Univ. Tübingen (Germany); Achim Vollhardt, Univ. of Zürich (Switzerland); Quirin Weitzel, Max-Planck-Institut für Kernphysik (Germany); Krzysztof Winiarski, AGH Univ. of Science and Technology (Poland); Krzysztof Zietara, Jagiellonian Univ. in Krakow (Poland) . . . . . [9145-112]

Development of extensive air showers at two different levels of measurement, Aline Galindo, Esperanza Carrasco, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Eduardo Moreno, Benemérita Univ. Autónoma de Puebla (Mexico); Ibrahim Torres, Alberto Carramiñana Alonso, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [9145-113]

Schwarzschild-Couder telescope for the Cherenkov telescope array, Kevin J. Meagher, Georgia Institute of Technology (USA) . . . . . [9145-114]

Thermal modeling of the balloon-borne telescope BLASTPol, Juan D. Soler, Institut d'Astrophysique Spatiale (France) and Univ. of Toronto (Canada); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Francesco E. Angilè, Univ. of Pennsylvania (USA); Steven J. Benton, Univ. of Toronto (Canada); Mark J. Devlin, Brad J. Dober, Univ. of Pennsylvania (USA); Laura M. Fissel, Univ. of Toronto (Canada) and Northwestern Univ. (USA); Yasuo Fukui, Nagoya Univ. (Japan); Nicholas Galitzki, Univ. of Pennsylvania (USA); Natalie N. Gandilo, Univ. of Toronto (Canada); Jeffrey M. Klein, Univ. of Pennsylvania (USA); Andrei L. Korotkov, Brown Univ. (USA); Tristan G. Matthews, Northwestern Univ. (USA); Lorenzo Moncelsi, Anthony K. Mroczkowski, California Institute of Technology (USA); Calvin B. Netterfield, Univ. of Toronto (Canada); Giles Novak, Northwestern Univ. (USA); David Nutter, Enzo Pascale, Cardiff Univ. (United Kingdom); Frédérick Poidevin, Instituto de Astrofísica de Canarias (Spain); Giorgio Savini, Univ. College London (United Kingdom); Douglas Scott, The Univ. of British Columbia (Canada); Jamil A. Shariff, Univ. of Toronto (Canada); Nicholas E. Thomas, Univ. of Miami (USA); Matthew D. P. Truch, Univ. of Pennsylvania (USA); Carole E. Tucker, Cardiff Univ. (United Kingdom); Gregory S. Tucker, Brown Univ. (USA); Derek Ward-Thompson, Cardiff Univ. (United Kingdom) and Jeremiah Horrocks Institute of Maths, Physics and Astronomy (United Kingdom) . . . . . [9145-116]

Development of a 30-cm submillimeter-wave telescope for the operation at Dome Fuji in Antarctica, Shun Ishii, Masumichi Seta, Taketo Nagasaki, Naomasa Nakai, Makoto Nagai, Univ. of Tsukuba (Japan); Yusuke Miyamoto, Ibaraki Univ. (Japan); Hiroaki Imada, Koichiro Doihata, Kota Saito, Univ. of Tsukuba (Japan); Yutaro Sekimoto, National Astronomical Observatory of Japan (Japan) . [9145-117]

Latest results of the Antarctica search for transit exo-planets program, Lyu Abe, Abdelkrim Agabi, Tristan Guillot, François-Xavier Schmider, Jean-Pierre Rivet, Lab. J.L. Lagrange (France); Daniel Bayliss, The Australian National Univ. (Australia); Nicolas Crouzet, Space Telescope Science Institute (USA) . . . . . [9145-118]

The mechanical design and study of the second Antarctic Survey Telescope, Haikun Wen, Xuefei Gong, BoZhong Gu, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9145-209]

Wide field corrector for the KMTNet telescope, Yongseok Lee, Sang-Mok Cha, Korea Astronomy and Space Science Institute (Korea, Republic of) and Kyung Hee Univ. (Korea, Republic of); Wade M. Poteet, CP Systems, Inc. (USA); Philip Lam, Lam Optics, Inc. (USA); Chung-Uk Lee, Seung-Lee Kim, Byeong-Gon Park, Korea Astronomy and Space Science Institute (Korea, Republic of); Richard A. Buchroeder, CP Systems, Inc. (USA); Ho Jin, Kyung Hee Univ. (Korea, Republic of) . . . . . [9145-119]

Stress polishing demonstrator for ELT M1 segments and industrialization, Emmanuel Hugot, Johan Floriot, Marc Ferrari, Fabrice Madec, Anais Bernard, Lab. d'Astrophysique de Marseille (France); Thibaut Dufour, Jean-Marc Combes, Denis Fappani, Christian Du Jeu, Thales SESO (France) . . . . . [9145-120]

The indoor turbulence sensor (INTENSE) instrument, Julien Chabé, Flavien Blary, Aziz Ziad, Julien Borgnino, Lab. J.L. Lagrange (France); Arnaud Liotard, Frederic Falzon, Thales Alenia Space (France) . . . . . [9145-121]

Approaches to the interferometric test of large flat mirrors: the case of the adaptive M4 for E-ELT, Giorgio Pariani, INAF - Osservatorio Astronomico di Brera (Italy); Runa Briguglio, Marco Xompero, Armando Riccardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Marco Riva, Andrea Bianco, INAF - Osservatorio Astronomico di Brera (Italy); Filippo Maria M. Zerbi, Istituto Nazionale di Astrofisica (Italy); Daniela Tresoldi, INAF - Osservatorio Astronomico di Brera (Italy); Emilio Molinari, Telescopio Nazionale Galileo (Spain); Matteo Tintori, Paolo Lazzarini, Daniele Gallieni, A.D.S. International S.r.l. (Italy); Marc Cayrel, Elise Vernet, European Southern Observatory (Germany) . . . . . [9145-123]

Design and development status of the University of Tokyo Atacama Observatory 6.5m telescope, Tomoki Morokuma, Tsutomu Aoki, Mamoru Doi, The Univ. of Tokyo (Japan); Toshihiro Handa, Kagoshima Univ. (Japan); Takafumi Kamizuka, Natsuko M. Kato, Kimiaki Kawara, Kotaro Kohno, Masahiro Konishi, The Univ. of Tokyo (Japan); Shintaro Koshida, Pontificia Univ. Católica de Chile (Chile); Takeo Minezaki, Takashi Miyata, Kentaro Motohara, Shigeyuki Sako, Takao Soyano, Hidenori Takahashi, Yoichi Tamura, Toshihiko Tanabe, Masuo Tanaka, Ken'ichi Tarusawa, Yuzuru Yoshii, The Univ. of Tokyo (Japan) . . . . . [9145-124]

Progress on the New York State Observatory: a new 12 meter astronomical telescope, Thomas A. Sebring, Xoptx LLC (USA); Christopher P. O'Dea, Space Telescope Science Institute (USA); Stefi Alison Baum, Rochester Institute of Technology (USA) . . . . . [9145-125]

Astroclimate at Jbel Aklim site in Moroccan anti-atlas: 2008-2010 seeing and isoplanatic angle statistics from the E-ELT site testing data, Mohammed Sabil, Zouhair Benkhaldoun, Mohamed Lazrek, Univ. Cadi Ayyad (Morocco); Abdelfattah Habib, Univ. Cadi Ayyad (Morocco) and CRMEF-Marrakech (Morocco); Abdelmajid M. Benhida, Youssef Hach, My Youssef Elazhari, Abdelhadi Jabiri, Univ. Cadi Ayyad (Morocco) . . . . . [9145-126]

E-ELT seeing and isoplanatic angle: comparison of Aklim site and El Roque de Los Muchachos Observatory, Mohammed Sabil, Zouhair Benkhaldoun, Mohamed Lazrek, Univ. Cadi Ayyad (Morocco); Abdelfattah Habib, Univ. Cadi Ayyad (Morocco) and CRMEF-Marrakech (Morocco); Abdelmajid M. Benhida, Youssef Hach, My Youssef Elazhari, Univ. Cadi Ayyad (Morocco); Thami El Halkouj, Univ. Cadi Ayyad (Morocco) and CRMEF-Marrakech (Morocco). . . . . [9145-127]

A new generalized differential image motion monitor, Eric Aristidi, Yan Fanteï-Caujolle, Aziz Ziad, Cecile Dimur, Julien Chabé, Baptiste Roland, Lab. J.L. Lagrange (France) . . . . . [9145-128]

Monitoring atmospheric turbulence profiles with high vertical resolution using PML/PBL instrument, Flavien Blary, Aziz Ziad, Julien Borgnino, Yan Fanteï-Caujolle, Eric Aristidi, Lab. J.L. Lagrange (France); Henri Lantéri, Observatoire de la Côte d'Azur (France) . . . . . [9145-129]

Phase characteristics of the ALMA 3-km baseline data, Satoki Matsushita, Academia Sinica (Taiwan); Yoshiharu Asaki, Japan Aerospace Exploration Agency (Japan); Ryohei Kawabe, National Astronomical Observatory of Japan (Japan) and Joint ALMA Observatory (Chile); Ed Fomalont, National Radio Astronomy Observatory (USA) and Joint ALMA Observatory (Chile); Denis Barkats, Stuartt A. Corder, Joint ALMA Observatory (Chile). . . . . [9145-130]

Optical turbulence profiling with SLODAR in the Canadian High Arctic, Jérôme Maire, Dunlap Institute for Astronomy & Astrophysics (Canada); Etsuko Mieda, Dunlap Institute for Astronomy & Astrophysics (Canada) and Univ. of Toronto (Canada); Eric Steinbring, Richard Murowinski, NRC - Herzburg Institute of Astrophysics (Canada); James R. Graham, Univ. of California, Berkeley (USA) and Dunlap Institute for Astronomy & Astrophysics (Canada); Raymond Carlberg, Univ. of Toronto (Canada); Shelley A. Wright, Dunlap Institute for Astronomy & Astrophysics (Canada) and Univ. of Toronto (Canada); Nicholas M. Law, Dunlap Institute for Astronomy & Astrophysics (Canada) and Univ. of Toronto (Canada) and The Univ. of North Carolina at Chapel Hill (USA); Suresh Sivanandam, Dunlap Institute for Astronomy & Astrophysics (Canada) . . . . . [9145-131]

A SLODAR instrument for characterizing an Arctic site: overview of the experimental method, design, and performance, Etsuko Mieda, Univ. of Toronto (Canada); Jérôme Maire, Dunlap Institute for Astronomy & Astrophysics (Canada); James R. Graham, Univ. of California, Berkeley (USA); Shelley A. Wright, Dae-Sik Moon, Univ. of Toronto (Canada) . . . . . [9145-132]

Calibration systems for LSST, Jacques Sebag, William J. Gressler, Ming Liang, National Optical Astronomy Observatory (USA); Charles F. Claver, LSST Corp. (USA) . . . . . [9145-133]

Reliability-centered maintenance for ground-based large optical telescopes and radio antenna arrays, Gianpietro Marchiori, Federico Formentin, Francesco Rampini, European Industrial Engineering s.r.l. (Italy). . . . . [9145-135]

Wavefront coding applied to a two-mirror telescope, Jose A. Araiza-Duran, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) and Univ. Nacional Autonoma de Mexico (Mexico); Esteban Luna, Univ. Nacional Autónoma de México (Mexico); Alejandro Cornejo, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Joel Herrera, Univ. Nacional Autónoma de México (Mexico) . . [9145-136]

CONFERENCE 9145 · LOCATION: ROOM 517D

Design of 1.2-m astronomical telescope for space-to-ground quantum communication experiment, Bo Qi, Ge Ren, Institute of Optics and Electronics (China) . . . . . [9145-137]

Wide-field telescopes with spherical primary mirrors, Daniel R. Blanco, MMT Observatory (USA). . . . . [9145-138]

Simultaneous ultra-high contrast imaging and determination of time-dependent, non-common path aberrations in the presence of detector noise, Richard A. Frazin, Univ. of Michigan (USA). . . . . [9145-139]

Integration and tuning of the China SONG telescope drive system, Changzhi Ren, Nanjing Institute of Astronomical Optics & Technology (China) . . . . [9145-140]

Fly's Eye camera system: optical imaging using a hexapod platform, Attila Jaskó, MTA Research Ctr. for Astronomy and Earth Sciences (Hungary); András Pal, MTA Research Ctr. for Astronomy and Earth Sciences (Hungary) and Loránd Eötvös Univ. (Hungary); Krisztián Vida, MTA Research Ctr. for Astronomy and Earth Sciences (Hungary); László Mészáros, Gergely Csépány, MTA Research Ctr. for Astronomy and Earth Sciences (Hungary) and Loránd Eötvös Univ. (Hungary); György Mezö, Katalin Oláh, MTA Research Ctr. for Astronomy and Earth Sciences (Hungary) . . . . . [9145-141]

Observational performance of the KMTNet, Chung-Uk Lee, Seung-Lee Kim, Sang-Mok Cha, Yongseok Lee, Dong-Jin Kim, Byeong-Gon Park, Korea Astronomy and Space Science Institute (Korea, Republic of). . . . . [9145-142]

Development of a wide field telescope, Il K. Moon, Ho-Soon Yang, Hyug-Gyo Rhee, Yun Woo Lee, Korea Research Institute of Standards and Science (Korea, Republic of); Jong Ung Lee, Cheongju Univ. (Korea, Republic of) . . . . . [9145-143]

The PANOPTES project: discovering exoplanets with low-cost digital cameras, Olivier Guyon, Josh Walawender, Subaru Telescope, National Astronomical Observatory of Japan (USA); Mike Butterfield, Univ. of Arizona (USA); Rawad Mery, Institut d'Optique Graduate School (France). . . . . [9145-145]

Dome shutter failure causes longest shutdown (67-nights) ever recorded by CFHT Observatory, Ivan A. Look, Derrick Salmon, Steven E. Bauman, Canada-France-Hawaii Telescope (USA) . . . . . [9145-146]

Design development of a deployable tertiary mirror for Keck 1, Jason X. Prochaska, Alex Tripsas, Univ. of California, Santa Cruz (USA); Sean M. Adkins, W. M. Keck Observatory (USA); Michael Bolte, Gerald Cabak, Lick Observatory (USA); David Cowley, Univ. of California, Santa Cruz (USA); Harland Epps, Lick Observatory (USA); Jerry Nelson, Univ. of California, Santa Cruz (USA); Christopher T. Ratliff, Andrew Phillips, Univ. of California Observatories (USA) . . . . . [9145-147]

Planning the installation of the dark energy spectroscopic instrument on the Mayall telescope, David Sprayberry, National Optical Astronomy Observatory (USA); William Goble, MMT Observatory (USA); Lori Allen, Jay Elias, Ronald G. Probst, Richard Joyce, Arjun Dey, Robert Marshall, Matthew Evatt, Robert Blum, Timothy Abbott, National Optical Astronomy Observatory (USA); Alistair R. Walker, Cerro Tololo Inter-American Observatory (Chile); Robert Besuner, Michael J. Sholl, Patrick N. Jelinsky, Univ. of California, Berkeley (USA); Robin Lafever, Christopher Bebek, Lawrence Berkeley National Lab. (USA); Brenna L. Flaugher, Fermi National Accelerator Laboratory (USA) . . . . . [9145-148]

A laser guide star system for LAMOST, Hua Bai, Xiangyan Yuan, Nanjing Institute of Astronomical Optics & Technology (China). . . . . [9145-149]

Upgradation progress of 13.7-m millimeter radio telescope reflector surface maintenance, Yong Zhang, Dehua Yang, Guohua Zhou, You Wang, Aihua Li, Yeping Li, Anfang Liu, Nanjing Institute of Astronomical Optics & Technology (China); Yizhong Zeng, Guoping Li, NIAOT (China); Qimeng Wang, Nanjing Institute of Astronomical Optics & Technology (China). . . . . [9145-150]

An active surface experiment for the Delingha 13.7-m millimeter radio telescope, Dehua Yang, Guohua Zhou, Aihua Li, You Wang, Yong Zhang, Nanjing Institute of Astronomical Optics & Technology (China). . . . . [9145-151]

Save our secondary: recovering a broken 1.3-m mirror, Timothy Abbott, Cerro Tololo Inter-American Observatory (Chile); Ronald G. Probst, Gary Poczulp, National Optical Astronomy Observatory (USA); Roberto Tighe, Patricio Schurter, Andres Montane, Cerro Tololo Inter-American Observatory (Chile); Joseph DeVries, Ron Harris, Jay Elias, National Optical Astronomy Observatory (USA) . . [9145-152]

The Mercator telescope: relevance, status, and future, Gert Raskin, Wim Pessemier, Katholieke Univ. Leuven (Belgium); Saskia Prins, Florian Merges, Jesus Pérez Padilla, Mercator Telescope (Spain); Hans Van Winckel, Katholieke Univ. Leuven (Belgium). . . . . [9145-153]

Concept and implementation of a virtual image slicer at the VLT, Stéphane Guisard, European Southern Observatory (Chile); Michael Sterzik, European Southern Observatory (Germany); Ivan Munoz, European Southern Observatory (Chile). . . . . [9145-154]

The guide focus and alignment (GFA) system for the dark energy spectroscopic instrument (DESI), Kevin A. Reil, SLAC National Accelerator Lab. (USA); Joseph H. Silber, Michael Lampton, Michael J. Sholl, Lawrence Berkeley National Lab. (USA); Aaron J. Roodman, SLAC National Accelerator Lab. (USA) . . . . . [9145-155]

Laboratory performance testing, installation, and commissioning of the wide field upgrade tracker for the Hobby-Eberly telescope, John M. Good, Gary J. Hill, Ronnie Leck, Hermanus Kriel, Emily Schroeder, Richard Savage, The Univ. of Texas at Austin (USA); Mark E. Cornell, MIT Lincoln Lab. (USA); Niv Drory, Martin Landriau, John A. Booth, The Univ. of Texas at Austin (USA) . . . . . [9145-156]

Turkey's next big science project: DAG the 4-m telescope, Onur Keskin, FMV Isik Univ. (Turkey); Cahit Yesilyaprak, Atatürk Üniv. (Turkey); Sinan K. Yerli, Middle East Technical Univ. (Turkey); Lorenzo Zago, HEIG-VD (Switzerland); Laurent Jolissaint, Haute Ecole d'Ingénierie et de Gestion du Canton de Vaud (Switzerland) . . . . . [9145-210]

Design of a new type telescope which can measure three dimension positions of space debris, Nenghong Zhu, Kexin Li, Pengjun Zhang, Shanghai Astronomical Observatory (China). . . . . [9145-211]

Challenges in operating an Arctic telescope, Liviu Ivanescu, Univ. de Sherbrooke (Canada), Univ. du Québec à Montréal (Canada); Konstantin Baibakov, Norman T. O'Neill, Auromeet Saha, Univ. de Sherbrooke (Canada); Jean-Pierre Blanchet, Univ. du Québec à Montréal (Canada); Martin Rietze, Baader Planetarium GmbH (Germany); Karl-Heinz Schulz, Dr. Schulz & Partner GmbH (Germany) . . [9145-212]

TUESDAY 24 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . TUE 8:50 TO 10:00

Session Chair: **Gillian S. Wright,** UK Astronomy Technology Ctr. (United Kingdom)

8:50: **SPIE Fellows Awards** presented by H. Philip Stahl, President of SPIE. The following individuals will be recognized for their contributions to SPIE and the scientific community: **Mark Clampin,** NASA Goddard Space Flight Ctr. (United States); **Gary Matthews,** Exelis Inc. (United States); **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (United States)

9:00: **Gaia: scientific in-orbit performance** *(Plenary),* Timo Prusti, European Space Agency (Netherlands) . . . . . [9143-503]

9:30: **ALMA Update** *(Plenary)*, Pierre Cox, Joint ALMA Observatory (Chile); Stuartt A. Corder, National Radio Astronomy Observatory (Chile) [9143-504]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 12

LOCATION: ROOM 517D . . . . . TUE 10:30 TO 12:00

Telescopes and Arrays for Surveys, Time-domain and Transient Observations I

Session Chair: **Victor L. Krabbendam,** LSST Corp. (USA)

10:30: **The Pan-STARRS project in 2014** *(Invited Paper)*, Jeffrey S. Morgan, William Burgett, Peter M. Onaka, Univ. of Hawai'i (USA) . . . . . [9145-33]

11:00: **The Evryscope: the first full-sky gigapixel-scale telescope**, Nicholas M. Law, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [9145-144]

11:20: **Introduction of Chinese SONG telescope**, Guomin Wang, Dongsheng Liu, Hai Wang, Xiang Jiang, Songfeng Kou, Changzhi Ren, Lingzhe Xu, Yu Ye, Zhiyong Zhang, Jin Xu, Zhongyu Yue, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9145-35]

11:40: **Liverpool Telescope 2: a new robotic facility for time domain astronomy in 2020+**, Chris M. Copperwheat, Iain A. Steele, Michael F. Bode, Liverpool John Moores Univ. (United Kingdom) . . . . . [9145-36]

Lunch Break . . . . . Tue 12:00 to 13:20

SESSION 13

LOCATION: ROOM 517D . . . . . TUE 13:20 TO 15:10

Telescopes and Arrays for Surveys, Time-domain and Transient Observations II

Session Chair: **Matthew Colless,** The Australian National Univ. (Australia)

13:20: **Large Synoptic Survey telescope construction readiness** *(Invited Paper)*, Victor L. Krabbendam, LSST Corp. (USA). . . . . [9145-37]

13:50: **Status of the transneptunian automated occultation survey (TAOS~II)**, Matthew J. Lehner, Academia Sinica (Taiwan) and Univ. of Pennsylvania (USA) and Harvard-Smithsonian Center for Astrophysics (USA); Shiang-Yu Wang, Zhi-Wei Zhang, Paul T. P Ho, Wei-Ling Yen, Academia Sinica (Taiwan); Mauricio Reyes Ruiz, Michael Richer, William Lee, Univ. Nacional Autónoma de México (Mexico); Charles Alcock, Gabor Furesz, John C. Geary, Timothy J. Norton, Andrew Szentgyorgyi, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9145-38]

14:10: **MASCARA multi-site all-sky camera: concept and first results**, Anna-Léa Lesage, Julien F. P. Spronck, Leiden Univ. (Netherlands); Remko Stuik, Leiden Observatory (Netherlands); Felix Bettonvil, Leiden Univ. (Netherlands) and NOVA Optical Infrared Instrumentation Group (Netherlands); Don Pollaco, The Univ. of Warwick (United Kingdom); Ignas A. G. Snellen, Leiden Observatory (Netherlands) . . . . . [9145-39]

14:30: **Current status and future plans for the Maunakea Spectroscopic Explorer (MSE)**, Doug Simons, Canada-France-Hawaii Telescope (USA); David Crampton, Patrick Cote, Alan McConnachie, Kei Szeto, NRC - Herzburg Institute of Astrophysics (Canada); Derrick Salmon, Daniel Devost, Canada-France-Hawaii Telescope (USA); Richard Murowinski, NRC - Herzburg Institute of Astrophysics (Canada) . . . . . [9145-40]

14:50: **Wavefront sensing and the active optics system of the dark energy camera**, Aaron J. Roodman, Kevin A. Reil, Christopher Davis, SLAC National Accelerator Lab. (USA) . . . . . [9145-41]

Coffee Break . . . . . Tue 15:10 to 15:40

SESSION 14

LOCATION: ROOM 517D . . . . . TUE 15:40 TO 17:10

Telescopes and Arrays for Surveys, Time-domain and Transient Observations III

Session Chair: **Tomonori Usuda,** National Astronomical Observatory of Japan (Japan)

15:40: **Spectroscopic survey of LAMOST** *(Invited Paper)*, Yongheng Zhao, National Astronomical Observatories (China) . . . . . [9145-42]

16:10: **Baseline design and requirements for the LSST telescope mount assembly**, Douglas Neill, Jacques Sebag, William J. Gressler, National Optical Astronomy Observatory (USA); Michael Warner, National Optical Astronomy Observatory (Chile); Oliver Wiecha, National Optical Astronomy Observatory (USA) . . . . . [9145-43]

16:30: **The Maunakea Spectroscopic Explorer: the science flowdown**, Alan McConnachie, NRC - Herzburg Institute of Astrophysics (Canada) and MSE Project Office (USA); Richard Murowinski, NRC - Herzberg Institute of Astrophysics (Canada) and MSE Project Office (USA); Derrick Salmon, Canada-France-Hawaii Telescope (USA) and MSE Project Office (USA); Doug Simons, Canada-France-Hawaii Telescope (USA); Patrick Cote, NRC - Herzburg Institute of Astrophysics (Canada) . . . . . [9145-44]

16:50: **Large Synoptic Survey telescope project telescope and site status**, William J. Gressler, National Optical Astronomy Observatory (USA) . . . . . [9145-45]

SESSION 15

LOCATION: ROOM 517D . . . . . TUE 17:10 TO 17:30

Telescope Performance Measurement

Session Chair: **Tomonori Usuda,** National Astronomical Observatory of Japan (Japan)

17:10: **Real time estimation and compensation of differential piston at the LBT**, Michael Boehm, Univ. Stuttgart (Germany) and Max-Planck-Institut für Astronomie (Germany); Jörg-Uwe Pott, Max-Planck-Institut für Astronomie (Germany); Oliver Sawodny, Univ. Stuttgart (Germany); Thomas M. Herbst, Martin Kürster, Max-Planck-Institut für Astronomie (Germany) . . . . . [9145-165]

WEDNESDAY 25 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . WED 9:00 TO 10:00

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

9:00: **Highlights from the Multi Unit Spectroscopic Explorer (MUSE): a 2nd generation VLT instrument for the VLT** *(Plenary)*, Roland M. Bacon, Observatoire de Lyon (France) . . . . . [9147-506]

9:30: **Canadian Space Astronomy: past, present and future** *(Plenary)*, John B. Hutchings, NRC - Herzberg Institute of Astrophysics (Canada) [9143-505]

Coffee Break . . . . . Wed 10:00 to 10:30

SESSION 16

LOCATION: ROOM 517D . . . . . WED 10:30 TO 12:00

Extremely Large Telescopes I

Session Chair: **Roberto Gilmozzi,** European Southern Observatory (Germany)

10:30: **Overview and status of the Giant Magellan telescope** *(Invited Paper)*, Rebecca Bernstein, Giant Magellan Telescope Project (USA) and Carnegie Observatories (USA); Matt Johns, Patrick McCarthy, Keith Raybould, Bruce C. Bigelow, Antonin H. Bouchez, José Filgueira, George Jacoby, David Sawyer, Michael Sheehan, Giant Magellan Telescope Project (USA). . . . . [9145-47]

11:00: **Thirty Meter telescope project update** *(Invited Paper)*, Gary H. Sanders, Thirty Meter Telescope Observatory Corp. (USA). . . . . [9145-48]

11:30: **European Extremely Large telescope: progress report** *(Invited Paper)*, Roberto Tamai, European Southern Observatory (Germany) . . . . . [9145-49]

Lunch/Exhibition Break . . . . . Wed 12:00 to 13:20

SESSION 17

LOCATION: ROOM 517D . . . . . WED 13:20 TO 14:00

Extremely Large Telescopes II

Session Chair: **Tomonori Usuda,** National Astronomical Observatory of Japan (Japan)

13:20: **Design of the Giant Magellan Telescope**, Matt Johns, Giant Magellan Telescope Project (USA); Steven Gunnels, Paragon Engineering (USA); Charlie Hull, Giant Magellan Telescope Project (USA); Brian McLeod, Harvard-Smithsonian Ctr. for Astrophysics (USA); Gary Muller, Ben Irarrazaval, Giant Magellan Telescope Project (USA); Christine Buleri, Quartus Engineering Inc. (USA); Jonathan Kern, Tomas Chylek, Carey Smith, Abhijit Wadhavkar, Giant Magellan Telescope Project (USA) . . . . . [9145-50]

13:40: **Enabling technologies for 100-m class telescopes: the Colossus project**, Jeffrey R. Kuhn, Univ. of Hawai'i (USA); Svetlana Berdyugina, Kiepenheuer-Institut für Sonnenphysik (Germany); David Halliday, Caisey Harlingten, Innovative Optics Ltd. (Canada); Gilberto Moretto, Institut de Physique Nucléaire de Lyon (France); Maud P. Langlois, Ctr. de Recherche Astronomique de Lyon (France) . . . [9145-51]

SESSION 18

LOCATION: ROOM 517D . . . . . WED 14:00 TO 15:00

Enabling Technologies for Extremely Large Telescopes I

Session Chair: **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (USA)

14:00: **GMT primary mirror support**, Charlie Hull, Giant Magellan Telescope Project (USA) . . . . . [9145-52]

14:20: **The secondary mirror concept for the European Extremely Large telescope**, Michael Mueller, Henri M. Bonnet, Marc Cayrel, Emanuela Ciattaglia, Michael Esselborn, Franz Koch, Herve Kurlandczyk, Lorenzo Pettazzi, Andrew Rakich, European Southern Observatory (Germany) . . . . . [9145-53]

14:40: **High volume production trial of mirror segments for the Thirty Meter telescope**, Tetsuji Oota, Mahito Negishi, Kotaro Akutsu, Hirohiko Shinonaga, Akihiko Gomi, Itaru Otsuka, Shun Mochizuki, Canon Inc. (Japan); Masanori Iye, Takuya Yamashita, National Astronomical Observatory of Japan (Japan) . [9145-54]

Coffee Break . . . . . Wed 15:00 to 15:30

CONFERENCE 9145 · LOCATION: ROOM 517D

SESSION 19

LOCATION: ROOM 517D . . . . . WED 15:30 TO 17:10

Enabling Technologies for Extremely Large Telescopes II

Session Chair: **Jeffrey R. Kuhn,** Institute for Astronomy, Univ. of Hawaii (USA)

15:30: **Improved EELT subsystem and component specifications thanks to M1 test facility**, Martin Dimmler, Juan Marrero, Pablo Barriga, Samuel S. Leveque, Babak Sedghi, Nick Kornweibel, European Southern Observatory (Germany) . . . . . [9145-55]

15:50: **New strategies for an extremely large telescope dedicated to extremely high contrast: the Colossus telescope**, Gilberto Moretto, Institut de Physique Nucléaire de Lyon (France); Éric M. Thiebaut, Maud P. Langlois, Ctr. de Recherche Astronomique de Lyon (France); Jeffrey R. Kuhn, Univ. of Hawai'i (USA); Svetlana Berdyugina, Kiepenheuer-Institut für Sonnenphysik (Germany); David Halliday, Dynamic Structures Ltd. (Canada) and Innovative Optics Ltd. (Canada); Caisey Harlingten, Innovative Optics Ltd. (Canada) . . . . . [9145-56]

16:10: **Development of GMT fast steering secondary mirror assembly**, Myung K. Cho, National Optical Astronomy Observatory (USA); Andrew Corredor, Christoph Dribusch, The Univ. of Arizona (USA); Won Hyun Park, College of Optical Sciences, The Univ. of Arizona (USA); Gary Muller, Matt Johns, Charlie Hull, Jonathan Kern, Giant Magellan Telescope Project (USA); Young-Soo Kim, Korea Astronomy and Space Science Institute (Korea, Republic of) . . . . . [9145-57]

16:30: **TMT primary mirror shape control system: status and risk reduction**, Peter M. Thompson, Systems Technology, Inc. (USA); Douglas G. MacMartin, California Institute of Technology (USA); Mark Colavita, Jet Propulsion Lab. (USA); Mark Sirota, Thirty Meter Telescope Observatory Corp. (USA) . . . . . [9145-58]

16:50: **Status of E-ELT M5 scale 1 demonstrator**, Pablo Barriga, Babak Sedghi, Martin Dimmler, Nick Kornweibel, European Southern Observatory (Germany) . . . . . [9145-59]

SESSION 20

LOCATION: ROOM 517D . . . . . WED 17:10 TO 17:30

Telescope Controls

Session Chair: **Jeffrey Kuhn,** Institute for Astronomy, Univ. of Hawaii (USA)

17:10: **CCAT mount control using de-convolution for fast scans**, Peter M. Thompson, Systems Technology, Inc. (USA); Stephen Padin, California Institute of Technology (USA) . . . . . [9145-60]

POSTER SESSION–WEDNESDAY

LOCATION: ROOM 516 . . . . . WED 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Wednesday. The interactive poster session with authors in attendance will be Wednesday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

LSST telescope integration and tests, Jacques Sebag, Douglas Neill, William J. Gressler, John Andrew, National Optical Astronomy Observatory (USA). [9145-157]

Tuning a 2.4-meter telescope... blindfolded, Kyle Lanclos, Michael Peck, Robert I. Kibrick, Michael Saylor, Univ. of California Observatories (USA); Steve Allen, University of California Observatories (USA). . . . . [9145-158]

Design and implementation of coating hardware for the Hobby-Eberly telescope wide-field corrector, John M. Good, Hanshin Lee, Gary J. Hill, Brian L. Vattiat, David Perry, The Univ. of Texas at Austin (USA) . . . . . [9145-160]

Pre-construction of giant steerable science mirror cell assembly for TMT, Fei Yang, Qichang An, Yanqin Su, Hongchao Zhao, Peng Guo, Yongting Deng, Kainan Yao, Yuhong Bai, Changchun Institute of Optics, Fine Mechanics and Physics (China) . . . . . [9145-161]

SPEED: the segmented pupil experiment for exoplanet detection, Patrice Martinez, Observatoire de la Côte d'Azur (France); Jean-Baptiste Daban, Olivier Preis, Carole Gouvret, Lab. J.L. Lagrange (France); Jean-Michel Clausse, Julien Dejonghe, Observatoire de la Côte d'Azur (France); Lyu Abe, Lab. J.L. Lagrange (France); Alain Spang, Observatoire de la Côte d'Azur (France); Sebastien Ottogalli, Lab. J.L. Lagrange (France); Frantz Martinache, Jean-Pierre Rivet, Mathilde Beaulieu, Observatoire de la Côte d'Azur (France) . . . . . [9145-162]

The integrated motion measurement simulation for SOFIA, Prashant A. Kaswekar, Benjamin Greiner, Jörg Wagner, Deutsches SOFIA Institut (Germany) . . . . . [9145-164]

Estimating and measuring observatory equipment vibration forces, Hugh A. Thompson, Thirty Meter Telescope Observatory Corp. (Canada); Douglas G. MacMartin, Thirty Meter Telescope Project (USA) . . . . . [9145-166]

Accelerometer-based position reconstruction for the feedforward compensation of fast telescope vibrations in the E-ELT/MICADO, Alexander Keck, Univ. Stuttgart (Germany) and Max-Planck-Institut für Astronomie (Germany); Jörg-Uwe Pott, Max-Planck-Institut für Astronomie (Germany); Oliver Sawodny, Univ. Stuttgart (Germany) . . . . . [9145-167]

ALMA band 10 (787-950 GHz) first astronomical fringes, Shin'ichiro Asayama, Lewis B. G. Knee, Paolo G. Calisse, Juan P. Colque, Cristian M. Lopez, Theodoros Nakos, Neil M. Phillips, Kurt H. Plarre, Matias C. Radiszcz, Giorgio Siringo, Nicholas D. Whyborn, Hiroshi Yatagai, ALMA (Chile) . . . . . [9145-168]

A holography receiver for the Atacama Large millimeter/submillimeter array antenna and the measured surface deformation, Hitoshi Kiuchi, Masumi Yamada, Masahiro Sugimoto, Masao Saito, National Astronomical Observatory of Japan (Japan) . . . . . [9145-169]

ALMA fast switching phase calibration on long baselines, Yoshiharu Asaki, Japan Aerospace Exploration Agency (Japan); Satoki Matsushita, Academia Sinica (Taiwan); Ryohei Kawabe, Joint ALMA Observatory (Chile) and National Astronomical Observatory of Japan (Japan); Ed Fomalont, Joint ALMA Observatory (Chile) and National Radio Astronomy Observatory (USA); Denis Barkats, Stuartt A. Corder, Joint ALMA Observatory (Chile) . . . . . [9145-170]

GMT enclosure structural and mechanism design, Jose Teran, M3 Engineering & Technology Corp. (USA); Michael Sheehan, Giant Magellan Telescope Project (USA); Daniel H. Neff, Nilesh Korde, Eric Manuel, Allan Ortega, M3 Engineering & Technology Corp. (USA); Arash Farahani, Giant Magellan Telescope Project (USA) . . . . . [9145-171]

Building information modeling (BIM) approach to the GMT Project, Jose Teran, M3 Engineering & Technology Corp. (USA); Michael Sheehan, Giant Magellan Telescope Project (USA); Daniel H. Neff, David Adriaanse, Eric Grigel, M3 Engineering & Technology Corp. (USA); Arash Farahani, Giant Magellan Telescope Project (USA) . . . . . [9145-172]

Design of mirror coating facility for the University of Tokyo Atacama Observatory 6.5m telescope, Hidenori Takahashi, Tsutomu Aoki, Mamoru Doi, The Univ. of Tokyo (Japan); Toshihiro Handa, Kagoshima Univ. (Japan); Takafumi Kamizuka, Natsuko M. Kato, Kimiaki Kawara, Kotaro Kohno, Masahiro Konishi, The Univ. of Tokyo (Japan); Shintaro Koshida, Pontificia Univ. Católica de Chile (Chile); Takeo Minezaki, Takashi Miyata, Tomoki Morokuma, Kentaro Motohara, Shigeyuki Sako, Takao Soyano, Yoichi Tamura, Toshihiko Tanabe, Masuo Tanaka, Ken'ichi Tarusawa, Yuzuru Yoshii, The Univ. of Tokyo (Japan) . . . . . [9145-173]

Baseline design and requirements for the LSST rotating enclosure (dome), Douglas Neill, Joseph DeVries, Edward A. Hileman, Jacques Sebag, National Optical Astronomy Observatory (USA) . . . . . [9145-174]

Design of enclosure and support facilities for the University of Tokyo Atacama Observatory 6.5-m telescope, Shigeyuki Sako, Tsutomu Aoki, Mamoru Doi, The Univ. of Tokyo (Japan); Toshihiro Handa, Kagoshima Univ. (Japan); Takafumi Kamizuka, Kimiaki Kawara, Kotaro Kohno, Masahiro Konishi, The Univ. of Tokyo (Japan); Shintaro Koshida, Pontificia Univ. Católica de Chile (Chile); Takeo Minezaki, Natsuko M. Kato, Takashi Miyata, Tomoki Morokuma, Kentaro Motohara, Takao Soyano, Hidenori Takahashi, Toshihiko Tanabe, Yoichi Tamura, Masuo Tanaka, Ken'ichi Tarusawa, Yuzuru Yoshii, The Univ. of Tokyo (Japan) . [9145-175]

SKA mid-frequency aperture array thermal analysis for South Africa, Hiddo Hanenburg, Marco Drost, Raymond van den Brink, Jan Kragt, ASTRON (Netherlands) . . . . . [9145-176]

Ideas for future single dish large radio telescopes, Hans J. Kärcher, MT Mechatronics GmbH (Germany); Jacob W. M. Baars, Max-Planck Institut für Radioastronomie (Germany) . . . . . [9145-177]

The SRT inclinometer for mapping the rail and the gradient thermal effects on the alidade structure, Tonino Pisanu, Franco Buffa, Sergio Poppi, Pasqualino Marongiu, Giampaolo Serra, Gian Paolo Vargiu, Raimondo Concu, INAF - Osservatorio Astronomico di Cagliari (Italy) . . . . . [9145-178]

Sardinia aperture array demonstrator, Matteo Murgia, INAF - Osservatorio Astronomico di Cagliari (Italy) . . . . . [9145-179]

QUIJOTE-CMB experiment: an overview, Ángeles R. Pérez de Taoro, Marta Aguiar-González, Instituto de Astrofísica de Canarias (Spain); Ricardo Génova-Santos, Instituto de Astrofísica de Canarias (Spain) and Univ. de La Laguna (Spain); Francisca Gómez-Reñasco, Roger J. Hoyland, Carlos López-Caraballo, Instituto de Astrofísica de Canarias (Spain); Rafael Rebolo-López, Jose Alberto Rubiño, Instituto de Astrofísica de Canarias (Spain) and Univ. de La Laguna (Spain); Vicente Sánchez-de-la-Rosa, Afrodisio Vega-Moreno, Teodora A. Viera-Curbelo, Instituto de Astrofísica de Canarias (Spain); Alba E. Peláez-Santos, Riccardo Vignaga, Denis Tramonte, Instituto de Astrofísica de Canarias (Spain) and Univ. de La Laguna (Spain); Frédérikc Poidevin, Instituto de Astrofísica de Canarias (Spain); Enrique Martínez-Gonzalez, Beatriz Aja, Eduardo Artal, Jaime Cagigas, Juan L. Cano de Diego, Eva M. Cuerno, Luisa de la Fuente, Ana Pérez Quintanilla, José V. Terán, Enrique Villa, Univ. de Cantabria (Spain); Lucio Piccirillo, The Univ. of Manchester (United Kingdom); M. P. Hobson, Univ. of Cambridge (United Kingdom) [9145-180]

A PSD (position sensing device) to map the shift and tilt of the SRT secondary mirror, Tonino Pisanu, Franco Buffa, Raimondo Concu, Sergio Poppi, Pasqualino Marongiu, Giampaolo Serra, Mauro Pili, Gian Paolo Vargiu, INAF - Osservatorio Astronomico di Cagliari (Italy) . . . . . [9145-181]

Calibrating CHIME: a new radio interferometer to probe dark energy, Laura Newburgh, Univ. of Toronto (Canada). . . . . [9145-182]

Latest progress of LAMOST primary phasing experiment in NIAOT, China, Yong Zhang, Xiangqun Cui, Hongmei Li, Jijun Ni, Aihua Li, Nanjing Institute of Astronomical Optics & Technology (China); Zhengqiu Yao, Xuefei Gong, NIAOT (China); Genrong Liu, Yuefei Wang, Yeping Li, Yizhong Zeng, Nanjing Institute of Astronomical Optics & Technology (China). . . . . [9145-184]

SALT segmented primary mirror: first results from inductive edge sensors, Hitesh Gajjar, John Menzies, David A. H. Buckley, South African Astronomical Observatory (South Africa) . . . . . [9145-186]

Research progress of co-phasing inductance edge sensor for Chinese extremely large telescope, Yong Zhang, Qimeng Wang, Yeping Li, Jijun Ni, Aihua Li, Hongmei Li, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9145-187]

High performance control of mirror segment actuators for the European Extremely Large telescope, Gert Witvoet, Remco den Breeje, Jorrit van Wakeren, TNO (Netherlands). . . . . [9145-188]

On solar radius measurements with PICARD, Mustapha Meftah, Abdanour Irbah, LATMOS (France) . . . . . [9145-189]

Active Control of the Chinese Giant Solar Telescope, Yichun Dai, Yunnan Observatories (China); Dehua Yang, Nanjing Institute of Astronomical Optics & Technology (China) and National Astronomical Observatories (China); Zhenyu Jin, Zhong Liu, Yunnan Observatories (China). . . . . [9145-191]

An innovative telescope control system architecture for SST-GATE telescopes at the CTA Observatory, Gilles Fasola, Shan B. Mignot, Philippe Laporte, Observatoire de Paris à Meudon (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Diderot (France); Abdel Abchiche, Gilles Buchholtz, Ctr. National de la Recherche Scientifique (France); Isabelle Jégouzo, Observatoire de Paris à Meudon (France) and Ctr. National de la Recherche Scientifique (France) and Univ. Paris-Diderot (France) . . . . . [9145-192]

TCS software for the SONG telescope, Hai Wang, Changzhi Ren, Nanjing Institute of Astronomical Optics & Technology (China). . . . . [9145-193]

A new telescope control system for the Telescopio Nazionale Galileo: I - derotators, Adriano Ghedina, Manuel D. Gonzalez, Hector Perez Ventura, Candido Carmona, Luis Riverol, Telescopio Nazionale Galileo (Spain). . . . . [9145-194]

System identification and interval analysis of the Green Bank telescope structure and servo system, Trupti M. Ranka, Mario Garcia-Sanz, Case Western Reserve Univ. (USA); Timothy L. Weadon, John M. Ford, National Radio Astronomy Observatory (USA). . . . . [9145-195]

An iterative model-based cogging compensator for the Green Bank telescope servo system, Timothy J. Franke, Case Western Reserve Univ. (USA); Timothy L. Weadon, John M. Ford, National Radio Astronomy Observatory (USA); Mario Garcia-Sanz, Case Western Reserve Univ. (USA). . . . . [9145-196]

Method for overcoming clock drifts between VxWorks command server and PMAC servo controller in a telescope control system (TCS), Brandon Metz, Kevin Ho, Jim Thomas, Bill Cruise, Canada-France-Hawaii Telescope (USA) . . . . . [9145-197]

Keck telescope mount control redesign to improve short move performance, Peter M. Thompson, Systems Technology, Inc. (USA); Tomas Krasuski, Jimmy Johnson, Kevin Tsubota, W. M. Keck Observatory (USA) . . . . . [9145-198]

Application of seismic design principles to the 4-meter telescope SST-GATE for the Cherenkov telescope array, Jean-Laurent Dournaux, Observatoire de Paris à Meudon (France); Jean-Michel Huet, GEPI - Observatoire de Paris (France); Simon Blake, Durham Univ. (United Kingdom); Delphine Dumas, Hélène Sol, Observatoire de Paris à Meudon (France). . . . . [9145-200]

Two-motor direct drive control for elevation axis of telescope, Tao Tang, Institute of Optics and Electronics (China); Ge Ren, Institute of Optics and Electronics, Chinese Academy of Sciences (China); Yi Tan, Institute of Optics and Electronics (China). . . . . [9145-201]

Simple modeling of GMT hydrostatic bearings, Charlie Hull, Giant Magellan Telescope Project (USA) . . . . . [9145-202]

Design and analysis of composite dish and support structure for the DVA-1 radio telescope, Joeleff Fitzsimmons, Gordon Lacy, NRC - Herzburg Institute of Astrophysics (Canada) . . . . . [9145-203]

Design of the HETDEX VIRUS support structure for the Hobby-Eberly telescope, John M. Good, Joseph Zierer, Mike Worthington, Gordon Wesley, Gary J. Hill, The Univ. of Texas at Austin (USA). . . . . [9145-204]

Design of the planets telescope structure, Steven F. Griffin, Matthew Edwards, Consultant (USA); Jeffrey R. Kuhn, Univ. of Hawai'i (USA) . . . . . [9145-205]

The Giant Magellan telescope (GMT): Gregorian instrument rotator bearing, Steven Gunnels, Paragon Engineering (USA) . . . . . [9145-206]

High precision bearing systems: different solutions for increasingly accurate telescopes and radiotelescopes, Francesco Rampini, Gianpietro Marchiori, Simone De Lorenzi, Andrea Busatta, European Industrial Engineering s.r.l. (Italy) . . . . . [9145-207]

Structural analysis and modifications to the V. M. Blanco telescope for dark energy camera installation, Patricio Schurter, Andres Montane, Cerro Tololo Inter-American Observatory (Chile); Douglas Neill, National Optical Astronomy Observatory (USA); Roberto Tighe, National Optical Astronomy Observatory (Chile); Timothy Abbott, Freddy Muñoz Arancibia, Cerro Tololo Inter-American Observatory (Chile). . . . . [9145-208]

THURSDAY 26 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . THU 9:00 TO 10:00

Session Chair: **Masanori Iye,** National Astronomical Observatory of Japan (Japan)

9:00: **Hyper Suprime-Cam for Weak Gravitational Lensing Survey** *(Plenary)*, Satoshi Miyazaki, National Astronomical Observatory of Japan (Japan) . . . . . [9143-507]

9:30: **Transiting Exoplanet Survey Satellite (TESS)** *(Plenary)*, George R. Ricker Jr., Massachusetts Institute of Technology (USA) . . . . . [9143-508]

Coffee Break . . . . . Thu 10:00 to 10:30

SESSION 21

LOCATION: ROOM 517D . . . . . THU 10:30 TO 12:10

Segmented Mirror Alignment, Phasing and Wavefront Control

Session Chair: **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (USA)

10:30: **On-sky measurement accuracy of Keck telescope segment surface errors**, Mitchell Troy, Jet Propulsion Lab. (USA); Gary Chanan, Univ. of California, Irvine (USA); Jennifer E. Roberts, Jet Propulsion Lab. (USA) . . . . . [9145-61]

10:50: **Inductive sensors based on embedded coil technology for nanometric inter-segment position sensing of the E-ELT**, Martin Wasmeier, Josef Hackl, MICRO-EPSILON Messtechnik GmbH & Co. KG (Germany); Samuel S. Leveque, European Southern Observatory (Germany) . . . . . [9145-62]

11:10: **Development of precision controller for segmented mirror telescope actuators**, Prasanna G. Deshmukh, Padmakar S. Parihar, Indian Institute of Astrophysics (India) . . . . . [9145-185]

11:30: **The Giant Magellan telescope active optics system**, Brian McLeod, Harvard-Smithsonian Ctr. for Astrophysics (USA); Antonin H. Bouchez, José Filgueira, Matt Johns, Giant Magellan Telescope Project (USA); Timothy J. Norton, Mark Ordway, William A. Podgorski, John Roll, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9145-64]

11:50: **Fast optical re-phasing of segmented primary mirrors**, Henri M. Bonnet, European Southern Observatory (Germany) . . . . . [9145-65]

Lunch/Exhibition Break . . . . . Thu 12:10 to 13:30

CONFERENCE 9145 · LOCATION: ROOM 517D

SESSION 22

LOCATION: ROOM 517D . . . . . THU 13:30 TO 15:00

Millimeter Wavelength Telescopes and Arrays I

Session Chair: **Jean-Gabriel Cuby,** Lab. d'Astrophysique de Marseille (France)

13:30: **Atacama large millimeter/submillimeter array: progress, status, and development** *(Invited Paper)*, Stuartt A. Corder, National Radio Astronomy Observatory (Chile); Pierre Cox, Joint ALMA Observatory (Chile). . . . . [9145-66]

14:00: **Design of the optical system for ALMA band 1**, Valeria Tapia, Univ. de Chile (Chile); Nicolás Reyes, Univ. de Chile (Chile) and Max-Planck-Institut für Radioastronomie (Germany); Doug Henke, NRC - Herzburg Institute of Astrophysics (Canada); Miguel Sanchez-Carrasco, Univ. de Chile (Chile) and Instituto de Astrofísica de Andalucía (Spain); F. Patricio Mena, Univ. de Chile (Chile); Stéphane M. X. Claude, NRC - Herzburg Institute of Astrophysics (Canada); Leonardo Bronfman, Univ. de Chile (Chile) . . . . . [9145-67]

14:20: **The Large Millimeter Telescope Alfonso Serrano: project status and early-science observations**, David H. Hughes, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); F. Peter Schloerb, Univ. of Massachusetts Amherst (USA); Alberto Carramiñana Alonso, Teresa de León Zamora, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Min Yun, Univ. of Massachusetts Amherst (USA); Miguel Chávez Dagostino, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); David Smith, MERLAB, P.C. (USA); Kamal Souccar, Univ. of Massachusetts Amherst (USA); José Luis Hernández Rebollar, Cesar Arteaga Magaña, David M. Gale, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Grant Wilson, Gopal Narayanan, Neal Erickson, Univ. of Massachusetts Amherst (USA); Daniel Ferrusca Rodriguez, Miguel Velázguez de la Rosa, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Edgar Castillo-Domínguez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) and Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Arak Olmos Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [9145-68]

14:40: **ALMA, the completion of the 25 Europeans antennas: focus on main performances, problem found during erection and lesson learned**, Francesco Rampini, Gianpietro Marchiori, Luigino Giacomel, Stefano Giacomel, Enrico Marcuzzi, Federico Formentin, European Industrial Engineering s.r.l. (Italy)[9145-69]

Coffee Break . . . . . Thu 15:00 to 15:30

SESSION 23

LOCATION: ROOM 517D . . . . . THU 15:30 TO 16:10

Millimeter Wavelength Telescopes and Arrays II

Session Chair: **Heather K. Marshall,** National Solar Observatory (USA)

15:30: **Development of high-accuracy pointing verification for ALMA antenna**, Ayumu Matsuzawa, The Graduate Univ. for Advanced Studies (Japan); Satoru Iguchi, The Graduate Univ. for Advanced Studies (Japan) and National Astronomical Observatory of Japan (Japan); Masao Saito, The Graduate Univ. for Advanced Studies (Japan) and Joint ALMA Observatory (Chile); Kouichiro Nakanishi, The Graduate Univ. for Advanced Studies (Japan) and National Astronomical Observatory of Japan (Japan) and Joint ALMA Observatory (Chile); Hiro Saito, Nippon Institute of Technology (Japan) . . . . . [9145-70]

15:50: **What are scientifically valuable developments for ALMA enhancement?**, Satoru Iguchi, Daisuke Iono, National Astronomical Observatory of Japan (Japan). . . . . [9145-71]

SESSION 24

LOCATION: ROOM 517D . . . . . THU 16:10 TO 17:40

Radio Telescopes and Arrays

Session Chair: **Xiangqun Cui,** Nanjing Institute of Astronomical Optics & Technology (China)

16:10: **SKA project update: the start of the pre-construction phase** *(Invited Paper)*, Alistair M. McPherson, SKA Organisation (United Kingdom) . . . . . [9145-72]

16:40: **Canadian hydrogen intensity mapping experiment (CHIME) pathfinder**, Kevin Bandura, McGill Univ. (Canada) and ACTPol Collaboration, Univ. of Toronto, Univ. of British Columbia (Canada) . . . . . [9145-73]

17:00: **Using feed array networks to control distortions in antenna reflector for astrophysical radio-astronomy**, Antonio Saitto, Rosario F. Cimmino, Consorzio Nazionale Interuniversitario per i Transporti e la Logistica (Italy); Francesco Romano, Rheinmetall Italia S.p.A. (Italy); Alessandro Trifiletti, Univ. degli Studi di Roma La Sapienza (Italy). . . . . [9145-74]

17:20: **A 200-GHz telescope unit for the QUIJOTE CMB experiment**, Ruben Sanquirce Garcia, Borja Etxeita, Gaizka Murga, Esther Fernandez, Iñaki Sainz, IDOM Ingenieria y Consultoria S.A. (Spain); Vicente Sánchez, Teodora A. Viera-Curbelo, Maria F. Gómez, Marta Aguiar-González, Roger J. Hoyland, Ángeles R. Pérez de Taoro, Afrodisio Vega, Rafael Rebolo-López, Jose Alberto Rubiño, Instituto de Astrofísica de Canarias (Spain) . . . . . [9145-75]

FRIDAY 27 JUNE

SESSION 25

LOCATION: ROOM 517D . . . . . FRI 8:30 TO 10:20

Solar Telescopes I

Session Chair: **Heather K. Marshall,** National Solar Observatory (USA)

8:30: **Construction status of the advanced technology solar telescope** *(Invited Paper)*, Joseph P. McMullin, Thomas R. Rimmele, Thomas E. Berger, Mark Warner, Simon C. Craig, Robert P. Hubbard, Bret Goodrich, Steve Hegwer, William McVeigh, Erik Johansson, Steve Shimko, Valentin Martinez Pillet, National Solar Observatory (USA). . . . . [9145-76]

9:00: **The progress of Chinese giant solar telescope**, Zhong Liu, Yunnan Observatories (China); Yuanyong Deng, National Astronomical Observatories (China); Haisheng Ji, Purple Mountain Observatory (China); Yihua Yan, National Astronomical Observatories (China) . . . . . [9145-77]

9:20: **ATST Enclosure fabrication, factory assembly, and testing**, Gaizka Murga, IDOM Ingenieria y Consultoria S.A. (Spain); Heather K. Marshall, National Solar Observatory (USA); Thomas E. Lorentz, IDOM (USA); Javier Ariño, IDOM Ingenieria y Consultoria S.A. (Spain) . . . . . [9145-78]

9:40: **The 1.6-meter new solar telescope: What's next?**, Wenda Cao, Philip R. Goode, Big Bear Solar Observatory (USA) . . . . . [9145-79]

10:00: **1.8-M solar telescope in China: the CLST**, Changhui Rao, Naiting Gu, Lei Zhu, Yangyi Liu, Jinlong Huang, Cheng Li, Yuntao Cheng, Lanqiang Zhang, Hong Liu, Yongjian Wan, Hao Xian, Wenli Ma, Ming Zhang, Xuedong Cao, Hua Bao, Xiaojun Zhang, Chunlin Guan, Donghong Chen, Mei Li, Institute of Optics and Electronics (China). . . . . [9145-80]

Coffee Break . . . . . Fri 10:20 to 10:50

SESSION 26

LOCATION: ROOM 517D . . . . . FRI 10:50 TO 11:10

Solar Telescopes II

Session Chair: **Jason Spyromilio,** European Southern Observatory (Germany)

10:50: **Performance verification of the ATST Mount and Coudé Laboratory**, Hans J. Kärcher, Oliver Dreyer, Alexei Ippa, MT Mechatronics GmbH (Germany); Paul Jeffers, National Solar Observatory (USA); Giovanni Bonomi, Ingersoll Machines Tools, Inc. (USA) . . . . . [9145-81]

SESSION 27

LOCATION: ROOM 517D . . . . . FRI 11:10 TO 12:30

AIV, Commissioning and Early Operations

Session Chair: **Jason Spyromilio,** European Southern Observatory (Germany)

11:10: **The automated planet finder at Lick Observatory**, Matthew V. Radovan, Robert I. Kibrick, S. L. Allen, Steven S. Vogt, Lick Observatory (USA); William T. S. Deich, Univ. of California Observatories (USA); Eugenio J. Rivera, Bradford Holden, Lick Observatory (USA); Jennifer Burt, Univ. of California, Santa Cruz (USA); Kyle Lanclos, Univ. of California Observatories (USA); Benjamin Fulton, Univ. of Hawai'i (USA); Paul Butler, Carnegie Institution for Science (USA) . . . . . [9145-85]

11:30: **Status and performance of the Discovery Channel telescope from commissioning into early science operations**, Stephen Levine, William DeGroff, Thomas A. Bida, Peter L. Collins, Frank Cornelius, Edward W. Dunham, Lisa Foley, Ben Hardesty, Michael Lacasse, Heidi Larson, Jason Sanborn, Susan Strosahl, Mike Sweaton, Alex Venetiou, Ron Winner, Saeid Zoonematkermani, Lowell Observatory (USA). . . . . [9145-82]

11:50: **Commissioning and science verification of the 2m-Wendelstein Fraunhofer telescope**, Ulrich Hopp, Ralf Bender, Univ.-Sternwarte München (Germany) and Max-Planck-Institut für extraterrestrische Physik (Germany); Frank U. Grupp, Max-Planck-Institut für extraterrestrische Physik (Germany); Claus A. Gössl, Florian Lang-Bardl, Wolfgang Mitsch, Arno Riffeser, Univ.-Sternwarte München (Germany); Nancy Ageorges, Kayser-Threde GmbH (Germany). [9145-83]

12:10: **OAJ 2.6-m survey telescope: assembly, integration, and testing**, Olivier Pirnay, Grégory Lousberg, Jean-Marc Tortolani, Peter Verheyden, AMOS Ltd. (Belgium) . . . . . [9145-84]

Lunch Break . . . . . Fri 12:30 to 13:40

SESSION 28

LOCATION: ROOM 517D . . . . . FRI 13:40 TO 15:00

Telescope Structures, Bearings and Drives

Session Chair: **Victor L. Krabbendam,** LSST Corp. (USA)

13:40: **Preliminary design study of the TMT telescope structure system: overview**, Tomonori Usuda, National Astronomical Observatory of Japan (Japan); Yutaka Ezaki, Noboru Kawaguchi, Kazuhiro Nagae, Atsushi Kato, Junji Takaki, Masaki Hirano, Tomoya Hattori, Masaki Tabata, Yasushi Horiuchi, Yusuke Saruta, Satoru Sofuku, Noboru Ito, Takeharu Oshima, Takashi Takanezawa, Makoto Endo, Mitsubishi Electric Corp. (Japan); Junji Inatani, Masanori Iye, National Astronomical Observatory of Japan (Japan); Amir Sadjadpour, Mark Sirota, Scott Roberts, Larry Stepp, Thirty Meter Telescope Observatory Corp. (USA) . . . . . [9145-86]

14:00: **New finite element models and seismic analyses of the telescopes at W.M. Keck Observatory**, Frank W. Kan, Andrew T. Sarawit, Simpson Gumpertz & Heger Inc. (USA); Shawn P. Callahan, California Institute of Technology (USA); Michael L. Pollard, W. M. Keck Observatory (USA) . . . . . [9145-87]

14:20: **Wheel drives for large telescopes: keep the money and the performance over hydrostatic bearings**, Marvin F. Campbell, Consultant (USA) . . . . . [9145-88]

14:40: **Finite element analyses of CCAT preliminary design**, Frank W. Kan, Andrew T. Sarawit, Simpson Gumpertz & Heger Inc. (USA). . . . . [9145-89]

Coffee Break . . . . . Fri 15:00 to 15:30

SESSION 29

LOCATION: ROOM 517D . . . . . FRI 15:30 TO 16:30

Observatory Facilities and Enclosures

Session Chair: **Frank W. Kan,** Simpson Gumpertz & Heger Inc. (USA)

15:30: **Approach to the E-ELT dome and main structure challenges**, Armando Bilbao, Javier Llarena, Celia Gomez, Gaizka Murga, IDOM Ingenieria y Consultoria S.A. (Spain) . . . . . [9145-90]

15:50: **GMT site: facilities and enclosure design overview**, Jose Teran, M3 Engineering & Technology Corp. (USA); Michael Sheehan, Giant Magellan Telescope Project (USA); Daniel H. Neff, Eric Grigel, David Adriaanse, M3 Engineering & Technology Corp. (USA); Arash Farahani, Giant Magellan Telescope Project (USA) . . . . . [9145-91]

16:10: **The Observatorio Astrofísico de Javalambre: engineering of observatory facilities and physical infrastructure, goals, and current status**, Axel Yanes Díaz, A. Javier Cenarro, Mariano Moles, Antonio Marin, David Cristóbal-Hornillos, Ctr. de Estudios de Física del Cosmos de Aragón (Spain) . . . . . [9145-92]

SESSION 30

LOCATION: ROOM 517D . . . . . FRI 16:30 TO 17:30

Measurement and Control of Telescope Vibration

Session Chair: **Frank W. Kan,** Simpson Gumpertz & Heger Inc. (USA)

16:30: **VLTI-UT vibrations effort and performances**, Sebastien Poupar, Pierre Haguenauer, Philippe Gitton, Jaime Alonso, Frédéric Y. J. Gonté, European Southern Observatory (Chile) . . . . . [9145-93]

16:50: **Implementation of an active vibration damping system for the SOFIA telescope assembly**, Paul C. Janzen, Paul J. Keas, Moog CSA Engineering (USA) . . . . . [9145-94]

17:10: **Equipment vibration budget for the TMT Observatory**, Douglas G. MacMartin, Thirty Meter Telescope Project (USA); Hugh A. Thompson, Thirty Meter Telescope Observatory Corp. (Canada) . . . . . [9145-95]

CONFERENCE 9146 · LOCATION: ROOM 518C

Monday–Friday 23–27 June 2014 • Proceedings of SPIE Vol. 9146

Optical and Infrared Interferometry IV


(Rajagopal)


(Creech-Eakman)


(Malbet)

Conference Chairs: **Jayadev K. Rajagopal,** National Optical Astronomy Observatory (USA); **Michelle J. Creech-Eakman,** New Mexico Institute of Mining and Technology (USA); **Fabien Malbet,** Institut de Planétologie et d'Astrophysique de Grenoble (France)

Program Committee: **Ellyn K. Baines,** U.S. Naval Research Lab. (USA); **Jean-Philippe Berger,** European Southern Observatory (France); **Françoise Delplancke,** European Southern Observatory (Germany); **Lucas Labadie,** Univ. zu Köln (Germany); **Matthew Ward Muterspaugh,** Tennessee State Univ. (USA); **Claudia Paladini,** Univ. Libre de Bruxelles (Belgium); **Jorg-Uwe Pott,** Max-Planck-Institut für Astronomie (Germany); **Stephen A. Rinehart,** NASA Goddard Space Flight Ctr. (USA); **Hiroshi Shibai,** Osaka Univ. (Japan); **Andrew Skemer,** The Univ. of Arizona (USA); **Isabelle Tallon-Bosc,** Ctr. de Recherche Astronomique de Lyon (France); **Theo A. ten Brummelaar,** CHARA (USA); **Peter G. Tuthill,** The Univ. of Sydney (Australia)

MONDAY 23 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . MON 8:50 TO 10:00

Session Chair: **Luc Simard,** National Research Council of Canada - Herzberg Institute of Astrophysics (Canada)

08:50: **Welcome**

9:00: **James Webb Space Telescope: the road to first science observations** *(Plenary)*, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) [9143-501]

9:30: **The Square Kilometre Array: a physics machine for the 21st Century** *(Plenary)*, Philip Diamond, SKA Organisation (United Kingdom) . . [9143-502]

Coffee Break . . . . . Mon 10:00 to 10:30

SESSION 1

LOCATION: ROOM 518C . . . . . MON 10:30 TO 11:50

Air/Space Interferometry

Session Chair: **Jayadev K. Rajagopal,** National Optical Astronomy Observatory (USA)

10:30: **The balloon experimental twin telescope for infrared interferometry (BETTII): interferometry at the edge of the atmosphere**, Stephen A. Rinehart, NASA Goddard Space Flight Ctr. (USA); Maxime J. Rizzo, Univ. of Maryland, College Park (USA) and NASA Goddard Space Flight Ctr. (USA); Dale J. Fixsen, NASA Goddard Space Flight Ctr. (USA); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Richard B. Barclay, Richard K. Barry, Dominic J. Benford, NASA Goddard Space Flight Ctr. (USA); Arnab Dhabal, Univ. of Maryland, College Park (USA) and NASA Goddard Space Flight Ctr. (USA); Georgina Klemencic, Matthew J. Griffin, Cardiff Univ. (United Kingdom); David T. Leisawitz, Stephen F. Maher, John E. Mentzell, NASA Goddard Space Flight Ctr. (USA); Lee G. Mundy, Univ. of Maryland, College Park (USA); Enzo Pascale, Cardiff Univ. (United Kingdom); Robert F. Silverberg, NASA Goddard Space Flight Ctr. (USA); Johannes G. Staguhn, Johns Hopkins Univ. (USA) and NASA Goddard Space Flight Ctr. (USA); Todd J. Veach, NASA Goddard Space Flight Ctr. (USA) . . . . . [9146-1]

10:50: **Design of a nano-satellite demonstrator of an infrared imaging space interferometer: the HyperCube**, Kjetil Dohlen, Sébastien Vives, Eddy N. Rakotonimbahy, Lab. d'Astrophysique de Marseille (France); Nicola Baccichet, Giorgio Savini, Bruce M. Swinyard, Univ. College London (United Kingdom)[9146-2]

11:10: **Imaging and nulling properties of sparse-aperture Fizeau interferometers**, François B. Hénault, Institut de Planétologie et d'Astrophysique de Grenoble (France). . . . . [9146-89]

11:30: **Cheapest nuller in the world: crossed beamsplitter cubes**, François B. Hénault, Institut de Planétologie et d'Astrophysique de Grenoble (France); Alain Spang, Observatoire de la Côte d'Azur (France). . . . . [9146-90]

LOCATION: ROOM 518C . . . . . 11:50 TO 12:05

Interferometry Prizes

Please join us to honor the 2014 winners of the Michelson and Fizeau prizes in interferometry. These prizes, intended to recognize important contributions in interferometry, and also to promote communication to the broader science community news about our rapidly developing field, are sponsored by the IAU Interferometry commission 54, the Mount Wilson Institute and the Observatoire de la Cote d'Azur.

Lunch Break . . . . . Mon 12:05 to 13:40

SESSION 2

LOCATION: ROOM 518C . . . . . MON 13:40 TO 14:00

Observing Techniques

Session Chair: **Jayadev K. Rajagopal,** National Optical Astronomy Observatory (USA)

13:40: **Toward visible wavelength coherent Imaging with the LBT**, Philip M. Hinz, The Univ. of Arizona (USA); Simone Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy); John M. Hill, Univ. of Arizona (USA) . . . . . [9146-5]

SESSION 3

LOCATION: ROOM 518C . . . . . MON 14:00 TO 14:20

Science I

Session Chair: **Ellyn K. Baines,** U.S. Naval Research Lab. (USA)

14:00: **Detection of a solar system scale azimuthally symmetric emission source around AB Aurigae with the Palomar fiber nuller**, Jonas G. Kühn, Bertrand Mennesson, Kurt M. Liewer, Stefan R. Martin, Frank Loya, Jet Propulsion Lab. (USA); Rafael Millan-Gabet, California Institute of Technology (USA); Eugene Serabyn, Jet Propulsion Lab. (USA) . . . . . [9146-6]

SESSION 4

LOCATION: ROOM 518C . . . . . MON 14:20 TO 16:30

Observing Techniques II

Session Chair: **Ellyn K. Baines,** U.S. Naval Research Lab. (USA)

14:20: **The LBTI hunt for observable signatures of terrestrial planetary systems: a key NASA science program on the road to exoplanet imaging missions**, William C. Danchi, NASA Goddard Space Flight Ctr. (USA); Vanessa P. Bailey, The Univ. of Arizona (USA); Geoffrey Bryden, Jet Propulsion Lab. (USA); Denis Defrère, The Univ. of Arizona (USA); Christopher A. Haniff, Univ. of Cambridge (United Kingdom); Philip M. Hinz, The Univ. of Arizona (USA); Grant Kennedy, Univ. of Cambridge (United Kingdom); Bertrand Mennesson, Jet Propulsion Lab. (USA); Rafael Millan-Gabet, California Institute of Technology (USA); George H. Rieke, The Univ. of Arizona (USA); Aki Roberge, NASA Goddard Space Flight Ctr. (USA); Eugene Serabyn, Jet Propulsion Lab. (USA); Andrew J. Skemer, The Univ. of Arizona (USA); Karl R. Stapelfeldt, NASA Goddard Space Flight Ctr. (USA); Alycia Weinberger, Carnegie Institution of Washington (USA); Mark Wyatt, Univ. of Cambridge (United Kingdom) . . . . . [9146-7]

14:40: **On-sky calibration performance of a monolithic Michelson interferometer filtered source**, Jian Ge, Rui Li, Scott Powell, Frank Varosi, Sidney L. Schofield, Univ. of Florida (USA) . . . . . [9146-8]

15:00: **Co-phasing the Large Binocular telescope: status and performance of LBTI/PHASEcam**, Denis Defrère, Philip M. Hinz, Elwood C. Downey, The Univ. of Arizona (USA); John M. Hill, Large Binocular Telescope Observatory (USA); Bertrand Mennesson, Jet Propulsion Lab. (USA); Andrew J. Skemer, Amali Vaz, David S. Ashby, Vanessa P. Bailey, Guido Brusa Zappellini, Julian C. Christou, The Univ. of Arizona (USA); William C. Danchi, NASA Goddard Space Flight Ctr. (USA); Paul Grenz, The Univ. of Arizona (USA); William F. Hoffmann, The Univ. of Arizona (USA); Jarron M. Leisenring, Thomas McMahon, The Univ. of Arizona (USA); Rafael Millan-Gabet, California Institute of Technology (USA); Manny Montoya, Vidhya Vaitheeswaran, The Univ. of Arizona (USA). . . . . [9146-9]

Coffee Break . . . . . Mon 15:20 to 15:50

15:50: **Progress toward unprecedented imaging of stellar surfaces with the Navy precision optical interferometer**, Anders M. Jorgensen, New Mexico Institute of Mining and Technology (USA); David Mozurkewich, Seabrook Engineering (USA); Henrique R. Schmitt, U.S. Naval Research Lab. (USA); Gerard T. van Belle, Lowell Observatory (USA); Donald J. Hutter, James H. Clark III, U.S. Naval Observatory (USA); Thomas J. Armstrong, Ellyn K. Baines, U.S. Naval Research Lab. (USA); Kyle Newman, Matthew I. Landavazo, Brian M. Sun, New Mexico Institute of Mining and Technology (USA); Sergio R. Restaino, U.S. Naval Research Lab. (USA) . . . . . [9146-60]

16:10: **Revealing bio-lines of exoplanets by Fourier spectroscopy**, Eyal Schwartz, Stephen G. Lipson, Erez N. Ribak, Technion-Israel Institute of Technology (Israel) . . . . . [9146-11]

TUESDAY 24 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . TUE 8:50 TO 10:00

Session Chair: **Gillian S. Wright,** UK Astronomy Technology Ctr. (United Kingdom)

8:50: **SPIE Fellows Awards** presented by H. Philip Stahl, President of SPIE. The following individuals will be recognized for their contributions to SPIE and the scientific community: **Mark Clampin,** NASA Goddard Space Flight Ctr. (United States); **Gary Matthews,** Exelis Inc. (United States); **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (United States)

9:00: **Gaia: scientific in-orbit performance** *(Plenary),* Timo Prusti, European Space Agency (Netherlands) . . . . . [9143-503]

9:30: **ALMA Update** *(Plenary)*, Pierre Cox, Joint ALMA Observatory (Chile); Stuartt A. Corder, National Radio Astronomy Observatory (Chile) [9143-504]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 5

LOCATION: ROOM 518C . . . . . TUE 10:30 TO 12:30

Historical Perspectives

Session Chair: **Fabien Malbet,** Institut de Planétologie et d'Astrophysique de Grenoble (France)

10:30: **The Narrabri stellar intensity interferometer: a 50th birthday tribute** *(Invited Paper)*, Peter G. Tuthill, The Univ. of Sydney (Australia). . . . . [9146-12]

11:00: **Making the CHARA array I: founding CHARA, the audacity of hope** *(Invited Paper)*, Harold A. McAlister, Theo A. ten Brummelaar, Georgia State Univ. (USA); Stephen T. Ridgway, National Optical Astronomy Observatory (USA) . . . . . [9146-13]

11:30: **Making the CHARA array part II: project management, 15 years on thin ice** *(Invited Paper)*, Stephen T. Ridgway, National Optical Astronomy Observatory (USA); Theo A. ten Brummelaar, CHARA (USA); Harold A. McAlister, Georgia State Univ. (USA) . . . . . [9146-14]

12:00: **Making the CHARA Array III: engineering decisions, to build or not to build** *(Invited Paper)*, Theo A. ten Brummelaar, Harold A. McAlister, CHARA (USA); Stephen T. Ridgway, National Optical Astronomy Observatory (USA) . . . . [9146-15]

Lunch Break . . . . . Tue 12:30 to 14:00

SESSION 6

LOCATION: ROOM 518C . . . . . TUE 14:00 TO 14:20

Science II

Session Chair: **Jean-Philippe Berger,** European Southern Observatory (Germany)

14:00: **MWC 314: binary results from optical interferometry compared with spectroscopy and photometry**, Noel D. Richardson, Univ. de Montréal (Canada) . . . . . [9146-16]

SESSION 7

LOCATION: ROOM 518C . . . . . TUE 14:20 TO 15:10

Current Facilities I

Session Chair: **Jean-Philippe Berger,** European Southern Observatory (Germany)

14:20: **Magdalena Ridge Observatory interferometer: 2014 status update** *(Invited Paper)*, Michelle J. Creech-Eakman, New Mexico Institute of Mining and Technology (USA); David F. Buscher, Christopher A. Haniff, Univ. of Cambridge (United Kingdom); Ifan Payne, Magdalena Ridge Observatory (USA). . . . . [9146-17]

14:50: **The LINC-NIRVANA Fizeau interferometric imager: final lab integration, First Light experiments and challenges**, Thomas M. Herbst, Max-Planck-Institut für Astronomie (Germany); Roberto Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy); Andreas Eckart, Univ. zu Köln (Germany); Gerd P. Weigelt, Max-Planck-Institut für Radioastronomie (Germany) . . . . . [9146-18]

Coffee Break . . . . . Tue 15:10 to 15:40

SESSION 8

LOCATION: ROOM 518C . . . . . TUE 15:40 TO 17:00

Current Facilities II

Session Chair: **Theo A. ten Brummelaar,** CHARA (USA)

15:40: **The VLT interferometer: status update**, Antoine Mérand, European Southern Observatory (Chile) . . . . . [9146-19]

16:00: **Multi-baseline bootstrapping at the Navy precision optical interferometer**, Thomas J. Armstrong, Henrique R. Schmitt, Ellyn K. Baines, U.S. Naval Research Lab. (USA); James A. Benson, Robert T. Zavala, Donald J. Hutter, U.S. Naval Observatory (USA); Anders M. Jorgensen, New Mexico Institute of Mining and Technology (USA); Matthew W. Muterspaugh, Tennessee State Univ. (USA) . . . . . [9146-20]

16:20: **GRAVITY: getting ready for ESO's VLT Interferometer**, Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Guy S. Perrin, Observatoire de Paris - LESIA (France); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Christian Straubmeier, Univ. zu Köln (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Antonio Amorim, Univ. de Lisboa (Portugal); Roberto Abuter, European Southern Observatory (Germany); Reinhard Genzel, Max-Planck-Institut für extraterrestrische Physik (Germany); Pierre Kervella, Observatoire de Paris - LESIA (France); Armin Böhm, Max-Planck-Institut für Astronomie (Germany); Andreas Eckart, Univ. zu Köln (Germany); Laurent Jocou, Institut de Planétologie et d'Astrophysique de Grenoble (France); Paulo J. V. Garcia, Univ. do Porto (Portugal); Matteo Accardo, European Southern Observatory (Germany); Oliver Pfuhl, Max-Planck-Institut für extraterrestrische Physik (Germany); Thibaut Paumard, Observatoire de Paris - LESIA (France); Casey P. Deen, Max-Planck-Institut für Astronomie (Germany); Imke Wank, Univ. zu Köln (Germany); Thibaut Moulin, Institut de Planétologie et d'Astrophysique de Grenoble (France); Paulo R. S. Gordo, Fundacão da Faculdade de Ciências da Univ. de Lisboa (Portugal); Françoise Delplancke-Stroebele, European Southern Observatory (Germany); Stefan Gillessen, Max-Planck-Institut für extraterrestrische Physik (Germany); Sylvestre Lacour, Observatoire de Paris - LESIA (France); Thomas F. E. Henning, Max-Planck-Institut für Astronomie (Germany); Michael Wiest, Univ. zu Köln (Germany); Yves Magnard, Institut de Planétologie et d'Astrophysique de Grenoble (France); Narsireddy Anugu, Univ. do Porto (Portugal); Gert Finger, European Southern Observatory (Germany); Nicolas Blind, Max-Planck-Institut für extraterrestrische Physik (Germany); Yann Clénet, Observatoire de Paris - LESIA (France); Stefan Hippler, Max-Planck-Institut für Astronomie (Germany); Senol Yazici, Univ. zu Köln (Germany); Noël Ventura, Institut de Planétologie et d'Astrophysique de Grenoble (France); Jorge Lima, Univ. de Lisboa (Portugal); C. Garcia, European Southern Observatory (Germany); Leonard Burtscher, Max-Planck-Institut für extraterrestrische Physik (Germany); Éric Gendron, Observatoire de Paris - LESIA (France); Armin Huber, Max-Planck-Institut für Astronomie (Germany); Bernard Lazareff, Institut de Planétologie

et d'Astrophysique de Grenoble (France); Philippe Gitton, European Southern Observatory (Chile); Yitping Kok, Max-Planck-Institut für extraterrestrische Physik (Germany); Gérard Rousset, Observatoire de Paris - LESIA (France); Ralf Klein, Max-Planck-Institut für Astronomie (Germany); Jean-Louis Monin, Institut de Planétologie et d'Astrophysique de Grenoble (France); Gerd H. Jakob, European Southern Observatory (Germany); Eckhard Sturm, Max-Planck-Institut für extraterrestrische Physik (Germany); Xavier Habois, Observatoire de Paris - LESIA (France); Werner Laun, Max-Planck-Institut für Astronomie (Germany); Myriam Benisty, Institut de Planétologie et d'Astrophysique de Grenoble (France); Lieselotte Jochum, European Southern Observatory (Germany); Marcus Haug, Max-Planck-Institut für extraterrestrische Physik (Germany); Pierre Fedou, Observatoire de Paris - LESIA (France); Rainer Lenzen, Max-Planck-Institut für Astronomie (Germany); Lothar Kern, European Southern Observatory (Germany); Stefan Kellner, Max-Planck-Institut für extraterrestrische Physik (Germany); Vincent Lapeyrere, Observatoire de Paris - LESIA (France); Udo Neumann, Max-Planck-Institut für Astronomie (Germany); Jean-Louis Lizon, European Southern Observatory (Germany); Ekkehard Wieprecht, Max-Planck-Institut für extraterrestrische Physik (Germany); Frédéric Chapron, Observatoire de Paris - LESIA (France); Johana Panduro, Max-Planck-Institut für Astronomie (Germany); Leander H. Mehrgan, European Southern Observatory (Germany); Thomas Ott, Max-Planck-Institut für extraterrestrische Physik (Germany); Roderick Dembet, Observatoire de Paris - LESIA (France); José R. Ramos, Max-Planck-Institut für Astronomie (Germany); Markus Schöller, European Southern Observatory (Germany); Magdalena Lippa, Max-Planck-Institut für extraterrestrische Physik (Germany); Arnaud Sevin, Observatoire de Paris - LESIA (France); Ralf-Rainer Rohloff, Max-Planck-Institut für Astronomie (Germany); Stefan Stroebele, European Southern Observatory (Germany); Johannes Weber, Max-Planck-Institut für extraterrestrische Physik (Germany); Claude Collin, Observatoire de Paris - LESIA (France); Andre Salzinger, Max-Planck-Institut für Astronomie (Germany); Marcos Suarez Valles, European Southern Observatory (Germany); Frank Haussmann, Max-Planck-Institut für extraterrestrische Physik (Germany); Denis Ziegler, Observatoire de Paris - LESIA (France); Silvia Scheithauer, Max-Planck-Institut für Astronomie (Germany); Markus Wittkowski, European Southern Observatory (Germany); Oliver Hans, Max-Planck-Institut für extraterrestrische Physik (Germany); Nabih Azouaoui, Observatoire de Paris - LESIA (France); Pengqian Yang, Max-Planck-Institut für Astronomie (Germany) . . . . . [9146-21]

16:40: **News of MATISSE and beyond**, Bruno Lopez, Observatoire de la Côte d'Azur (France) and Matisse Consortium (France) . . . . . [9146-22]

WEDNESDAY 25 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . WED 9:00 TO 10:00

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

9:00: **Highlights from the Multi Unit Spectroscopic Explorer (MUSE): a 2nd generation VLT instrument for the VLT** *(Plenary)*, Roland M. Bacon, Observatoire de Lyon (France) . . . . . [9147-506]

9:30: **Canadian Space Astronomy: past, present and future** *(Plenary)*, John B. Hutchings, NRC - Herzberg Institute of Astrophysics (Canada) [9143-505]

Coffee Break . . . . . Wed 10:00 to 10:30

SESSION 9

LOCATION: ROOM 518C . . . . . WED 10:30 TO 12:10

Data Processing/Analysis I

Session Chair: **Michelle J. Creech-Eakman,** New Mexico Institute of Mining and Technology (USA)

10:30: **Modeling instrumental chromatic effects for a better model fitting of optical interferometric data**, Michel Tallon, Observatoire de Lyon (France); Isabelle Tallon-Bosc, Ctr. de Recherche Astronomique de Lyon (France); Olivier Chesneau, Luc Dessart, Observatoire de la Côte d'Azur (France) . . . . . [9146-10]

10:50: **A global database for optical interferometry**, Xavier Haubois, Observatoire de Paris à Meudon (France); Patrick Bernaud, Institut de Planétologie et d'Astrophysique de Grenoble (France); Myriam Benisty, Institut de Planétologie et d'Astrophysique de Grenoble (France); Philippe Bério, Observatoire de la Côte d'Azur (France); Laurent Bourges, Alain E. Chelli, Institut de Planétologie et d'Astrophysique de Grenoble (France); Olivier Chesneau, Observatoire de la Côte d'Azur (France); Gilles Duvert, Institut de Planétologie et d'Astrophysique de Grenoble (France); Sylvestre Lacour, Observatoire de Paris à Meudon (France); Sylvain Lafrasse, Observatoire de la Côte d'Azur (France) and Institut de Planétologie et d'Astrophysique de Grenoble (France); Jean-Baptiste Le Bouquin, Guillaume Mella, Institut de Planétologie et d'Astrophysique de Grenoble (France); Nicolas Nardetto, Observatoire de la Côte d'Azur (France); Johan Olofsson, Max-Planck-Institut für Astronomie (Germany) . . . . . [9146-111]

11:10: **A semiparametric approach for image reconstruction of chromatic objects (SPARCO): application to the young stellar objects as seen by PIONIER and AMBER at the VLTi**, Jacques Kluska, Fabien Malbet, Institut de Planétologie et d'Astrophysique de Grenoble (France); Jean-Philippe Berger, European Southern Observatory (Germany); Fabien Baron, Georgia State Univ. (USA); Bernard Lazareff, Jean-Baptiste Le Bouquin, Institut de Planétologie et d'Astrophysique de Grenoble (France); John D. Monnier, Univ. of Michigan (USA); Ferréol Soulez, Éric M. Thiebaut, Ctr. de Recherche Astronomique de Lyon (France) . . . . . [9146-24]

11:30: **AGN BLR structure, luminosity, and mass from combined reverberation mapping and optical interferometry observations**, Suvendu Rakshit, Romain R. G. Petrov, Anthony Meilland, Florentin Millour, Observatoire de la Côte d'Azur (France) . . . . . [9146-25]

11:50: **Polarization considerations for long baseline interferometry**, Jason Mudge, Lockheed Martin Advanced Technology Ctr. (USA); Benjamin M. Johnson, Chad E. Ogden, Lockheed Martin Space Systems Co. (USA) . . . . . [9146-93]

Lunch/Exhibition Break . . . . . Wed 12:10 to 13:40

SESSION 10

LOCATION: ROOM 518C . . . . . WED 13:40 TO 14:00

Science III

Session Chair: **Lucas Labadie,** Univ. zu Köln (Germany)

13:40: **The tidally disrupted interferometric binaries HD 104237 and AK Sco**, Paulo J. V. Garcia, Univ. do Porto (Portugal); Catherine Dougados, Institut de Planétologie et d'Astrophysique de Grenoble (Chile); Myriam Benisty, Jacques Kluska, Jean-Baptiste Le Bouquin, Wing-Fai Thi, Institut de Planétologie et d'Astrophysique de Grenoble (France) . . . . . [9146-27]

SESSION 11

LOCATION: ROOM 518C . . . . . WED 14:00 TO 15:00

Planned Facilities I

Session Chair: **Lucas Labadie,** Univ. zu Köln (Germany)

14:00: **Commissioning the LBTI for use as a nulling interferometer and coherent imager**, Philip M. Hinz, Vanessa P. Bailey, Denis Defrère, Elwood C. Downey, The Univ. of Arizona (USA); Simone Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy); John M. Hill, Large Binocular Telescope Observatory (USA); William F. Hoffmann, Manny Montoya, Thomas McMahon, The Univ. of Arizona (USA); Alfio T. Puglisi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Andrew J. Skemer, The Univ. of Arizona (USA); Michael F. Skrutskie, Univ. of Virginia (USA); Vidhya Vaitheeswaran, Univ. of Arizona (USA) . . . . . [9146-28]

14:20: **VAMPIRES: probing the innermost regions of protoplanetary systems with polarimetric aperture-masking**, Barnaby R. Norris, Peter G. Tuthill, The Univ. of Sydney (Australia); Nemanja Jovanovic, Olivier Guyon, Frantz Martinache, Subaru Telescope, National Astronomical Observatory of Japan (USA); Guillaume Schworer, Paul N. Stewart, The Univ. of Sydney (Australia) . . . . . [9146-29]

14:40: **Development of FIRST-IR instrument and study of nulling capabilities**, Lucien Gauchet, Sylvestre Lacour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Guy S. Perrin, Vartan Arslanyan, Observatoire de Paris à Meudon (France); Julien Gaudemard, Observatoire de Paris à Meudon (France) . . . . . [9146-30]

Coffee Break . . . . . Wed 15:00 to 15:30

SESSION 12

LOCATION: ROOM 518C . . . . . WED 15:30 TO 15:50

Science IV

Session Chair: **Matthew Ward Muterspaugh,** Tennessee State Univ. (USA)

15:30: **Testing limb-darkening laws using NPOI observations**, Ellyn K. Baines, Thomas J. Armstrong, Henrique R. Schmitt, U.S. Naval Research Lab. (USA); James A. Benson, Donald J. Hutter, Robert T. Zavala, U.S. Naval Observatory (USA) . . . . . [9146-31]

SESSION 13

LOCATION: ROOM 518C . . . . . .WED 15:50 TO 16:30

Planned Facilities II: Facility Issues

Session Chair: **Matthew Ward Muterspaugh,** Tennessee State Univ. (USA)

15:50: **Telescope birefringence and phase errors in optical interferometry at the VLTI**, Bernard Lazareff, Institut de Planétologie et d'Astrophysique de Grenoble (France); Nicolas Blind, Max-Planck-Institut für extraterrestrische Physik (Germany); Laurent Jocou, Institut de Planétologie et d'Astrophysique de Grenoble (France); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Sylvestre Lacour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Françoise Delplancke-Stroebele, Markus Schoeller, European Southern Observatory (Germany); Antonio Amorim, Univ. de Lisboa (Portugal); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Christian Straubmeier, Univ. zu Köln (Germany) . . . . . [9146-32]

16:10: **System engineering applied to VLTI: a scientific success**, Pierre Haguenauer, Jaime Alonso, Philippe Gitton, Sebastien Morel, Sebastien Poupar, Nicolas Schuhler, European Southern Observatory (Chile). . . . . [9146-33]

SESSION 14

LOCATION: ROOM 518C . . . . . WED 16:30 TO 16:50

Future I

Session Chair: **Matthew Ward Muterspaugh,** Tennessee State Univ. (USA)

16:30: **Stellar intensity interferometry over kilometer baselines: laboratory simulation of observations with the Cherenkov telescope array**, Dainis Dravins, Tiphaine Lagadec, Lund Observatory (Sweden) . . . . . [9146-37]

LOCATION: ROOM 518C . . . . . .16:50 TO 17:30

Poster Pops

Each poster author is invited to give a brief (two-minute) preview of his/her research with a maximum of two slides during these poster pops sessions. Please bring your slides in PDF format on a USB stick at the break before the first poster pops session to transfer to the meeting room computer.

POSTER SESSION–WEDNESDAY

LOCATION: ROOM 516 . . . . . .WED 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Wednesday. The interactive poster session with authors in attendance will be Wednesday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Hyperspectral methods for planet formation imaging, Gaetan Dalla Vedova, Romain R. G. Petrov, Florentin Millour, Observatoire de la Côte d'Azur (France) . . . . . [9146-3]

GRAVITY: the calibration unit, Nicolas Blind, Frank Eisenhauer, Marcus Haug, Stefan Kellner, Frank Haussmann, Leonard Burtscher, Stefan Gillessen, Annemieke Janssen, Magdalena Lippa, Max-Planck-Institut für extraterrestrische Physik (Germany); Thomas Ott, Max-Planck-Institut für extraterrestrische Physik (Germany); Oliver Pfuhl, Eckhard Sturm, Ekkehard Wieprecht, Yitping Kok, Max-Planck-Institut für extraterrestrische Physik (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Antonio Amorim, Univ. de Lisboa (Portugal); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Christian Straubmeier, Univ. zu Köln (Germany) . . . . . [9146-64]

Integration and testing of the GRAVITY infrared camera for multiple telescope optical beam analysis, Paulo R. S. Gordo, Antonio Amorim, Univ. de Lisboa (Portugal); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Paulo J. V. Garcia, Narsireddy Anugu, Univ. do Porto (Portugal); Oliver Pfuhl, Max-Planck-Institut für extraterrestrische Physik (Germany); Jorge Luis Silva de Oliveira Abreu, Fundacão da Faculdade de Ciências da Univ. de Lisboa (Portugal); Marcus Haug, Eckhard Sturm, Ekkehard Wieprecht, Max-Planck-Institut für extraterrestrische Physik (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Christian Straubmeier, Univ. zu Köln (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France) [9146-65]

New HAWAII-1 array detector system for the CLASSIC/CLIMB instrument of the CHARA interferometer, Udo Beckmann, Claus Connot, Matthias Heininger, Karl-Heinz Hofmann, Edmund Nußbaum, Dieter Schertl, Max-Planck-Institut für Radioastronomie (Germany); Theo A. ten Brummelaar, CHARA (USA); Gerd P. Weigelt, Max-Planck-Institut für Radioastronomie (Germany) . . . . . [9146-66]

Optimisation of infrared eAPD detector readout for interferometry, David F. Buscher, Univ. of Cambridge (United Kingdom); Gert Finger, European Southern Observatory (Germany); John S. Young, Eugene B. Seneta, Univ. of Cambridge (United Kingdom). . . . . [9146-67]

Phase tracking with differential dispersion, Xavier Haubois, Observatoire de Paris à Meudon (France); Sylvestre Lacour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Guy S. Perrin, Observatoire de Paris à Meudon (France); Roderick Dembet, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Pierre Fedou, Observatoire de Paris à Meudon (France); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Christian Straubmeier, Univ. zu Köln (Germany); Antonio Amorim, Univ. de Lisboa (Portugal); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany) . . . . . [9146-68]

Performance of the MROI fast tip-tilt correction system, John S. Young, David F. Buscher, Martin Fisher, Christopher A. Haniff, Alexander D. Rea, Eugene B. Seneta, Xiaowei Sun, Donald M. A. Wilson, Univ. of Cambridge (United Kingdom); Allen Farris, Andres M. Olivares, Magdalena Ridge Observatory (USA); Robert Selina, National Radio Astronomy Observatory (USA) . . . . . [9146-69]

The new classic data acquisition system for NPOI, Brian M. Sun, Anders M. Jorgensen, Matthew I. Landavazo, Kyle Newman, New Mexico Institute of Mining and Technology (USA); Donald J. Hutter, U.S. Naval Observatory (USA); Gerard T. van Belle, Lowell Observatory (USA); David Mozurkewich, Seabrook Engineering (USA); Thomas J. Armstrong, Henrique R. Schmitt, Ellyn K. Baines, Sergio R. Restaino, U.S. Naval Research Lab. (USA). . . . . [9146-70]

6-station, 5-baseline fringe tracking with the new classic data acquisition system at the Navy precision optical interferometer, Matthew I. Landavazo, Anders M. Jorgensen, New Mexico Institute of Mining and Technology (USA); David Mozurkewich, Seabrook Engineering (USA); Donald J. Hutter, U.S. Naval Observatory (USA); Gerard T. van Belle, Lowell Observatory (USA). . . . . [9146-71]

The GRAVITY metrology system: narrow-angle astrometry via phase-shifting interferometry, Magdalena Lippa, Nicolas Blind, Stefan Gillessen, Yitping Kok, Johannes Weber, Frank Eisenhauer, Oliver Pfuhl, Max-Planck-Institut für extraterrestrische Physik (Germany); Annemieke Janssen, Max Planck Institut für extraterrestrische Physik (Germany); Marcus Haug, Frank Haussmann, Stefan Kellner, Oliver Hans, Ekkehard Wieprecht, Thomas Ott, Leonard Burtscher, Eckhard Sturm, Reinhard Genzel, Reiner Hofmann, Stefan Huber, David Huber, Stefanie Senftleben, Andreas Pflüger, Roland Greßmann, Max-Planck-Institut für extraterrestrische Physik (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Christian Straubmeier, Univ. zu Köln (Germany); Antonio Amorim, Univ. de Lisboa (Portugal); Markus Schöller, European Southern Observatory (Germany) . . . . . [9146-72]

The fiber coupler and beam stabilization system of the GRAVITY interferometer, Oliver Pfuhl, Marcus Haug, Frank Eisenhauer, Stefan Kellner, Frank Haussmann, Max-Planck-Institut für extraterrestrische Physik (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Stefan Gillessen, Max-Planck-Institut für extraterrestrische Physik (Germany); Christian Straubmeier, Univ. zu Köln (Germany); Thomas Ott, Max-Planck-Institut für extraterrestrische Physik (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Antonio Amorim, Univ. de Lisboa (Portugal); Magdalena Lippa, Annemieke Janssen, Max-Planck-Institut für extraterrestrische Physik (Germany); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Yitping Kok, Nicolas Blind, Leonard Burtscher, Eckhard Sturm, Ekkehard Wieprecht, Max-Planck-Institut für extraterrestrische Physik (Germany); Markus Schoeller, European Southern Observatory (Germany); Johannes Weber, Oliver Hans, Stefan Huber, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9146-73]

GRAVITY: modeling the metrology, Nicolas Blind, Heinrich Huber, Frank Eisenhauer, Johannes Weber, Stefan Gillessen, Magdalena Lippa, Oliver Hans, Marcus Haug, Frank Haussmann, Stefan Huber, Annemieke Janssen, Stefan Kellner, Thomas Ott, Oliver Pfuhl, Eckhard Sturm, Ekkehard Wieprecht, Yitping Kok, Max-Planck-Institut für extraterrestrische Physik (Germany); Antonio Amorim, Univ. de Lisboa (Portugal); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Christian Straubmeier, Univ. zu Köln (Germany) . . . . . [9146-74]

CONFERENCE 9146 · LOCATION: ROOM 518C

GRAVITY: the impact of non-common optical paths within the metrology system, Yitping Kok, Stefan Gillessen, Johannes Weber, Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Sylvestre Lacour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Nicolas Blind, Magdalena Lippa, Oliver Pfuhl, Leonard Burtscher, Thomas Ott, Ekkehard Wieprecht, Eckhard Sturm, Marcus Haug, Stefan Kellner, Max-Planck-Institut für extraterrestrische Physik (Germany); Frank Haussmann, Max Planck Institut für extraterrestrische Physik (Germany); Annemieke Janssen, Reinhard Genzel, Max-Planck-Institut für extraterrestrische Physik (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Christian Straubmeier, Univ. zu Köln (Germany); Antonio Amorim, Univ. de Lisboa (Portugal); Oliver Hans, Stefan Huber, Max-Planck-Institut für extraterrestrische Physik (Germany); Markus Schöller, European Southern Observatory (Germany) . . . . . [9146-75]

Robust phase and group delay estimation from the LBTI phase sensor, Amali Vaz, Philip M. Hinz, Denis Defrère, Elwood C. Downey, John M. Hill, Andrew J. Skemer, The Univ. of Arizona (USA) . . . . . [9146-76]

Integrated optics interferometric four telescopes nuller, Ronnie Errmann, Stefano Minardi, Friedrich-Schiller-Univ. Jena (Germany); Lucas Labadie, Univ. zu Köln (Germany); Felix Dreisow, Stefan Nolte, Thomas Pertsch, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [9146-77]

The GRAVITY Spectrometers: optical qualification, Senol Yazici, Christian Straubmeier, Univ. zu Köln (Germany); Sebastian Fischer, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) and Univ. zu Köln (Germany); Imke Wank, Michael Wiest, Univ. zu Köln (Germany); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Andreas Eckart, Univ. zu Köln (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (Finland); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Antonio Amorim, Univ. de Lisboa (Portugal) . . . . . [9146-78]

The GRAVITY spectrometers: thermal behaviour, Imke Wank, Christian Straubmeier, Univ. zu Köln (Germany); Sebastian Fischer, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Michael Wiest, Senol Yazici, Univ. zu Köln (Germany); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Andreas Eckart, Univ. zu Köln (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Antonio Amorim, Univ. de Lisboa (Portugal) . . . . . [9146-79]

The GRAVITY spectrometers: optical design and principle of operation, Christian Straubmeier, Imke Wank, Michael Wiest, Senol Yazici, Andreas Eckart, Univ. zu Köln (Germany); Sebastian Fischer, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany) and Univ. zu Köln (Germany); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Guy S. Perrin, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Antonio Amorim, Univ. de Lisboa (Portugal) . . . . . [9146-80]

The GRAVITY instrument software/hardware related aspects, Thomas Ott, Ekkehard Wieprecht, Leonard Burtscher, Yitping Kok, Max-Planck-Institut für extraterrestrische Physik (Germany); Senol Yazici, Univ. zu Köln (Germany); Narsireddy Anugu, Univ. do Porto (Portugal); Roderick Dembet, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Pierre Fedou, Observatoire de Paris à Meudon (France); Sylvestre Lacour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Jürgen Ott, redlogix Software & System Engineering GmbH (Germany); Frank Eisenhauer, Nicolas Blind, Reinhard Genzel, Stefan Gillessen, Oliver Hans, Marcus Haug, Frank Haussmann, Stefan Huber, Annemieke Janssen, Max-Planck-Institut für extraterrestrische Physik (Germany); Stefan Kellner, Max-Planck-Institut für extraterrestrische Physik (Germany); Magdalena Lippa, Oliver Pfuhl, Eckhard Sturm, Johannes Weber, Max-Planck-Institut für extraterrestrische Physik (Germany); Antonio Amorim, Univ. de Lisboa (Portugal); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Guy S. Perrin, Observatoire de Paris à Meudon (France); Christian Straubmeier, Univ. zu Köln (Germany); Markus Schöller, Roberto Abuter, European Southern Observatory (Germany) . . . . . [9146-81]

The GRAVITY instrument software/high-level software, Leonard Burtscher, Ekkehard Wieprecht, Thomas Ott, Yitping Kok, Max-Planck-Institut für extraterrestrische Physik (Germany); Senol Yazici, Univ. zu Köln (Germany); Narsireddy Anugu, Univ. do Porto (Portugal); Roderick Dembet, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Pierre Fedou, Observatoire de Paris à Meudon (France); Sylvestre Lacour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Jürgen Ott, redlogix Software & System Engineering GmbH (Germany); Frank Eisenhauer, Nicolas Blind, Reinhard Genzel, Stefan Gillessen, Oliver Hans, Marcus Haug, Frank Haussmann, Stefan Huber, Annemieke Janssen, Stefan Kellner, Magdalena Lippa, Oliver Pfuhl, Eckhard Sturm, Johannes Weber, Max-Planck-Institut für extraterrestrische Physik (Germany); Antonio Amorim, Univ. de Lisboa (Portugal); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Guy S. Perrin, Observatoire de Paris à Meudon (France); Christian Straubmeier, Univ. zu Köln (Germany); Markus Schöller, Roberto Abuter, European Southern Observatory (Germany) . . . . . [9146-82]

The GRAVITY/VLTI acquisition camera software, Narsireddy Anugu, Paulo J. V. Garcia, Univ. do Porto (Portugal); Ekkehard Wieprecht, Leonard Burtscher, Thomas Ott, Max-Planck-Institut für extraterrestrische Physik (Germany); Antonio Amorim, Univ. de Lisboa (Portugal); Paulo R. S. Gordo, Fundacão da Faculdade de Ciências da Univ. de Lisboa (Portugal); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Christian Straubmeier, Univ. zu Köln (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France) . . . . . [9146-83]

The GRAVITY data reduction software, Vincent Lapeyrere, Pierre Kervella, Observatoire de Paris à Meudon (France); Sylvestre Lacour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Nabih Azouaoui, Observatoire de Paris à Meudon (France); Cesar Enrique Garcia-Dabo, European Southern Observatory (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Christian Straubmeier, Univ. zu Köln (Germany); Antonio Amorim, Systems, Instrumentation and Modeling (Portugal); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany) . . . . . [9146-84]

Astrometric error budget of the GRAVITY instrument, Sylvestre Lacour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Henri M. Bonnet, European Southern Observatory (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Christian Straubmeier, Univ. zu Köln (Germany); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Antonio Amorim, Univ. de Lisboa (Portugal); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9146-85]

MATISSE: warm optics integration and performance in laboratory, Sylvie Robbe-Dubois, Stéphane Lagarde, Pierre Antonelli, Yves Bresson, Christophe Bailet, Aurélie Marcotto, Bruno Lopez, Lamine Thiam, Philippe Bério, Jean-Michel Clausse, Yan Fanteï-Caujolle, Michel F. Dugué, Romain R. G. Petrov, Thierry Lanz, Observatoire de la Côte d'Azur (France) . . . . . [9146-87]

Performance of the LINC NIRVANA fringe and flexure tracker at delivery, Matthew Horrobin, Andreas Eckart, Univ. zu Köln (Germany); Udo Beckmann, Claus Connot, Max-Planck-Institut für Radioastronomie (Germany); Jens Dierkes, Bettina Lindhorst, Univ. zu Köln (Germany); Edmund Nußbaum, Max-Planck-Institut für Radioastronomie (Germany); Steffen Rost, Semir Smajic, Christian Straubmeier, Imke Wank, Univ. zu Köln (Germany); Thomas Bertram, Jörg-Uwe Pott, Max-Planck-Institut für Astronomie (Germany) . . . . . [9146-88]

Imaging and nulling properties of sparse-aperture Fizeau interferometers, François B. Hénault, Institut de Planétologie et d'Astrophysique de Grenoble (France) . . . . . [9146-89]

Cheapest nuller in the world: crossed beamsplitter cubes, François B. Hénault, Institut de Planétologie et d'Astrophysique de Grenoble (France); Alain Spang, Observatoire de la Côte d'Azur (France) . . . . . [9146-90]

The balloon experimental twin telescope for infrared interferometry (BETTII): optical design, Todd J. Veach, Stephen A. Rinehart, John E. Mentzell, NASA Goddard Space Flight Ctr. (USA); Dale J. Fixsen, Maxime J. Rizzo, Univ. of Maryland, College Park (USA); Caitlin E. Gibbons, The Pennsylvania State Univ. (USA); Dominic J. Benford, NASA Goddard Space Flight Ctr. (USA) . . . . . [9146-91]

Lithium Niobate active beam combiners: results on fringe locking, fringe scanning, and high contrast on-chip interferometry and high resolution spectrometry, Guillermo Martin, samuel Heidmann, Fabrice Thomas, Mikhael de Mengin Poirier, Laurent Jocou, Institut de Planétologie et d'Astrophysique de Grenoble (France); Gwenn Ulliac, Nadège Courjal, FEMTO-ST (France); Alain Morand, Pierre Benech, IMEP-LAHC (France); Etienne P. Le Coarer, Institut de Planétologie et d'Astrophysique de Grenoble (France) . . . . . [9146-92]

THURSDAY 26 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . THU 9:00 TO 10:00

Session Chair: **Masanori Iye,** National Astronomical Observatory of Japan (Japan)

9:00: **Hyper Suprime-Cam for Weak Gravitational Lensing Survey** *(Plenary)*, Satoshi Miyazaki, National Astronomical Observatory of Japan (Japan) . . . . . [9143-507]

9:30: **Transiting Exoplanet Survey Satellite (TESS)** *(Plenary)*, George R. Ricker Jr., Massachusetts Institute of Technology (USA) . . . . . [9143-508]

Coffee Break . . . . . Thu 10:00 to 10:30

SESSION 15

LOCATION: ROOM 518C . . . . . THU 10:30 TO 11:55

Future II: The Planet Formation Imager

Session Chair: **Peter G. Tuthill,** The Univ. of Sydney (Australia)

10:30: **Technology roadmap for Planet Formation Imager (PFI)** *(Invited Paper)*, John D. Monnier, Univ. of Michigan (USA); Jean-Philippe Berger, European Southern Observatory (Germany); Stefan Kraus, Univ. of Exeter (United Kingdom); Michael Ireland, Macquarie Univ. (Australia); Lucas Labadie, Univ. zu Köln (Germany); Sylvestre Lacour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Jo?rg-Uwe Pott, Max-Planck-Institut für Astronomie (Germany); Stephen T. Ridgway, National Optical Astronomy Observatory (USA); Jean Surdej, Univ. de Liège (Belgium); Theo A. ten Brummelaar, Georgia State Univ. (USA); Peter G. Tuthill, The Univ. of Sydney (Australia); Gerard T. van Belle, Lowell Observatory (USA). . . . . [9146-35]

11:00: **The science case for the planet formation imager (PFI)**, Stefan Kraus, Univ. of Exeter (United Kingdom); John D. Monnier, Univ. of Michigan (USA); Matthew Bate, Johanna Browning, Tim Harries, Christopher Mowat, Univ. of Exeter (United Kingdom); Jean-Philippe Berger, European Southern Observatory (Germany); Michael Ireland, Research School of Astronomy & Astrophysics (Australia); Lucas Labadie, Univ. zu Köln (Germany); Sylvestre Lacour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Jörg-Uwe Pott, Max-Planck-Institut für Astronomie (Germany); Stephen T. Ridgway, National Optical Astronomy Observatory (USA); Jean Surdej, Univ. de Liège (Belgium); Theo A. ten Brummelaar, Georgia State Univ. (USA); Peter G. Tuthill, The Univ. of Sydney (Australia); Gerard T. van Belle, Lowell Observatory (USA). . . . . [9146-120]

11:20: **A dispersed heterodyne design for the planet formation imager**, Michael Ireland, Australian Astronomical Observatory (Australia); John D. Monnier, Univ. of Michigan (USA) . . . . . [9146-38]

11:35: **MROI technologies for the planet formation imager**, David F. Buscher, Christopher A. Haniff, John S. Young, Univ. of Cambridge (United Kingdom); Michelle J. Creech-Eakman, New Mexico Institute of Mining and Technology (USA); Ifan Payne, Magdalena Ridge Observatory (USA). . . . . [9146-34]

LOCATION: ROOM 518C . . . . . 12:00 TO 12:30

Poster Pops

Each poster author is invited to give a brief (two-minute) preview of his/her research with a maximum of two slides during these poster pops sessions. Please bring your slides in PDF format on a USB stick at the break before the first poster pops session to transfer to the meeting room computer.

Lunch/Exhibition Break . . . . . Thu 12:30 to 13:50

SESSION 16

LOCATION: ROOM 518C . . . . . THU 13:50 TO 15:30

Future III

Session Chair: **Henrique R. Schmitt,** U.S. Naval Research Lab. (USA)

13:50: **VLTI in 2020 and beyond**, Jean-Philippe Berger, European Southern Observatory (Germany) . . . . . [9146-36]

14:10: **Phase closure following nulling: a lithium niobate architecture for long baseline interferometers**, Sylvestre Lacour, Lucien Gauchet, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); John D. Monnier, Univ. of Michigan (USA); Peter G. Tuthill, The Univ. of Sydney (Australia); Guillermo Martin, Institut de Planétologie et d'Astrophysique de Grenoble (France) . . . . . [9146-39]

14:30: **Long baseline interferometry in the visible: the FRIEND project**, Philippe Bério, Yves Bresson, Jean-Michel Clausse, Denis Mourard, Julien Dejonghe, Stéphane Lagarde, Christophe Bailet, Olivier Chesneau, Philippe Stee, Observatoire de la Côte d'Azur (France); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Nicolas Nardetto, Anthony Meilland, Observatoire de la Côte d'Azur (France); Isabelle Tallon-Bosc, Ctr. de Recherche Astronomique de Lyon (France) . . . . . [9146-40]

14:50: **Interferometer evolution: imaging terras after building 'little' experiments (INEVITABLE)**, Stephen A. Rinehart, Kenneth G. Carpenter, NASA Goddard Space Flight Ctr. (USA); Gerard T. van Belle, Lowell Observatory (USA); Stephen C. Unwin, Jet Propulsion Lab. (USA) . . . . . [9146-117]

15:10: **Improving the limiting magnitude in optical long baseline interferometry**, Romain R. G. Petrov, Stéphane Lagarde, Observatoire de la Côte d'Azur (France); Thami El Halkouj, Univ. Cadi Ayyad (Morocco); Florentin Millour, Yves Bresson, Suvendu Rakshit, Martin Vannier, Anthony Meilland, Observatoire de la Côte d'Azur (France) . . . . . [9146-42]

Coffee Break . . . . . Thu 15:30 to 16:00

SESSION 17

LOCATION: ROOM 518C . . . . . THU 16:00 TO 17:40

Technologies I

Session Chair: **Henrique R. Schmitt,** U.S. Naval Research Lab. (USA)

16:00: **JouFLU: upgrades to the fiber linked unit for optical recombination (FLUOR) interferometric beam combiner**, Nicholas J. Scott, Mount Wilson Institute (USA); Rafael Millan-Gabet, California Institute of Technology (USA); Emilie Lhomé, Observatoire de Paris (France); Theo A. ten Brummelaar, CHARA (USA); Vincent Coudé du Foresto, Observatoire de Paris (France) and Berner Fachhochschule (Switzerland); Judit Sturmann, Laszlo Sturmann, CHARA (USA) . . . . . [9146-43]

16:20: **High performance 3D waveguide architecture for astronomical pupil-remapping interferometry**, Simon Gross, Macquarie Univ. (Australia); Barnaby R. Norris, The Univ. of Sydney (Australia); Nick Cvetojevic, The Univ. of Sydney (Australia) and Australian Astronomical Observatory (Australia); Nemanja Jovanovic, Subaru Telescope, National Astronomical Observatory of Japan (USA); Alexander Arriola Martiarena, Heriot-Watt Univ. (United Kingdom); Paul N. Stewart, The Univ. of Sydney (Australia); Jon S. Lawrence, Australian Astronomical Observatory (Australia); Michael J. Withford, Macquarie Univ. (Australia); Peter G. Tuthill, The Univ. of Sydney (Australia) . . . . . [9146-44]

16:40: **NAOMI: a new adaptive optics module for interferometry**, Emmanuel Aller-Carpentier, Reinhold J. Dorn, Françoise Delplancke-Stroebele, Jérome Paufique, Julien Woillez, Norbert Hubin, Jean-Philippe Berger, European Southern Observatory (Germany); Philippe Gitton, European Southern Observatory (Chile); Enrico Fedrigo, Marcos Suarez Valles, Enrico Marchetti, Paul Lilley, Miska Le Louarn, Luigi Andolfato, Christophe Dupuy, Paul D. Jolley, Jutta Quentin, Than P. Duc, Stewart McLay, Bernard-Alexis Delabre, Christian Schmid, Luca Pasquini, European Southern Observatory (Germany) . . . . . [9146-45]

17:00: **3D-integrated beam combiner for optical spectro-interferometry**, Stefano Minardi, Friedrich-Schiller-Univ. Jena (Germany); Allar Saviauk, Leibniz-Institut für Astrophysik Potsdam (Germany); Felix Dreisow, Stefan Nolte, Thomas Pertsch, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [9146-46]

17:20: **The MROI fringe tracker: laboratory tracking with ICoNN**, Tyler M. McCracken, Colby A. Jurgenson, Yale Univ. (USA); John S. Young, Eugene B. Seneta, David F. Buscher, Christopher A. Haniff, Univ. of Cambridge (United Kingdom); Michelle J. Creech-Eakman, Luke M. Schmidt, New Mexico Institute of Mining and Technology (USA); Fernando G. Santoro, Giant Magellan Telescope Project (USA); Sam Rochelle, New Mexico Institute of Mining and Technology (USA) . . . . . [9146-47]

CONFERENCE 9146 · LOCATION: ROOM 518C

POSTER SESSION–THURSDAY

LOCATION: ROOM 516 . . . . . THU 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Thursday. The interactive poster session with authors in attendance will be Wednesday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Exploring new material platforms for photonic on-chip nulling interferometry in the mid-IR, Nick Cvetojevic, Ctr. for Ultrahigh bandwidth Devices for Optical Systems (Australia) and Australian Astronomical Observatory (Australia); Simon Gross, Macquarie Univ. (Australia); Stephen J. Madden, Darren D. Hudson, Ctr. for Ultrahigh bandwidth Devices for Optical Systems (Australia); Nemanja Jovanovic, Subaru Telescope, National Astronomical Observatory of Japan (USA); Barry Luther-Davies, Benjamin J. Eggleton, Ctr. for Ultrahigh bandwidth Devices for Optical Systems (Australia); Michael J. Withford, Macquarie Univ. (Australia); Jon S. Lawrence, Australian Astronomical Observatory (Australia); Peter G. Tuthill, The Univ. of Sydney (Australia) . . . . . [9146-94]

Ultrafast laser inscribed integrated waveguide components for L-band interferometry, Gillian E. Madden, Heriot-Watt Univ. (United Kingdom); Lucas Labadie, Univ. zu Köln (Germany); Alexander Arriola Martiarena, Debaditya Choudhury, Robert R. Thomson, Heriot-Watt Univ. (United Kingdom) . . . [9146-95]

Two, three, four, or six telescopes with phase referencing or closure phase relations: the best tactics for interferometric image reconstruction, Nuno Gomes, Paulo J. V. Garcia, Univ. do Porto (Portugal); Éric M. Thiebaut, Ctr. de Recherche Astronomique de Lyon (France) . . . . . [9146-98]

A thermal spectral-spatial interferometric testbed, Giorgio Savini, Roser Juanola-Parramon, Nicola Baccichet, Roger Stabbins, Univ. College London (United Kingdom). . . . . [9146-99]

Effects of anisoplanatism on the visibility amplitudes and phase variances measured by the PRIMA fringe trackers, Nuno Gomes, Univ. do Porto (Portugal); Françoise Delplancke-Stroebele, European Southern Observatory (Germany) . . . . . [9146-100]

Hierarchical fringe tracking in optical interferometry, Romain R. G. Petrov, Observatoire de la Côte d'Azur (France); Thami El Halkouj, Univ. Cadi Ayyad (Morocco); Jean-Pierre Folcher, Univ. de Nice Sophia Antipolis (France); Stéphane Lagarde, Yves Bresson, Observatoire de la Côte d'Azur (France); Zouhair Benkhaldoun, Mohamed Lazrek, Faiçal Barzi, Univ. Cadi Ayyad (Morocco) . . . . . [9146-101]

Photometric calibration of NPOI visibilities, Henrique R. Schmitt, U.S. Naval Research Lab. (USA); David Mozurkewich, Seabrook Engineering (USA); Thomas J. Armstrong, U.S. Naval Research Lab. (USA); James A. Benson, U.S. Naval Observatory (USA); Anders M. Jorgensen, New Mexico Institute of Mining and Technology (USA); Ellyn K. Baines, U.S. Naval Research Lab. (USA) . . . [9146-102]

Alternative approach to precision narrow-angle astrometry for Antarctic long baseline interferometry, Yitping Kok, Max-Planck-Institut für extraterrestrische Physik (Germany) and The Univ. of Sydney (Australia); Michael Ireland, Macquarie Univ. (Australia) and Australian Astronomical Observatory (Australia); Aaron C. Rizzuto, Macquarie Univ. (Australia); Peter G. Tuthill, Gordon Robertson, The Univ. of Sydney (Australia); Benjamin A. Warrington, Macquarie Univ. (Australia); William J. Tango, The Univ. of Sydney (Australia) . . . . . [9146-103]

Realizing interferometric deconvolution of Fizeau images with LBTI/LMIRcam, Jarron M. Leisenring, The Univ. of Arizona (USA); Michael F. Skrutskie, Univ. of Virginia (USA); Andrew J. Skemer, Philip M. Hinz, The Univ. of Arizona (USA) . . . . . [9146-104]

HD139614: the interferometric case for a group-Ib pre-transitional young disk, Lucas Labadie, Univ. zu Köln (Germany); Alexis Matter, Max-Planck-Institut für Radioastronomie (Germany) and Institut de Planétologie et d'Astrophysique de Grenoble (France); Alexander Kreplin, Max-Planck-Institut für Radioastronomie (Germany); Bruno Lopez, Observatoire de la Côte d'Azur (France); Sebastian Wolf, Christian-Albrechts-Univ. zu Kiel (Germany); Gerd P. Weigelt, Max-Planck-Institut für Radioastronomie (Germany); Steve Ertel, Institut de Planétologie et d'Astrophysique de Grenoble (France); Jorg-Uwe Pott, Max-Planck-Institut für Astronomie (Germany); William C. Danchi, NASA Goddard Space Flight Ctr. (USA) . . . . . [9146-105]

Spectroscopy of resolved binary systems at the diffraction limit with the FIRST pupil remapping instrument, Elsa Huby, Observatoire de Paris à Meudon (France); Gaspard Duchêne, Univ. of California, Berkeley (USA) and Institut de Planétologie et d'Astrophysique de Grenoble (France); Franck Marchis, SETI Institute (USA); Sylvestre Lacour, Guy S. Perrin, Observatoire de Paris à Meudon (France); Takayuki Kotani, National Astronomical Observatory of Japan (Japan); Élodie Choquet, Space Telescope Science Institute (USA) and Observatoire de Paris à Meudon (France); Elinor L. Gates, Lick Observatory (USA); France Allard, Ctr. de Recherche Astronomique de Lyon (France); Olivier Lai, Subaru Telescope, National Astronomical Observatory of Japan (USA) . . . . . [9146-106]

Analysis of surface structures of chemically peculiar stars with modern and future interferometers, Denis Shulyak, Georg-August-Univ. Göttingen (Germany); Claudia Paladini, Univ. Libre de Bruxelles (Belgium); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Gianluca Li Causi, INAF - Osservatorio Astronomico di Roma (Italy); Stephane Sacuto, Oleg Kochukhov, Uppsala Univ. (Sweden) . . . . . [9146-107]

Tracing dusty sources close to the Galactic Center with infrared interferometry: GRAVITY / MATIS (VLTI) and LINC-NIRVANA (LBT), Andreas Eckart, Univ. zu Köln (Germany) . . . . . [9146-108]

A MIDI view of the symbiotic system HD330036, Sebastiano Ligori, INAF - Osservatorio Astronomico di Torino (Italy); Mauro D'Onofrio, Univ. degli Studi di Padova (Italy). . . . . [9146-109]

Image reconstruction with optimal a posteriori fringe tracking javascript:__doPostBack('ctl00$Main$btnNext',''), Ferréol Soulez, Observatoire de Lyon (France); Éric M. Thiebaut, Isabelle Tallon-Bosc, Ctr. de Recherche Astronomique de Lyon (France); Michel Tallon, Ctr de Recherche Astrophysique de Lyon (France) . . . . . [9146-110]

A robust approach to estimate stellar angular diameters from photometric colors, Alain E. Chelli, Gilles Duvert, Laurent Bourges, Jean-Baptiste Le Bouquin, Herve Beust, Institut de Planétologie et d'Astrophysique de Grenoble (France); Olivier Chesneau, Pierre Cruzalebes, Lab. J.L. Lagrange (France); Xavier Delfosse, Sylvain Lafrasse, Guillaume Mella, Institut de Planétologie et d'Astrophysique de Grenoble (France) . . . . . [9146-112]

Design and Implementation of the NPOI database and website, Kyle Newman, Anders M. Jorgensen, New Mexico Institute of Mining and Technology (USA); David Mozurkewich, Seabrook Engineering (USA); Gerard T. van Belle, Lowell Observatory (USA); Donald J. Hutter, U.S. Naval Observatory (USA); Henrique R. Schmitt, Thomas J. Armstrong, Ellyn K. Baines, Sergio R. Restaino, U.S. Naval Research Lab. (USA). . . . . [9146-113]

An accurate assessment of uncertainties in the model fitting of interferometric observables: the bootstrap method, Regis Lachaume, Markus Rabus, Andrés Jordán, Pontificia Univ. Católica de Chile (Chile) . . . . . [9146-114]

Stellar interferometric beam combiners in the context of linear optics networks, Christian Schmid, European Southern Observatory (Germany)[9146-115]

Simulating interferometric data of binary systems, Claudia Paladini, Alain Jorissen, Christos Siopis, Gilles Sadowski, Univ. Libre de Bruxelles (Belgium); Denis Shulyak, Georg-August-Univ. Göttingen (Germany); Gianluca Li Causi, INAF - Osservatorio Astronomico di Roma (Italy). . . . . [9146-116]

Concept for fiber-based near-infrared interferometry of highest frequency resolution, Ernest A. Michael, Rodolfo Prado, Felipe Besser, Laurent Pallanca, Univ. de Chile (Chile). . . . . [9146-118]

ALMA heritage for a planet formation imager, Vincent Coudé du Foresto, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Anne Dutrey, Univ. Bordeaux 1 (France); Sylvestre Lacour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Guy S. Perrin, Observatoire de Paris à Meudon (France); Jean Louis Schneider, Observatoire de Paris à Meudon (France) . . . . . [9146-119]

Cramer-Rao lower bound and image reconstruction performance evaluation for intensity interferometry, Jean J. Dolne, David R. Gerwe, The Boeing Co. (USA); Peter N. Crabtree, Air Force Research Lab. (USA) . . . . . [9146-121]

FRIDAY 27 JUNE

SESSION 18

LOCATION: ROOM 518C . . . . . FRI 9:00 TO 9:20

Science V

Session Chair: **Claudia Paladini,** Univ. Libre de Bruxelles (Belgium)

9:00: **High accuracy null depth measurements of nearby main sequence stars with the LBTI**, Denis Defrère, Philip M. Hinz, Andrew J. Skemer, The Univ. of Arizona (USA); Bertrand Mennesson, Jet Propulsion Lab. (USA); Rafael Millan-Gabet, California Institute of Technology (USA); Eugene Serabyn, Jet Propulsion Lab. (USA); William F. Hoffmann, The Univ. of Arizona (USA); Olivier Absil, Lindsay Marion, Univ. de Liège (Belgium); Jonas G. Kuhn, Jet Propulsion Lab. (USA); William C. Danchi, NASA Goddard Space Flight Ctr. (USA); Vanessa P. Bailey, The Univ. of Arizona (USA) . . . . . [9146-48]

SESSION 19

LOCATION: ROOM 518C . . . . . .FRI 9:20 TO 11:10

Critical Subsystems and Technologies I

Session Chair: **Claudia Paladini,** Univ. Libre de Bruxelles (Belgium)

9:20: **Fringe tracking for the VLTI mid-infrared interferometric instrument (MIDI)**, Antoine Mérand, André Müller, European Southern Observatory (Chile); Roberto Abuter, Eszter Pozna, European Southern Observatory (Germany); Andres Ramirez, European Southern Observatory (Chile); Jörg-Uwe Pott, Max-Planck-Institut für Astronomie (Germany) . . . . . [9146-49]

9:40: **Improving the astrometric performance of VLTI-PRIMA**, Julien Woillez, Henri M. Bonnet, Serge Guniat, Antoine Mérand, European Southern Observatory (Germany) . . . . . [9146-50]

10:00: **Robust control framework for fringe tracking systems**, Jean-Pierre Folcher, Univ. de Nice Sophia Antipolis (France); Romain R. G. Petrov, Lab. J.L. Lagrange (France); Thami El Halkouj, Univ. Cadi Ayyad (Morocco) . . . . . [9146-51]

Coffee Break . . . . . Fri 10:20 to 10:50

10:50: **The beam combiners of GRAVITY VLTI instrument: concept, development, and performance in laboratory**, Laurent Jocou, Karine Rousselet-Perraut, Thibaut Moulin, Yves Magnard, Institut de Planétologie et d'Astrophysique de Grenoble (France); Pierre R. Labeye, MINATEC (France); Valerie Lapras, CEA-LETI (France); Guy S. Perrin, Observatoire de Paris à Meudon (France); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Christopher H. Holmes, Univ. of Southampton (United Kingdom); Antonio Amorim, Univ. de Lisboa (Portugal); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Christian Straubmeier, Univ. zu Köln (Germany) . . . . . [9146-52]

SESSION 20

LOCATION: ROOM 518C . . . . . FRI 11:10 TO 11:30

Science VI

Session Chair: **Claudia Paladini,** Univ. Libre de Bruxelles (Belgium)

11:10: **Unveiling new stellar companions from the PIONIER exozodi survey**, Lindsay Marion, Olivier Absil, Univ. de Liège (Belgium); Steve Ertel, European Southern Observatory (Chile); Jean-Baptiste Le Bouquin, Institut de Planétologie et d'Astrophysique de Grenoble (France); Denis Defrère, The Univ. of Arizona (USA) . . . . . [9146-53]

Lunch Break . . . . . Fri 11:30 to 13:00

SESSION 21

LOCATION: ROOM 518C . . . . . .FRI 13:00 TO 14:20

Critical Subsystems and Technologies II

Session Chair: **Stephen A. Rinehart,** NASA Goddard Space Flight Ctr. (USA)

13:00: **New method for path-length equalization of long single-mode fibers for interferometry**, Matt Anderson, Georgia State Univ. (USA); John D. Monnier, Kenneth Ozdowy, Univ. of Michigan (USA); Julien Woillez, European Southern Observatory (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Michael Ireland, Macquarie Univ. (Australia) . . . . . [9146-54]

13:20: **GRAVITY detector systems**, Leander H. Mehrgan, Gert Finger, Matteo Accardo, Jean-Louis Lizon, Joerg Stegmeier, European Southern Observatory (Germany) . . . . . [9146-55]

13:40: **RAPID: a revolutionary fast optical to NIR camera applied to interferometry**, Sylvain Guieu, Institut de Planétologie et d'Astrophysique de Grenoble (France) and European Southern Observatory (Germany); Philippe Feautrier, Eric Stadler, Institut de Planétologie et d'Astrophysique de Grenoble (France); Johan Rothman, MINATEC (France); Michel Tauvy, ONERA (France); Jean-Baptiste Le Bouquin, Gérard Zins, Pierre Kern, Institut de Planétologie et d'Astrophysique de Grenoble (France); Jérome Coussement, SOFRADIR (France); Eric D. de Borniol, MINATEC (France); Jean-Luc Gach, Lab. d'Astrophysique de Marseille (France); Marc Jacquart, ONERA (France); Thibaut Moulin, Sylvain Rochat, Alain Delboulbé, Institut de Planétologie et d'Astrophysique de Grenoble (France); Sophie Derelle, Clélia Robert, ONERA (France); Michel Vuillermet, SOFRADIR (France) . . . . . [9146-56]

14:00: **The GRAVITY fringe tracking system**, Guy S. Perrin, Observatoire de Paris à Meudon (France); Sylvestre Lacour, Roderick Dembet, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Pierre Fedou, Observatoire de Paris à Meudon (France); Élodie Choquet, Observatoire de Paris à Meudon (USA); Jonathan Menu, Katholieke Univ. Leuven (Belgium); Vincent Lapeyrere, Observatoire de Paris à Meudon (France); Frédéric Cassaing, ONERA (France); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Christian Straubmeier, Univ. zu Köln (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Antonio Amorim, Univ. de Lisboa (Portugal) . . . . . [9146-57]

SESSION 22

LOCATION: ROOM 518C . . . . . FRI 14:20 TO 15:40

Data Processing Analysis II

Session Chair: **Stephen A. Rinehart,** NASA Goddard Space Flight Ctr. (USA)

14:20: **Kernel-phase for interferometric image reconstruction**, Frantz Martinache, Lab. J.L. Lagrange (France). . . . . [9146-58]

14:40: **2014 optical interferometry beauty contest**, John D. Monnier, Univ. of Michigan (USA); John S. Young, David F. Buscher, Univ. of Cambridge (United Kingdom); Fabien Baron, Brian K. Kloppenborg, Georgia State Univ. (USA); Jacques Kluska, Fabien Malbet, Institut de Planétologie et d'Astrophysique de Grenoble (France); Ferréol Soulez, Observatoire de Lyon (France); Éric M. Thiebaut, Univ. Claude Bernard Lyon 1 (France); Karl-Heinz Hofmann, Gerd P. Weigelt, Dieter Schertl, Max-Planck-Institut für Radioastronomie (Germany); Rainer Köhler, Max-Planck-Institut für Astronomie (Germany); Martin Vannier, Florentin Millour, Gaetan Dalla Vedova, David Mary, Anthony Schutz, André Ferrari, Lab. J.L. Lagrange (France); Sridharan Rengaswamy, European Southern Observatory (Germany); William Cotton, National Radio Astronomy Observatory (USA) . . . . . [9146-59]

15:00: **Image reconstruction with MATISSE at the VLTI**, Rainer Köhler, Max-Planck-Institut für Astronomie (Germany); Jan Philipp Ruge, Christian-Albrechts-Univ. zu Kiel (Germany); Jörg-Uwe Pott, Max-Planck-Institut für Astronomie (Germany); Sebastian Wolf, Christian-Albrechts-Univ. zu Kiel (Germany); Walter J. Jaffe, Leiden Observatory (Netherlands); Thomas F. E. Henning, Max-Planck-Institut für Astronomie (Germany) . . . . . [9146-61]

15:20: **The MiRA-3D polychromatic image reconstruction algorithm**, Ferréol Soulez, Observatoire de Lyon (France); Éric M. Thiebaut, Ctr. de Recherche Astronomique de Lyon (France) . . . . . [9146-62]

CONFERENCE 9147 · LOCATION: ROOM 520C

Sunday–Thursday 22–26 June 2014 • Proceedings of SPIE Vol. 9147

Ground-based and Airborne Instrumentation for Astronomy V


(Ramsay)


(McLean)


(Takami)

Conference Chairs: **Suzanne K. Ramsay,** European Southern Observatory (Germany); **Ian S. McLean,** Univ. of California, Los Angeles (USA); **Hideki Takami,** Subaru Telescope, National Astronomical Observatory of Japan (USA)

Program Committee: **Julia J. Bryant,** The Univ. of Sydney (Australia); **Stephen S. Eikenberry,** Univ. of Florida (USA); **Chris J. Evans,** UK Astronomy Technology Ctr. (United Kingdom); **Ramón J. García López,** Instituto de Astrofísica de Canarias (Spain); **Maureen L. Savage,** SOFIA / USRA (USA); **Luc Simard,** National Research Council Canada (Canada); **Oskar von der Lühe,** Kiepenheuer-Institut für Sonnenphysik (Germany)

SUNDAY 22 JUNE

SESSION 1

LOCATION: ROOM 520C . . . . . SUN 9:00 TO 12:10

Instrument Programs at Major Observatories

Session Chair: **Hideki Takami,** National Astronomical Observatory of Japan (Japan)

9:00: **Instrumentation at Gemini Observatory** *(Invited Paper)*, Scot J. Kleinman, Gemini Observatory (USA); Maxime Boccas, Gemini Observatory (Chile); Stephen J. Goodsell, Gemini Observatory (USA); Percy Gomez, Gemini Observatory (Chile); Rick Murowinski, Gemini Observatory (USA) . . . . . [9147-1]

9:25: **New developments in instrumentation at the W. M. Keck Observatory** *(Invited Paper)*, Sean M. Adkins, Taft E. Armandroff, W. M. Keck Observatory (USA); Michael P. Fitzgerald, Univ. of California, Los Angeles (USA); Jimmy Johnson, W. M. Keck Observatory (USA); James E. Larkin, Univ. of California, Los Angeles (USA); Hilton A. Lewis, W. M. Keck Observatory (USA); D. Christopher Martin, Keith Y. Matthews, California Institute of Technology (USA); Jason X. Prochaska, Univ. of California, Santa Cruz (USA); Peter L. Wizinowich, W. M. Keck Observatory (USA) . . . . . [9147-2]

9:50: **Status of the Paranal instrumentation program** *(Invited Paper)*, Luca Pasquini, Mark M. Casali, European Southern Observatory (Germany) . . . . [9147-3]

Coffee Break . . . . . Sun 10:15 to 10:45

10:45: **An overview and the current status of instrumentation at the Large Binocular Telescope Observatory** *(Invited Paper)*, R. Mark Wagner, Michelle L. Edwards, Olga P. Kuhn, David Thompson, Christian Veillet, Large Binocular Telescope Observatory (USA) . . . . . [9147-4]

11:10: **SOFIA science instruments: commissioning, upgrades, and future opportunities**, Erin C. Smith, NASA Ames Research Ctr. (United States); John W. Miles, NASA Ames Research Ctr. (United States), Universities Space Research Association (United States); B. G. Andersson, Eric E. Becklin, James M. De Buizer, NASA Ames Research Ctr. (United States), SOFIA / USRA (United States); Charles D. Dowell, Jet Propulsion Lab. (United States); Edward W. Dunham, Lowell Observatory (United States); Rolf Güsten, Max-Planck-Institut für Radioastronomie (Germany); Ryan T. Hamilton, NASA Ames Research Ctr. (United States), SOFIA / USRA (United States); Doyal A. Harper, The Univ. of Chicago (United States); Terry L. Herter, Cornell Univ. (United States); Randolf Klein, NASA Ames Research Ctr. (United States), SOFIA / USRA (United States); Alfred Krabbe, Deutsches SOFIA Institut (Germany); Pamela M. Marcum, NASA Ames Research Ctr. (United States); Ian S. McLean, Univ. of California, Los Angeles (United States); William T. Reach, NASA Ames Research Ctr. (United States), SOFIA / USRA (United States); Matthew J. Richter, Univ. of California, Davis (United States); Thomas L. Roellig, NASA Ames Research Ctr. (United States); Göran Sandell, Maureen L. Savage, NASA Ames Research Ctr. (United States), SOFIA / USRA (United States); Pasquale Temi, NASA Ames Research Ctr. (United States); William D. Vacca, John E. Vaillancourt, Jeffrey E. Van Cleve, Erick T. Young, NASA Ames Research Ctr. (United States), SOFIA / USRA (United States); Peter T. Zell, NASA Ames Research Ctr. (United States); Adwin Boogert, NASA Ames Research Ctr. (United States), SOFIA / USRA (United States) . . . . . [9147-5]

11:30: **The advanced technology solar telescope first light instruments and critical science program**, Thomas E. Berger, Thomas R. Rimmele, Joseph P. McMullin, David F. Elmore, Friedrich Wöger, Steve Hegwer, Alexandra Tritschler, Kevin Reardon, National Solar Observatory (USA) . . . . . [9147-6]

11:50: **Sinistro: instrumentation on a global scale**, Joseph R. Tufts, Las Cumbres Observatory Global Telescope Network (USA) . . . . . [9147-7]

Lunch Break . . . . . Sun 12:10 to 13:20

SESSION 2

LOCATION: ROOM 520C . . . . . SUN 13:20 TO 17:30

New Instruments and Upgrades to Existing Instruments

Session Chair: **Oskar von der Lühe,** Kiepenheuer-Institut für Sonnenphysik (Germany)

13:20: **Introducing CUBES: the cassegrain ultraviolet Brazilian ESO spectrograph**, Paul Bristow, European Southern Observatory (Germany); Beatriz Barbuy, Univ. de São Paulo (Brazil); Vanessa B. P. Macanhan, Bruno Castilho, Lab. Nacional de Astrofísica (Brazil); Johannes K. Dekker, Bernard-Alexis Delabre, Roland Reiss, Joel R. D. Vernet, Jean-Louis Lizon, European Southern Observatory (Germany); Marcos P. Diaz, Univ. de São Paulo (Brazil); Clemens D. Gneiding, Márcio Vital de Arruda, Lab. Nacional de Astrofísica (Brazil) . . . . . [9147-8]

13:40: **LRS2: the new facility low resolution integral field spectrograph for the Hobby-Eberly telescope**, Taylor S. Chonis, Gary J. Hill, Hanshin Lee, Sarah E. Tuttle, Brian L. Vattiat, The Univ. of Texas at Austin (USA). . . . . [9147-9]

14:00: **Project status of the Robert Stobie spectrograph near infrared instrument (RSS-NIR) for SALT**, Marsha J. Wolf, Mark P. Mulligan, Michael P. Smith, Douglas P. Adler, Curtis Bartosz, Univ. of Wisconsin-Madison (USA); J. Christopher Clemens, The Univ. of North Carolina at Chapel Hill (USA); Kristine Garot, Briana L. Indahl, Kurt P. Jaehnig, Univ. of Wisconsin-Madison (USA); Ron Koch, Diron Technologies, Inc. (USA); Gregory Mosby, Kenneth H. Nordsieck, Jeffrey W. Percival, Univ. of Wisconsin-Madison (USA); Alan Schier, The Pilot Group (USA); Andrew I. Sheinis, Australian Astronomical Observatory (Australia); Stephen A. Smee, Johns Hopkins Univ. (USA); Donald J. Thielman, Mark W. Werner, Univ. of Wisconsin-Madison (USA). . . . . [9147-10]

14:20: **VISIR upgrade: overview and status**, Florian Kerber, Hans-Ulrich Käufl, European Southern Observatory (Germany); Pedro Baksai, European Southern Observatory (Chile); Danuta Dobrzycka, Gert Finger, European Southern Observatory (Germany); Stephanie Heikamp, Leiden Univ. (Netherlands); Derek J. Ives, Gerd H. Jakob, Lars Lundin, European Southern Observatory (Germany); Dimitri Mawet, European Southern Observatory (Chile); Leander H. Mehrgan, European Southern Observatory (Germany); Yazan Momany, European Southern Observatory (Chile); Vincent Moreau, Eric J. Pantin, CEA-Ctr. de SACLAY (France); Miguel Riquelme, European Southern Observatory (Chile); Ralf Siebenmorgen, European Southern Observatory (Germany); Alain Smette, European Southern Observatory (Chile); Joerg Stegmeier, Julian Taylor, Mario van den Ancker, European Southern Observatory (Germany); Lars Venema, ASTRON (Netherlands) . . . . . [9147-11]

14:40: **The camera of the ASTRI SST-2M prototype for the Cherenkov Telescope Array**, Osvaldo Catalano, Maria C. Maccarone, Carmelo Gargano, Giovanni La Rosa, Alberto Segreto, Giuseppe Sottile, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Vincenzo De Caprio, INAF - Osservatorio Astronomico di Capodimonte (Italy); Francesco Russo, Milvia Capalbi, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Giovanni Bonanno, Alessandro Grillo, Salvatore Garozzo, Davide Marano, Sergio Billotta, Giuseppe Romeo, INAF - Osservatorio Astrofisico di Catania (Italy); Luca Stringhetti, Mauro Fiorini, Nicola La Palombara, Salvatore Incorvaia, INAF - IASF Milano (Italy); Giorgio Toso, INAF - Osservatorio Astronomico di Brera (Italy); Domenico Impiombato, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Salvatore Giarrusso, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy) and for the ASTRI Collaboration and the CTA Consortium (Italy); Pierluca Sangiorgi, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy). . . . . [9147-12]

15:00: **A two-dimensional spectropolarimeter as a first-light instrument for the Advanced Technology Solar telescope**, Wolfgang Schmidt, Alexander Bell, Andreas Fischer, Clemens Halbgewachs, Thomas J. Kentischer, Oskar von der Lühe, Thomas Scheiffelen, Michael Sigwarth, Kiepenheuer-Institut für Sonnenphysik (Germany) . . . . . [9147-13]

Coffee Break . . . . . Sun 15:20 to 15:50

15:50: **Performance of polarization modulation and calibration optics for the Daniel K Inouye Solar telescope**, David F. Elmore, National Solar Observatory (USA); Stacey R. Sueoka, College of Optical Sciences, The Univ. of Arizona (USA); Roberto Casini, National Ctr. for Atmospheric Research (USA) . . . . . [9147-14]

16:10: **KIDSpec: an MKID based medium resolution integral field spectrograph**, Kieran O'Brien, Niranjan A. Thatte, Univ. of Oxford (United Kingdom); Benjamin A. Mazin, Univ. of California, Santa Barbara (USA) . . . . . [9147-332]

16:30: **HIPO in-flight performance improvements**, Edward W. Dunham, Thomas A. Bida, Peter L. Collins, Georgi I. Mandushev, Saeid Zoonematkermani, Lowell Observatory (USA); Jeffrey E. Van Cleve, Universities Space Research Association (USA); Daniel Angerhausen, Rensselaer Polytechnic Institute (USA); Avi Mandell, NASA Goddard Space Flight Ctr. (USA) . . . . . [9147-16]

16:50: **Commissioning and first science results of FIFI-LS**, Alfred Krabbe, Univ. Stuttgart (Germany); Norbert Geis, Max-Planck-Institut für extraterrestrische Physik (Germany); Thomas F. E. Henning, Max-Planck-Institut für Astronomie (Germany); Randolf Klein, SOFIA / USRA (USA); Leslie W. Looney, Univ. of Illinois at Urbana-Champaign (USA); Albrecht Poglitsch, Max-Planck-Institut für extraterrestrische Physik (Germany); Simon Beckmann, Aaron Bryant, Sebastian Colditz, Christian Fischer, Fabio Fumi, Rainer Hönle, Univ. Stuttgart (Germany); Walfried Raab, Max-Planck-Institut für extraterrestrische Physik (Germany); Felix Rebell, Univ. Stuttgart (Germany); Maureen L. Savage, SOFIA / USRA (USA) . . . . . [9147-17]

17:10: **A near-infrared SETI experiment: instrument overview**, Shelley A. Wright, Univ. of Toronto (Canada); Dan J. Werthimer, Space Sciences Lab. (USA); Jérôme Maire, Univ. of Toronto (Canada); Geoffrey W. Marcy, Univ. of California, Berkeley (USA); Richard R. Treffers, Starman Systems, LLC (USA); Remington P. S. Stone, Lick Observatory (USA); Elliot Meyer, Univ. of Toronto (Canada); Andrew P. V. Siemion, Univ. of California, Berkeley (USA); Frank Drake, SETI Institute (USA) . . . . . [9147-18]

LOCATION: ROOM 520C . . . . . 17:30 TO 17:50

POSTER POPS

Poster authors have been contacted and selected to make brief presentations.

POSTER SESSION–SUNDAY

LOCATION: ROOM 516 . . . . . SUN 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Sunday. The interactive poster session with authors in attendance will be Sunday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Posters: Instrument Programs and New Science Instruments and Upgrades

Visible imaging spectrometer (VIS) of the new solar telescope at Big Bear Solar Observatory, Wenda Cao, Nicolas Gorceix, Sergiy Shumko, Philip R. Goode, Big Bear Solar Observatory (USA). . . . . [9147-15]

Instrument concepts for solar physics research integrated network group (SPRING), Sanjay Gosain, National Solar Observatory (USA) and Kiepenheuer-Institut für Sonnenphysik (Germany); Markus Roth, Kiepenheuer-Institut für Sonnenphysik (Germany); Frank Hill, National Solar Observatory (USA); Michael J. Thompson, National Ctr. for Atmospheric Research (USA) . . . . . [9147-83]

Updated optical design of the MOONS-VLT spectrometer, Ernesto Oliva, Andrea Tozzi, Debora Ferruzzi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Michele Cirasuolo, UK Astronomy Technology Ctr. (United Kingdom); Jose M. Afonso, Observatório Astronómico de Lisboa (Portugal); Piercarlo Bonifacio, Observatoire de Paris à Meudon (France); Leonardo Vanzi, Pontificia Univ. Católica de Chile (Chile); Marcella Carollo, ETH Zürich (Switzerland); Fabrizio Vitali, INAF - Osservatorio Astronomico di Roma (Italy); Andrea Bianco, INAF - Osservatorio Astronomico di Brera (Italy); Bianca Garilli, INAF - IASF Milano (Italy); Pietro S. Schipani, INAF - Osservatorio Astronomico di Capodimonte (Italy); Emiliano Diolaiti, INAF - Osservatorio Astronomico di Bologna (Italy); Dario Lorenzetti, Fernando Pedichini, Gianluca Li Causi, INAF - Osservatorio Astronomico di Roma (Italy); Salvotore Scuderi, INAF - Osservatorio Astrofisico di Catania (Italy); Vincenzo De Caprio, INAF - Osservatorio Astronomico di Capodimonte (Italy); Stephen Todd, Philip Rees II, UK Astronomy Technology Ctr. (United Kingdom). . . . . [9147-84]

Optical, mechanical and electronic design and integration of POMM, a polarimeter for the 'Observatoire du mont Mégantic, Mélanie R. Leclerc, Patrice Côté, François Duchesne, INO (Canada); Pierre Bastien, Univ. de Montréal (Canada); Olivier Hernandez, Univ. de Montréal (Canada) and Observatoire du Mont Mégantic (Canada); Pierre Colonna d'Istria, Univ. de Montréal (Canada); Mathieu Demers, Marc Girard, Maxime Savard, Dany Lemieux, INO (Canada); Simon Thibault, Denis Brousseau, Univ. Laval (Canada) . . . . . [9147-85]

Design, motivation, and on-sky tests of an efficient fiber coupling unit for 1-meter class telescopes, Michael Bottom, Jon Swift, California Institute of Technology (USA); Philip S. Muirhead, Boston Univ. (USA); Ming Zhao, The Pennsylvania State Univ. (USA); Paul Gardner, Peter P. Plavchan, Reed L. Riddle, California Institute of Technology (USA); Erich Herzig, Thacher High School (USA); John Johnson, Harvard Univ. (USA); Jason T. Wright, The Pennsylvania State Univ. (USA); Nate McCrady, The Univ. of Montana (USA); Rob Wittenmeyer, The Univ. of New South Wales (Australia) . . . . . [9147-86]

A polarimetric unit for HARPS-North at the Telescopio Nazionale Galileo (TNG), Francesco Leone, Univ. degli Studi di Catania (Italy); Massimo Cecconi, Adriano Ghedina, Manuel D. Gonzalez, Vania Lorenzi, Telescopio Nazionale Galileo (Spain); Matteo Munari, INAF - Osservatorio Astrofisico di Catania (Italy); Hector Perez Ventura, A. Luis Riverol Rodrìguez, José San Juan Gómez, Telescopio Nazionale Galileo (Spain); Salvatore Scuderi, INAF - Osservatorio Astrofisico di Catania (Italy) . . . . . [9147-87]

An off-the-shelf guider for the Palomar 200-inch telescope: interfacing amateur astronomy software with professional telescopes for an easy life, Fraser Clarke, Niranjan A. Thatte, Matthias Tecza, Univ. of Oxford (United Kingdom) . . . . . [9147-88]

Design updates and status of the fourth generation TripleSpec spectrograph, Everett A. Schlawin, Terry L. Herter, Charles P. Henderson, Cornell Univ. (USA); John C. Wilson, Univ. of Virginia (USA); Ronald G. Probst, National Optical Astronomy Observatory (USA); Patricio Schurter, Michael Warner, Marco A. Bonati, Cerro Tololo Inter-American Observatory (Chile); David Sprayberry, Roberto Tighe, National Optical Astronomy Observatory (USA); David James, Manuel Martínez, Cerro Tololo Inter-American Observatory (Chile) . . . . . [9147-89]

A new approach for astronomical seeing measurement: simulation and experimental results, Abdelfettah Habib, Univ. Cadi Ayyad (Morocco) and CRMEF-Marrakech (Morocco); Mohammed Sabil, Univ. Cadi Ayyad (Morocco); Zouhair Benkhaldoun, Univ. Cadi Ayyad (Morocco) and Oukaimeden Observatory (Morocco); My Youssef Elazhari, Mohammed Lazrek, Univ. Cadi Ayyad (Morocco) . . . . . [9147-90]

A Fabry-Perot and Grism imaging spectrograph LISS (line imager and slit spectrograph), Yasuhito Hashiba, Mamoru Doi, Shigeyuki Sako, Tomoki Morokuma, The Univ. of Tokyo (Japan); Kuncarayakti Hanindyo, Univ. de Chile (Chile); Mitsuru Kokubo, Kazuma Mitsuda, The Univ. of Tokyo (Japan); Makoto Watanabe, Hikaru Nakao, Hokkaido Univ. (Japan) . . . . . [9147-91]

The mechanical design for the WEAVE prime focus corrector system, Don Carlos Abrams, Kevin M. Dee, Isaac Newton Group of Telescopes (Spain); Tibor Agócs, ASTRON (Netherlands); Emilie Lhomé, Isaac Newton Group of Telescopes (Spain); José Peñate Castro, Instituto de Astrofísica de Canarias (Spain); Gavin B. Dalton, Univ. of Oxford (United Kingdom) and Rutherford Appleton Lab. (United Kingdom); Piercarlo Bonifacio, Observatoire de Paris à Meudon (France); Jose Alfonso López Aguerri, Instituto de Astrofísica de Canarias (Spain); Scott C. Trager, Univ. of Groningen (Netherlands) . . . . . [9147-93]

Conceptual design of a low resolution spectrograph for the Astronomical Observatory of Cordoba, Daniel Q. Nagasawa, Darren L. DePoy, Jennifer L. Marshall, Texas A&M Univ. (USA) . . . . . [9147-94]

CONFERENCE 9147 · LOCATION: ROOM 520C

The GRAVITY spectrometers: design report of the optomechanics and active cryogenic mechanisms, Michael Wiest, Senol Yazici, Univ. zu Köln (Germany); Sebastian Fischer, Deutsches Zentrum für Luft- und Raumfahrt e.V. (Germany); Markus Thiel, Kayser-Threde GmbH (Germany); Marcus Haug, Max-Planck-Institut für extraterrestrische Physik (Germany); Constanza Araujo Hauck, Gemini Observatory (Chile); Christian Straubmeier, Imke Wank, Univ. zu Köln (Germany); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Guy S. Perrin, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France); Antonio Amorim, Univ. de Lisboa (Portugal); Markus Schöller, European Southern Observatory (Germany); Andreas Eckart, Univ. zu Köln (Germany) . . . . . [9147-95]

First-generation instrumentation for the Discovery Channel telescope, Thomas A. Bida, Edward W. Dunham, Philip Massey, Henry Roe, Lowell Observatory (USA). . . . . [9147-96]

Cyrogenic infrared imager-spectrometer of the Discovery Channel telescope, Alexander S. Kutyrev, NASA Goddard Space Flight Ctr. (USA); John I. Capone, Univ. of Maryland, College Park (USA); David A. Content, NASA Goddard Space Flight Ctr. (USA); Vicki L. Toy, Univ. of Maryland, College Park (USA); Gennadiy N. Lotkin, Frederick D. Robinson, Global Science & Technology, Inc. (USA); Neil A. Gehrels, Samuel Harvey Moseley Jr., NASA Goddard Space Flight Ctr. (USA); Stuart N. Vogel, Sylvain Veilleux, Univ. of Maryland, College Park (USA); Ori D. Fox, Univ. of California, Berkeley (USA) . . . . . [9147-97]

Characterization of Hawaii-2RG 1.7 micron cutoff detectors for the habitable-zone planet finder spectrograph, Chad F. Bender, Ryan C. Terrien, Paul Robertson, Suvrath Mahadevan, Lawrence W. Ramsey, Frederick R. Hearty, The Pennsylvania State Univ. (USA); Matt J. Nelson, Univ. of Virginia (USA) . . [9147-98]

POMM: design of rotating mechanism and hexapod structure, Patrice Côté, Mélanie R. Leclerc, INO (Canada); Pierre Bastien, Olivier Hernandez, Univ. de Montréal (Canada); Mathieu Demers, INO (Canada). . . . . [9147-99]

Testing deep depleted CCD, Ricard Casas, Institut de Ciències de l'Espai (Spain); Jorge Jiménez Rojas, Institut de Física d'Altes Energies (Spain); Juan de Vicente, Ctr. de Investigaciones Energéticas, Medioambientales y Tecnológicas (Spain); Laia Cardiel-Sas, Institut de Física d'Altes Energies (Spain); Francisco J. Castander, Institut de Ciències de l'Espai (Spain). . . . . [9147-100]

Readout electronics of physics of accelerating universe camera, Juan de Vicente, Javier Castilla, Ctr. de Investigaciones Energéticas, Medioambientales y Tecnológicas (Spain); Jorge Jiménez Rojas, José María Illa, Laia Cardiel-Sas, Institut de Física d'Altes Energies (Spain) . . . . . [9147-101]

Acousto-optical imaging spectropolarimetric devices: new opportunities and developments, Vladimir Y. Molchanov, Sergey P. Anikin, Sergey I. Chizhikov, Konstantin B. Yushkov, Oleg Y. Makarov, National Univ. of Science and Technology "MISiS" (Russian Federation); Andrey M. Tatarnikov, Sergey A. Potanin, Valentin F. Esipov, Lomonosov Moscow State Univ. (Russian Federation) . . . . . [9147-102]

The HAWC+ upgrade program: wide-field far-infrared imaging and polarimetry with SOFIA, Charles D. Dowell, Jet Propulsion Lab. (USA); Troy J. Ames, Dominic J. Benford, NASA Goddard Space Flight Ctr. (USA); Marc Berthoud, The Univ. of Chicago (USA); Nicholas L. Chapman, Northwestern Univ. (USA); David T. Chuss, NASA Goddard Space Flight Ctr. (USA); Jessie L. Dotson, NASA Ames Research Ctr. (USA); Louise A. Hamlin, Jet Propulsion Lab. (USA); Doyal A. Harper, The Univ. of Chicago (USA); Gene C. Hilton, National Institute of Standards and Technology (USA); Kent D. Irwin, Stanford Univ. (USA); Christine A. Jhabvala, NASA Goddard Space Flight Ctr. (USA); Attila Kovacs, California Institute of Technology (USA); Leslie W. Looney, Univ. of Illinois at Urbana-Champaign (USA); Stephen F. Maher, Science Systems and Applications, Inc. (USA); Samuel Harvey Moseley Jr., NASA Goddard Space Flight Ctr. (USA); Giles Novak, Northwestern Univ. (USA); Marcus C. Runyan, Jet Propulsion Lab. (USA); Eric Sandberg, SOFIA / USRA (USA); Elmer H. Sharp III, Leroy M. Sparr, Johannes G. Staguhn, NASA Goddard Space Flight Ctr. (USA); John E. Vaillancourt, SOFIA / USRA (USA); Caesar Wirth, The Univ. of Chicago (USA); Edward J. Wollack, NASA Goddard Space Flight Ctr. (USA) . . . . . [9147-103]

The near infrared camera for the Subaru prime focus spectrograph, Stephen A. Smee, Johns Hopkins Univ. (USA); James E. Gunn, Princeton Univ. (USA); Mirek Golebiowski, Robert H. Barkhouser, Johns Hopkins Univ. (USA); Michael A. Carr, Princeton Univ. (USA); Stephen C. Hope, Johns Hopkins Univ. (USA); Craig Loomis, Princeton Univ. (USA); Murdock Hart, Johns Hopkins Univ. (USA) . . . . . [9147-104]

Detector driver systems and photometric estimates for RIMAS, Vicki L. Toy, Univ. of Maryland, College Park (USA); Alexander S. Kutyrev, NASA Goddard Space Flight Ctr. (USA) and Univ. of Maryland, College Park (USA); Eric Lyness, NASA Goddard Space Flight Ctr. (USA); Marius Muench, Norwegian Univ. of Science and Technology (Norway); Frederick D. Robinson, Gennadiy N. Lotkin, NASA Goddard Space Flight Ctr. (USA) and Global Science & Technology, Inc. (USA); John I. Capone, Univ. of Maryland, College Park (USA); David A. Content, NASA Goddard Space Flight Ctr. (USA); Sylvain Veilleux, Univ. of Maryland, College Park (USA); Samuel Harvey Moseley Jr., Neil A. Gehrels, NASA Goddard Space Flight Ctr. (USA); Stuart N. Vogel, Univ. of Maryland, College Park (USA) [9147-105]

FIFI-LS: the facility far-infrared spectrometer for SOFIA, Randolf Klein, SOFIA / USRA (USA); Simon Beckmann, Aaron Bryant, Sebastian Colditz, Christian Fischer, Fabio Fumi, Deutsches SOFIA Institut (Germany); Norbert Geis, Rainer Hönle, Max-Planck-Institut für extraterrestrische Physik (Germany); Alfred Krabbe, Deutsches SOFIA Institut (Germany); Leslie W. Looney, Univ. of Illinois at Urbana-Champaign (USA); Albrecht Poglitsch, Walfried Raab, Max-Planck-Institut für extraterrestrische Physik (Germany); Felix Rebell, Deutsches SOFIA Institut (Germany); Maureen L. Savage, SOFIA / USRA (USA) . . . . . [9147-106]

FLITECAM: early commissioning results, Sarah E. Logsdon, Ian S. McLean, Univ. of California, Los Angeles (USA); Eric E. Becklin, SOFIA / USRA (USA); Edward W. Dunham, Lowell Observatory (USA); Ryan T. Hamilton, SOFIA / USRA (USA); Christopher A. Johnson, Univ. of California, Los Angeles (USA); Jennifer W. Milburn, California Institute of Technology (USA); Maureen L. Savage, SOFIA / USRA (USA); Erin C. Smith, NASA Ames Research Ctr. (USA) . . . . . [9147-108]

One controlling and driving module based on FPGA in optical fiber positioning device, Jun Guo, Yonggang Gu, Yi Jin, Chao Zhai, Univ. of Science and Technology of China (China) . . . . . [9147-111]

Weather monitor station and 225-GHz radiometer system installed at Sierra Negra: the large millimeter telescope site, Daniel Ferrusca Rodriguez, Jesus Contreras, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [9147-112]

VLT/MUSE global performances as measured during commissioning, Johan Richard, Roland M. Bacon, Observatoire de Lyon (France); Lutz Witsotzki, Peter Weilbacher, Leibniz-Institut für Astrophysik Potsdam (Germany); Gérard Zins, Institut de Planétologie et d'Astrophysique de Grenoble (France); Joel R. D. Vernet, European Southern Observatory (Germany) . . . . . [9147-113]

Near-infrared wavelength calibration of astrophysical spectrographs with emission spectra of the CN molecule, Andreas Boesch, Ansgar Reiners, Georg-August-Univ. Göttingen (Germany); Peter F. Bernath, Old Dominion Univ. (USA) . . . . . [9147-115]

The characteristics and development status of the control and housekeeping electronics of FRIDA, José Javier Díaz Garcia, Instituto de Astrofísica de Canarias (Spain); Rubén A. Flores-Meza, Beatriz Sánchez, Univ. Nacional Autónoma de México (Mexico); Jesús Patrón Recio, Instituto de Astrofísica de Canarias (Spain) . . . . . [9147-116]

The fibre positioning system concept for WEAVE at the William Herschel telescope, Ian J. Lewis, Univ. of Oxford (United Kingdom); Gavin B. Dalton, Univ. of Oxford (United Kingdom) and Rutherford Appleton Lab. (United Kingdom); Matthew Brock, James Gilbert, Univ. of Oxford (United Kingdom); Kevin F. Middleton, Rutherford Appleton Lab. (United Kingdom); Don Carlos Abrams, Isaac Newton Group of Telescopes (Spain); Piercarlo Bonifacio, Observatoire de Paris à Meudon (France); Jose Alfonso López Aguerri, Instituto de Astrofísica de Canarias (Spain); Scott C. Trager, Univ. of Groningen (Netherlands) . . . . . [9147-117]

Precise angular positioning at 6K: the FIFI-LS grating drive, Felix Rebell, Univ. Stuttgart (Germany); Simon Beckmann, Deutsches SOFIA Institut (Germany); Aaron Bryant, Sebastian Colditz, Christian Fischer, Fabio Fumi, Univ. Stuttgart (Germany); Norbert Geis, Max-Planck-Institut für extraterrestrische Physik (Germany); Rainer Hönle, Univ. Stuttgart (Germany); Randolf Klein, SOFIA / USRA (USA); Alfred Krabbe, Univ. Stuttgart (Germany); Leslie W. Looney, Univ. of Illinois at Urbana-Champaign (USA); Albrecht Poglitsch, Walfried Raab, Max-Planck-Institut für extraterrestrische Physik (Germany); Maureen L. Savage, SOFIA / USRA (USA) . . . . . [9147-118]

The performance of cryogenic optical systems for the rapid infrared imager/spectrometer (RIMAS), John I. Capone, Univ. of Maryland, College Park (USA); David A. Content, Alexander S. Kutyrev, NASA Goddard Space Flight Ctr. (USA); Frederick D. Robinson, Gennadiy N. Lotkin, NASA Goddard Space Flight Ctr. (USA) and Global Science & Technology, Inc. (USA); Vicki L. Toy, Sylvain Veilleux, Univ. of Maryland, College Park (USA); Samuel Harvey Moseley Jr., Neil A. Gehrels, NASA Goddard Space Flight Ctr. (USA); Stuart N. Vogel, Univ. of Maryland, College Park (USA) . . . . . [9147-119]

An update on the development of IO:I: a NIR imager for the Liverpool Telescope, Robert M. Barnsley, Iain A. Steele, Stuart D. Bates, Christopher J. Mottram, Liverpool John Moores Univ. (United Kingdom) . . . . . [9147-120]

The precise measurement of the attenuation coefficients of various IR optical materials applicable to immersion grating, Sayumi Kaji, Kyoto Sangyo Univ. (Japan); Yuki Sarugaku, Japan Aerospace Exploration Agency (Japan); Yuji Ikeda, Photocoding (Japan); Kenshi Nakanishi, Kyoto Sangyo Univ. (Japan); Naoto Kobayashi, The Univ. of Tokyo (Japan); Sohei Kondo, Kyoto Sangyo Univ. (Japan); Chikako Yasui, The Univ. of Tokyo (Japan). . . . . [9147-121]

Mechanical design of mounts for IGRINS focal plane arrays and field flattening lenses, Jae Sok Oh, Chan Park, Sang-Mok Cha, In-Soo Yuk, Kwijong Park, Kang-Min Kim, Moo-Young Chun, Kyeong Yeon Ko, Heeyoung Oh, Ueejeong Jeong, Jakyoung Nah, Korea Astronomy and Space Science Institute (Korea, Republic of); Hanshin Lee, Michael D. Pavel, Daniel T. Jaffe, The Univ. of Texas at Austin (USA) . . . . . [9147-122]

Mid-infrared millisecond photometry with VISIR, Hans-Ulrich Käufl, Derek J. Ives, Florian Kerber, Gert Finger, Ralf Siebenmorgen, Joerg Stegmeier, Mario van den Ancker, European Southern Observatory (Germany). . . . . [9147-123]

ARNICA and LonGSp: the refurbishment of two near infrared instruments, Leonardo Vanzi, Shintaro Koshida, Christian Dani Guzman Carmine, Pontificia Univ. Católica de Chile (Chile); Marco A. Bonati, Cerro Tololo Inter-American Observatory (Chile); Roberto L. Avilés, Pontificia Univ. Católica de Chile (Chile); Carlo Baffa, Francesco Palla, Filippo Mannucci, INAF - Osservatorio Astrofisico di Arcetri (Italy); Tzu Chiang Shen, Blue Shadows Astronomy and Engineering Ltd. (Chile); Vincent Suc, Pontificia Univ. Católica de Chile (Chile). . . . . [9147-124]

Revised specifications and current development status of MIMIZUKU: the mid-infrared instrument for the TAO 6.5-m telescope, Takafumi Kamizuka, Takashi Miyata, Shigeyuki Sako, Kentaro Asano, Mizuho Uchiyama, Kazushi Okada, Tomohiko Nakamura, Itsuki Sakon, Takashi Onaka, The Univ. of Tokyo (Japan); Hirokazu Kataza, Japan Aerospace Exploration Agency (Japan); Tsutomu Aoki, Mamoru Doi, Natsuko M. Kato, Kimiaki Kawara, Yutaro Kitagawa, Kotaro Kohno, Masahiro Konishi, The Univ. of Tokyo (Japan); Shintaro Koshida, Pontificia Univ. Católica de Chile (Chile); Takeo Minezaki, Tomoki Morokuma, Kentaro Motohara, Takao Soyano, Hidenori Takahashi, Yoichi Tamura, Toshihiko Tanabe, Masuo Tanaka, Ken'ichi Tarusawa, Ken Tateuchi, Soya Todo, Yuzuru Yoshii, The Univ. of Tokyo (Japan) . . . . . [9147-125]

Near-infrared imaging spectro-polarimeter (NIRIS) of the new solar telescope at Big Bear Solar Observatory, Wenda Cao, Kwangsu Ahn, Sergiy Shumko, Nicolas Gorceix, Philip R. Goode, Big Bear Solar Observatory (USA) . . . [9147-127]

Day-time site characterisation of La Palma, and its relation to night-time conditions, Matthew J. Townson, Aglaé Kellerer, Gordon D. Love, Timothy Butterley, Timothy J. Morris, James Osborn, Durham Univ. (United Kingdom); Göran B. Scharmer, The Institute for Solar Physics (Sweden); Richard W. Wilson, Durham Univ. (United Kingdom) . . . . . [9147-128]

Cryogenic infrared spectrograph (CYRA) of the new solar telescope at Big Bear Solar Observatory, Wenda Cao, Roy Coulter, Philip R. Goode, Nicolas Gorceix, Claude Plymate, Sergiy Shumko, Big Bear Solar Observatory (USA); Matt Penn, National Solar Observatory (USA); Thomas Ayres, Univ. of Colorado at Boulder (USA) . . . . . [9147-129]

First experience installing ZIMPOL at Gregor telescope, Renzo Ramelli, Michele Bianda, Istituto Ricerche Solari Locarno (Switzerland); Daniel Gisler, Kiepenheuer-Institut für Sonnenphysik (Germany) and Istituto Ricerche Solari Locarno (Switzerland); Nazaret Bello González, Svetlana Berdyugina, Dirk Soltau, Kiepenheuer-Institut für Sonnenphysik (Germany) . . . . . [9147-130]

Spiral galaxy evolution as seen with SpIOMM, Laurie Rousseau-Nepton, Carmelle Robert, Laurent Drissen, Univ. Laval (Canada) . . . . . [9147-131]

MuSICa image slicer prototype at 1.5-m GREGOR solar telescope, Ariadna Calcines Rosario, Roberto L. López, Manuel Collados Vera, Instituto de Astrofísica de Canarias (Spain) . . . . . [9147-132]

Gemini planet imager observational calibrations I: overview of the GPI data analysis pipeline, Marshall D. Perrin, Space Telescope Science Institute (USA); Jérôme Maire, Dunlap Institute for Astronomy & Astrophysics (Canada); Patrick J. Ingraham, Stanford Univ. (USA); Dmitry Savransky, Cornell Univ. (USA); Jean-Baptiste Ruffio, Institut Supérieur de l'Aéronautique et de l'Espace (France); Max Millar-Blanchaer, Dunlap Institute for Astronomy & Astrophysics (Canada); Schuyler G. Wolff, Johns Hopkins Univ. (USA); Naru Sadakuni, Gemini Observatory (Chile); Christian Marois, NRC - Herzberg Institute of Astrophysics (Canada); Michael P. Fitzgerald, Univ. of California, Los Angeles (USA); Bruce A. Macintosh, Stanford Univ. (USA); René Doyon, Univ. de Montréal (Canada); James R. Graham, Univ. of California, Berkeley (USA); James E. Larkin, Jeffrey K. Chilcote, Univ. of California, Los Angeles (USA); Zachary H. Draper, Univ. of Victoria (Canada); Alexandra Z. Greenbaum, Johns Hopkins Univ. (USA); Quinn M. Konopacky, Dunlap Institute for Astronomy & Astrophysics (Canada); Franck Marchis, SETI Institute (USA); Laurent A. Pueyo, Rémi Soummer, Space Telescope Science Institute (USA); Sandrine J. Thomas, NASA Ames Research Ctr. (USA); Jason J. Wang, Univ. of California, Berkeley (USA); Sloane J. Wiktorowicz, Univ. of California, Santa Cruz (USA) . . . . . [9147-133]

KOALA, a wide-field 1000 element integral-field unit for the Anglo-Australian telescope: assembly and commissioning, Ross Zhelem, Jurek Brzeski, Scott Case, Vladimir Churilov, Simon C. Ellis, Tony J. Farrell, Anthony Heng, Anthony J. Horton, Australian Astronomical Observatory (Australia); Michael Ireland, Macquarie Univ. (Australia) and Australian Astronomical Observatory (Australia); Damien J. Jones, Prime Optics (Australia); Urs Klauser, Jon S. Lawrence, Stan Miziarski, David R. Orr, Naveen Pai, Nick F. Staszak, Julia Tims, Minh V. Vuong, Lewis G. Waller, Pascal Xavier, Australian Astronomical Observatory (Australia) . . . . . [9147-134]

Single-lock: a stable Fabry-Perot based wavelength calibrator, Tyler M. McCracken, Colby A. Jurgenson, Debra A. Fischer, Rebecca A. Stoll, Andrew E. Szymkowiak, Jeremy Bradford, Yale Univ. (USA); Will Rutter, Massachusetts Institute of Technology (USA) . . . . . [9147-136]

PAUCam carbon fiber body and internal filter jukebox, Ferràn Grañena, Luis Lopez, Javier Gaweda, Carles Arteche, Otger Ballester, Ester Majà, Institut de Física d'Altes Energies (Spain) . . . . . [9147-137]

225-GHz opacity measurements at Summit camp, Greenland, for the GreenLand telescope (GLT) site testing, Pierre L. Martin-Cocher, Keiichi Asada, Satoki Matsushita, Ming-Tang Chen, Institute of Astronomy and Astrophysics (Taiwan); Paul T. P. Ho, Institute of Astronomy and Astrophysics (Taiwan) and Harvard-Smithsonian Ctr. for Astrophysics (USA); Chien-Ping Chen, Institute of Astronomy and Astrophysics (Taiwan) . . . . . [9147-138]

S4EI (spectral sampling with slicer for stellar and extragalactical instrumentation): a new-generation of 3D spectro-imager dedicated to night-time astronomy, Frédéric N. Sayède, Mathieu Puech, Observatoire de Paris à Meudon (France); Pierre Mein, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Piercarlo Bonifacio, Jean-Philippe Amans, Gilles Fasola, Observatoire de Paris à Meudon (France); Raphaël Galicher, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France) . . . . . [9147-139]

Development of Nayoro optical camera and spectrograph for 1.6-m Pirka telescope of Hokkaido University, Hikaru Nakao, Makoto Watanabe, Kazuo Sorai, Hokkaido Univ. (Japan); Mahiro Yamada, Kobe Univ. (Japan); Yoichi Itoh, Univ. of Hyogo (Japan); Shigeyuki Sako, Takashi Miyata, The Univ. of Tokyo (Japan). . . . . [9147-140]

Instrument control software based on Labview for HARPS-N, Xiaofeng Gao, UK Astronomy Technology Ctr. (United Kingdom); Alexander G. Glenday, Observatoire de Genèva (Switzerland); Manuel D. Gonzalez, Telescopio Nazionale Galileo (Spain); Andrew J. A. Vick, UK Astronomy Technology Ctr. (United Kingdom) . . . [9147-141]

Optomecatronic design and integration of the Speckle interferometer BERKUT to the 1-meter class telescopes, Ricardo Granados, Univ. Nacional Autónoma de México (Mexico) . . . . . [9147-142]

VIRUS instrument collimator assembly, Jennifer L. Marshall, Travis Prochaska, Richard D. Allen, Ting Li, David Baker, Emily Boster, Marisela Rodriguez-Patino, Darren L. DePoy, Texas A&M Univ. (USA); Gary J. Hill, Sarah E. Tuttle, Brian L. Vattiat, Taylor S. Chonis, The Univ. of Texas at Austin (USA). . . . . [9147-143]

Reverse and concurrent engineering applied to Speckle interferometer Berkut for 1-meter class telescopes, Rogelio Lopez, Alejandro D. Simón Farah, Univ. Nacional Autónoma de México (Mexico). . . . . [9147-144]

Remote and automatic small-scale observatories: experience with an all-sky fireball patrol camera, Felix Bettonvil, NOVA Optical Infrared Instrumentation Group (Netherlands) . . . . . [9147-145]

Optical integration and verification of LINC-NIRVANA, Javier Moreno-Ventas, Peter Bizenberger, Thomas Bertram, Fulvio DeBonis, Harald Baumeister, Thomas M. Herbst, Lars Mohr, Max-Planck-Institut für Astronomie (Germany). . . [9147-146]

The ZIMPOL high contrast imaging polarimeter for SPHERE: system test results, Ronald Roelfsema, NOVA Optical Infrared Instrumentation Group (Netherlands); Andreas Bazzon, Hans Martin Schmid, ETH Zürich (Switzerland); Johan H. Pragt, NOVA Optical Infrared Instrumentation Group (Netherlands); Daniel Gisler, ETH Zürich (Switzerland); Carsten Dominik, Astronomical Institute Anton Pannekoek (Netherlands) . . . . . [9147-147]

PANIC in the lab: status before commissioning, Bernhard Dorner, Armin Huber, Max-Planck-Institut für Astronomie (Germany); María Concepción Cárdenas Vázquez, Instituto de Astrofísica de Andalucía (Spain); Peter Bizenberger, Max-Planck-Institut für Astronomie (Germany); Irene Ferro Rodriguez, Instituto de Astrofísica de Andalucía (Spain); Vianak Naranjo, Johana Panduro, Ulrich Mall, Richard J. Mathar, Clemens Storz, Matthias Alter, Max-Planck-Institut für Astronomie (Germany); Matilde Fernández, Instituto de Astrofísica de Andalucía (Spain); Josef W. Fried, Max-Planck-Institut für Astronomie (Germany); Julio F. Rodríguez Gómez, Instituto de Astrofísica de Andalucía (Spain) . . . . . [9147-148]

PISCO: the parallel imager for southern cosmological observations, Brian Stalder, Antony A. Stark, Stephen M. Amato, John C. Geary, Harvard-Smithsonian Ctr. for Astrophysics (USA); Stephen A. Shectman, Carnegie Observatories (USA); Christopher W. Stubbs, Harvard Univ. (USA); Andrew Szentgyorgyi, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9147-149]

SITELLE optical design, assembly, and testing, Denis Brousseau, Simon Thibault, Simon Fortin-Boivin, Univ. Laval (Canada); Hu Zhang, ImmerVision (Canada); Philippe Vallée, Univ. de Montréal (Canada); Hugues Auger, Laurent Drissen, Univ. Laval (Canada) . . . . . [9147-150]

Automated alignment and on-sky performance of the Gemini planet imager coronagraph, Dmitry Savransky, Cornell Univ. (USA); Sandrine J. Thomas, NASA Ames Research Ctr. (USA); Lisa A. Poyneer, Lawrence Livermore National Lab. (USA); Jennifer S. Dunn, NRC - Herzburg Institute of Astrophysics (Canada); Bruce A. Macintosh, Lawrence Livermore National Lab. (USA); Daren Dillon, Lick Observatory (USA) and Univ. of California Observatories (USA). . . . . [9147-151]

CONFERENCE 9147 · LOCATION: ROOM 520C

The circumgalactic H-Alpha spectrograph, Erika T. Hamden, David Schiminovich, Sam Gordon, Columbia Univ. (USA) . . . . . [9147-152]

Passive reduction of vibrations from a Joule-Thompson cryo-cooler: part II, Marc R. Baril, Tom Benedict, Canada-France-Hawaii Telescope (USA) . [9147-153]

Better flat-fielding for ground-based UV spectrographs, Florian Kerber, Reinhard Hanuschik, Sabine Moehler, European Southern Observatory (Germany); Alain Smette, Jonathan Smoker, Pierre Bourget, European Southern Observatory (Chile); Peter J. Dwyer, Energetiq Technology, Inc. (USA); Michael Rothschaedl, Mountain Photonics GmbH (Germany) . . . . . [9147-154]

Developing micro DC brushless motor driver and position control for fiber positioners, Laurent Jenni, Philipp Horler, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Guillermo Gonzalez de-Rivera, Univ. Autónoma de Madrid (Spain); Justo Sánchez, Instituto de Astrofísica de Andalucía (Spain); Nasib Fahim, Univ. Autónoma de Madrid (Spain); Laleh Makarem, Hannes Bleuler, Mohamed Bouri, Jean-Paul Kneib, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Francisco Prada, Univ. Autónoma de Madrid (Spain) . . . . . [9147-155]

A miniature cryogenic scanning Fabry-Perot interferometer for mid-IR to submm astronomical observations, Stephen Parshley, Eve Vavagiakis, Thomas Nikola, Gordon J. Stacey, Cornell Univ. (USA) . . . . . [9147-156]

The development of ground-based infrared multi-object spectrograph based on the microshutter array, Dae-Sik Moon, Suresh Sivanandam, Univ. of Toronto (Canada); Alexander S. Kutyrev, Samuel Harvey Moseley Jr., NASA Goddard Space Flight Ctr. (USA); James R. Graham, Univ. of California, Berkeley (USA) . [9147-157]

Optical design of the SuMiRe/PFS spectrograph, Sandrine Pascal, Sébastien Vivès, Lab. d'Astrophysique de Marseille (France) and Aix Marseille Univ. (France); Robert H. Barkhouser, Johns Hopkins Univ. (USA); James E. Gunn, Princeton Univ. (USA) . . . . . [9147-158]

Spherical grating spectrometers, Darragh E. O'Donoghue, South African Astronomical Observatory (South Africa); J. Christopher Clemens, The Univ. of North Carolina at Chapel Hill (USA). . . . . [9147-159]

Inverse analysis method to optimize the optic tolerances of MEGARA: the future IFU and multi-object spectrograph for GTC, Rafael Ortiz, Esperanza Carrasco, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Gonzalo Páez, Ctr. de Investigaciones en Óptica, A.C. (Mexico); Armando Gil de Paz, Jesús Gallego, Univ. Complutense de Madrid (Spain); Francisco Manuel Sánchez-Moreno, Univ. Politécnica de Madrid (Spain); Jorge Iglesias-Páramo, Instituto de Astrofísica de Andalucía (Spain); Ernesto Sánchez-Blanco, FRACTAL S.L.N.E (Spain) . . . . . [9147-161]

Status and first results of the Canarias infrared camera experiment (CIRCE) for the Gran Telescopio Canarias, Alan Garner, Richard D. Stelter, Stephen S. Eikenberry, Univ. of Florida (USA); Nestor M. Lasso-Cabrera, Ctr. de Estudios de Física del Cosmos de Aragón (Spain); Steven N. Raines, Univ. of Florida (USA); Miguel V. Charcos-Llorens, NASA Ames Research Ctr. (USA); Michelle L. Edwards, Gemini Observatory (Chile); Antonio Marín-Franch, Ctr. de Estudios de Física del Cosmos de Aragón (Spain); Kendall Ackley, Univ. of Florida (USA); A. Javier Cenarro, Ctr. de Estudios de Física del Cosmos de Aragón (Spain); John G. Bennett, Raymond Frommeyer, Michael D. Herlevich, Paola Miller, Charles H. Murphey, Univ. of Florida (USA); Christopher Packham, The Univ. of Texas at San Antonio (USA) . . . . . [9147-162]

LINC-NIRVANA: large diffraction limited optics in cryogenic environment, Peter Bizenberger, Harald Baumeister, Thomas M. Herbst, Werner Laun, Lars Mohr, Javier Moreno-Ventas, Max-Planck-Institut für Astronomie (Germany) . . [9147-163]

Investigating concepts for a photonic spectrograph, Robert J. Harris, Jeremy R. Allington-Smith, Durham Univ. (United Kingdom); David G. MacLachlan, Robert R. Thomson, Heriot-Watt Univ. (United Kingdom). . . . . [9147-164]

The ngCFHT spectrograph optical design: a novel pupil slicing technique, Paolo Spanò, NRC - Herzberg Institute of Astrophysics (Canada). . . . . [9147-165]

New GRISMs for AFOSC based on volume phase holographic gratings in photopolymers, Alessio Zanutta, Andrea Bianco, Marco Landoni, INAF - Osservatorio Astronomico di Brera (Italy); Thomas Fäcke, Bayer MaterialScience AG (Germany); Lina Tomasella, Stefano Benetti, Enrico Giro, INAF - Osservatorio Astronomico di Padova (Italy) . . . . . [9147-166]

Characterization of the reflectivity of various black materials, Jennifer L. Marshall, Patrick D. Williams, Jean-Philippe Rheault, Travis Prochaska, Richard D. Allen, Darren L. DePoy, Texas A&M Univ. (USA). . . . . [9147-167]

FIFI-LS data reduction and first science results, Aaron Bryant, Simon Beckmann, Sebastian Colditz, Christian Fischer, Fabio Fumi, Univ. Stuttgart (Germany); Norbert Geis, Max-Planck-Institut für extraterrestrische Physik (Germany); Thomas F. E. Henning, Max-Planck-Institut für Astronomie (Germany); Rainer Hönle, Univ. Stuttgart (Germany); Randolf Klein, Universities Space Research Association (USA); Alfred Krabbe, Univ. Stuttgart (Germany); Leslie W. Looney, Univ. of Illinois at Urbana-Champaign (USA); Albrecht Poglitsch, Walfried Raab, Max-Planck-Institut für extraterrestrische Physik (Germany); Felix Rebell, Univ. Stuttgart (Germany); Maureen L. Savage, Universities Space Research Association (USA) . . . . . [9147-168]

Tests and procedures for optimizing EMIR cooling system, Patricia Fernández Izquierdo, Instituto de Astrofísica de Canarias (Spain); Jean-Louis Lizon, European Southern Observatory (Germany); Miguel Núñez Cagigal, Jesús Patrón Recio, Maria Barreto Cabrera, Instituto de Astrofísica de Canarias (Spain); Francisco Garzón López, Instituto de Astrofísica de Canarias (Spain) and Univ. de la Laguna (Spain) . . . . . [9147-169]

Construction of pre-slit system of Chinese SONG spectrograph, Pengfei Gao, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9147-170]

Design, alignment, and deployment of the Hobby Eberly telescope prime focus instrument package, Brian L. Vattiat, Gary J. Hill, Hanshin Lee, Walter Moreira, Niv Drory, Jason Ramsey, Linda Elliot, Martin Landriau, The Univ. of Texas at Austin (USA); Marco H. Häuser, Florian Mangold, Ludwig-Maximilians-Univ. München (Germany) . . . . . [9147-172]

A near-infrared SETI experiment: probability distribution of false coincidences, Jérôme Maire, Dunlap Institute for Astronomy & Astrophysics (Canada); Shelley A. Wright, Dunlap Institute for Astronomy & Astrophysics (Canada) and Univ. of Toronto (Canada); Dan J. Werthimer, Geoffrey W. Marcy, Univ. of California, Berkeley (USA); Richard R. Treffers, Starman Systems, LLC (USA); Remington P. S. Stone, Lick Observatory (USA); Elliot Meyer, Univ. of Toronto (Canada); Andrew P. V. Siemion, Univ. of California, Berkeley (USA); Frank Drake, SETI Institute (USA) . . . . . [9147-173]

Installation and operation at Dome C of AMICA, the infrared camera for astronomical imaging from Antarctica, Mauro Dolci, Angelo Valentini, Oscar Straniero, INAF - Osservatorio Astronomico di Teramo (Italy); Gianluca Di Rico, INAF - Osservatorio Astrofisico di Arcetri (Italy); Amico Di Cianno, INAF - Osservatorio Astronomico di Teramo (Italy); Daniele Tavagnacco, Istituto Officina dei Materiali (Italy); Francesco D'Alessio, INAF - Osservatorio Astronomico di Roma (Italy); Yann Reinert, CEA-Ctr. de SACLAY (France); Christophe Le Roy-Dos Santos, Consorzio Interuniversitario per la Fisica Spaziale (Italy); Favio Bortoletto, Maurizio D'Alessandro, Demetrio Magrin, INAF - Osservatorio Astronomico di Padova (Italy); Leonardo Corcione, Alberto Riva, INAF - Osservatorio Astronomico di Torino (Italy) . . . . . [9147-174]

Automatisms in EMIR instrument to improve operation, safety, and maintenance, Patricia Fernández Izquierdo, Miguel Núñez Cagigal, Maria Barreto Cabrera, Jesús Patrón Recio, Instituto de Astrofísica de Canarias (Spain); Francisco Garzón López, Instituto de Astrofísica de Canarias (Spain) and Univ. de La Laguna (Spain) . . . . . [9147-175]

Simulation and test of heat dissipation for the Stewart platform of Chinese SONG telescope, Zhongyu Yue, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9147-176]

HONIR: an optical and near-infrared simultaneous imager, spectrograph, and polarimeter for the 1.5-m Kanata telescope, Hiroshi Akitaya, Yuki Moritani, Takahiro Ui, Takeshi Urano, Yuma Ohashi, Koji S. Kawabata, Hiroshima Univ. (Japan); Asami Nakashima, Nagoya City Science Museum (Japan); Mahito Sasada, Kyoto Univ. (Japan); Kiyoshi Sakimoto, Tatsuya Harao, Hiroshima Univ. (Japan); Hisashi Miyamoto, Molex Japan Co., Ltd. (Japan); Rieko Matsui, Ryosuke Itoh, Katsutoshi Takaki, Issei Ueno, Takashi Ohsugi, Hiroshima Univ. (Japan); Hidehiko Nakaya, Takuya Yamashita, National Astronomical Observatory of Japan (Japan); Michitoshi Yoshida, Hiroshima Univ. (Japan) . . . . . [9147-177]

The HII regions of barred spiral galaxies with SpIOMM, Ismaël Moumen, Carmelle Robert, Univ. Laval (Canada); Daniel Devost, Canada-France-Hawaii Telescope (USA); Laurent Drissen, Univ. Laval (Canada) . . . . . [9147-178]

PAUCam readout electronics validation, Jorge Jiménez Rojas, José María Illa, Institut de Física d'Altes Energies (Spain); Ricard Casas, ICE - Institut de Ciències de l'Espai (Spain); Juan de Vicente, Javier Castilla, Ctr. de Investigaciones Energéticas, Medioambientales y Tecnológicas (Spain). . . . . [9147-179]

A flux calibration device for the SNfactory Integral Field Spectrograph (SNIFS), Simona Lombardo, Marek Kowalski, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Klaus Reif, Argelander-Institut für Astronomie (Germany); Akos Hoffmann, Daniel Kuesters, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany) . . . . . [9147-180]

Boresight calibration of FIFI-LS: in theory, in the lab and on the sky, Sebastian Colditz, Simon Beckmann, Aaron Bryant, Christian Fischer, Fabio Fumi, Deutsches SOFIA Institut (Germany); Norbert Geis, Max-Planck-Institut für extraterrestrische Physik (Germany); Rainer Hönle, Deutsches SOFIA Institut (Germany); Randolf Klein, SOFIA / USRA (USA); Alfred Krabbe, Deutsches SOFIA Institut (Germany); Leslie W. Looney, Univ. of Illinois at Urbana-Champaign (USA); Albrecht Poglitsch, Walfried Raab, Max-Planck-Institut für extraterrestrische Physik (Germany); Felix Rebell, Deutsches SOFIA Institut (Germany); Maureen L. Savage, SOFIA / USRA (USA) . . . . . [9147-181]

SPHERE/IRDIS: final performance assessment of the dual-band imaging and long slit spectroscopy modes, Arthur Vigan, Lab. d'Astrophysique de Marseille (France); Maud P. Langlois, Ctr. de Recherche Astronomique de Lyon (France) and Observatoire de Lyon (France); Kjetil Dohlen, Claire Moutou, Anne Costille, Cécile Gry, Fabrice Madec, David Le Mignant, Lab. d'Astrophysique de Marseille (France); Jean-François Sauvage, ONERA (France); Alice Zurlo, Lab. d'Astrophysique de Marseille (France) . . . . . [9147-182]

Characterization of the atmospheric dispersion corrector of the Gemini planet imager, Pascale Hibon, Gemini Observatory (Chile); Sandrine J. Thomas, NASA Ames Research Ctr. (USA); Jennifer S. Dunn, Jenny Atwood, Leslie Saddlemyer, NRC - Herzburg Institute of Astrophysics (Canada); Naru Sadakuni, Gemini Observatory (Chile) . . . . . [9147-183]

Measuring the variations in the line spread function (spectral PSF) of KMOS at the ESO-VLT, Niranjan A. Thatte, Ryan Houghton, Ian J. Lewis, Univ. of Oxford (United Kingdom); Ray M. Sharples, Durham Univ. (United Kingdom); Nicholas Scott, Swinburne Univ. of Technology (Australia) . . . . . [9147-184]

Vibration specifications for VLT instruments, Gerd H. Jakob, Jean-Louis Lizon, European Southern Observatory (Germany) . . . . . [9147-185]

ARDOLORES: an Arduino based motors control system for DOLORES, Manuel D. Gonzalez, Hector Perez Ventura, José San Juan Gómez, Luca Di Fabrizio, Telescopio Nazionale Galileo (Spain) . . . . . [9147-186]

Design and integration of a mechanism for focusing and alignment of the echelle spectrograph for the telescope of 2.1 meters of the National Astronomic Observatory, Alejandro D. Simón Farah, Horacio Gutiérrez, Univ. Nacional Autónoma de México (Mexico). . . . . [9147-188]

Gemini planet imager observational calibrations IX: least square inversion flux extraction, Zachary H. Draper, Univ. of Victoria (Canada); Christian Marois, NRC - Herzberg Institute of Astrophysics (Canada); Schuyler G. Wolff, Johns Hopkins Univ. (USA); Marshall D. Perrin, Space Telescope Science Institute (USA); Patrick J. Ingraham, Univ. de Montréal (Canada); Jean-Baptiste Ruffio, SETI Institute (USA) . . . . . [9147-189]

Gemini planet imager one button approach, Jennifer S. Dunn, Daniel A. Kerley, Malcolm Smith, Robert Wooff, Leslie Saddlemyer, NRC - Herzberg Institute of Astrophysics (Canada); Bruce A. Macintosh, Ctr. for Adaptive Optics (USA); Dmitry Savransky, Cornell Univ. (USA); David W. Palmer, Lawrence Livermore National Lab. (USA); Jason L. Weiss, Univ. of California, Los Angeles (USA); Carlos Quiroz, Gemini Observatory (Chile); Stephen J. Goodsell, Univ. of Oxford (United Kingdom) . . . . . [9147-190]

A standard format for efficient interchange of high-contrast imaging science products, Élodie Choquet, Space Telescope Science Institute (USA); Arthur Vigan, Lab. d'Astrophysique de Marseille (France); Rémi Soummer, Space Telescope Science Institute (USA); Gaël Chauvin, Institut de Planétologie et d'Astrophysique de Grenoble (France); Laurent A. Pueyo, Marshall D. Perrin, Dean C. Hines, Space Telescope Science Institute (USA) . . . . . [9147-191]

Environmental control system for habitable-zone planet finder (HPF), Frederick R. Hearty, The Pennsylvania State Univ. (USA); Matt J. Nelson, Univ. of Virginia (USA); Suvrath Mahadevan, Lawrence W. Ramsey, The Pennsylvania State Univ. (USA); Adam M. Burton, Sara D. Bruhns, Univ. of Virginia (USA); Eric I. Levi, Chad F. Bender, Samuel Halverson, Ryan C. Terrien, The Pennsylvania State Univ. (USA); Paul Robertson, Univ. of Pennsylvania (USA); Arpita Roy, The Pennsylvania State Univ. (USA); Basil Blank, Ken Blanchard, PulseRay (USA) . . . . . [9147-192]

Concept study for DREAMS: a dedicated robotic Earths-finding single-mode spectrograph, Julien F. P. Spronck, Leiden Univ. (Netherlands). . . . . [9147-193]

Characterizing U-Ne and Th-Ne hollow cathode lamps at optical and near-IR wavelengths, Luis F. Sarmiento, Ansgar Reiners, Georg-August-Univ. Göttingen (Germany) . . . . . [9147-194]

Gemini planet imager observational calibrations VIII: characterization and role of satellite spots, Jason J. Wang, Univ. of California, Berkeley (USA); Patrick J. Ingraham, Univ. de Montréal (Canada); James R. Graham, Univ. of California, Berkeley (USA); Dmitry Savransky, Cornell Univ. (USA); Anand Sivaramakrishnan, Marshall D. Perrin, Space Telescope Science Institute (USA); Sandrine J. Thomas, NASA Ames Research Ctr. (USA); Naru Sadakuni, Univ. of California, Santa Cruz (USA); Laurent A. Pueyo, Space Telescope Science Institute (USA); Alexandra Z. Greenbaum, Johns Hopkins Univ. (USA); Christian Marois, NRC - Herzberg Institute of Astrophysics (Canada); Ben R. Oppenheimer, American Museum of Natural History (USA); Paul R. Kalas, Univ. of California, Berkeley (USA) . . . . . [9147-195]

MASCARA: opto-mechanical design and integration, Julien F. P. Spronck, Anna-Léa Lesage, Remko Stuik, Leiden Univ. (Netherlands); Felix Bettonvil, Leiden Univ. (Netherlands) and NOVA Optical Infrared Instrumentation Group (Netherlands); Ignas A. G. Snellen, Leiden Univ. (Netherlands) . . . . . [9147-196]

Study on a multi-delay spectral interferometry for stellar radial velocity measurement, Kai Zhang, Haijiao Jiang, Jin Tang, Hangxin Ji, Nanjing Institute of Astronomical Optics & Technology (China); Liang Wang, National Astronomical Observatories (China); Yongtian Zhu, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9147-197]

Test of multi-exoplanet search spectral interferometer, Kai Zhang, Nanjing Institute of Astronomical Optics & Technology (China); Liang Wang, National Astronomical Observatories (China); Haijiao Jiang, Yonghui Hou, Zhen Tang, Jin Tang, Hangxin Ji, Songxin Dai, Mingda Jiang, Lei Wang, Zhongwen Hu, Yongtian Zhu, Nanjing Institute of Astronomical Optics & Technology (China) . . . . [9147-198]

Noise reduction in CCDs below the 1/f limit, Gustavo I. Cancelo, Fermi National Accelerator Lab. (USA) . . . . . [9147-200]

Diffraction-limited lucky imaging with a 12" commercial telescope, Brian J. Baptista, Oak Ridge Institute for Science & Education (USA). . . . . [9147-201]

Archon: A modern controller for high performance astronomical CCDs, Gregory R. Bredthauer, Semiconductor Technology Associates Inc. (USA) . . . . . [9147-202]

Near field modal noise reduction using annealed optical fiber, Steven N. Osterman, Johns Hopkins Univ. (USA); Gabriel G. Ycas, National Institute of Standards and Technology (USA); Chelsea Donaldson, Southwest Research Institute (USA); Scott A. Diddams, National Institute of Standards and Technology (USA); Suvrath Mahadevan, Lawrence W. Ramsey, The Pennsylvania State Univ. (USA) . . . . . [9147-203]

Current instrument package for the 1.6-m New Solar telescope in Big Bear, John R. Varsik, Claude Plymate, Philip R. Goode, Alexander G. Kosovichev, Wenda Cao, Roy Coulter, Kwangsu Ahn, Nicolas Gorceix, Sergiy Shumko, Big Bear Solar Observatory (USA). . . . . [9147-204]

On-sky tests of sky-subtraction methods for fiber integrated field unit, Myriam Rodrigues, Observatoire de Paris à Meudon (France) and European Southern Observatory (Germany); Mathieu Puech, Hector Flores, François Hammer, Yanbin Yang, Observatoire de Paris à Meudon (France) . . . . . [9147-205]

DigiCam: fully digital compact camera for SST-1M telescope, Pawel J. Rajda, AGH Univ. of Science and Technology (Poland); Krzysztof Zietara, Adam Marszalek, Jagiellonian Univ. in Krakow (Poland); Jerzy Kasperek, Marcin Rupiński, AGH Univ. of Science and Technology (Poland). . . . . [9147-206]

Wavelength calibration from 1-5µm for the CRIRES+ high-resolution spectrograph at the VLT, Ulf Seemann, Guillem Anglada-Escude, Ansgar Reiners, Georg-August-Univ. Göttingen (Germany); Dietrich Baade, Paul Bristow, Reinhold J. Dorn, European Southern Observatory (Germany); Roman Follert, Thüringer Landessternwarte Tautenburg (Germany); Jason Grunhut, European Southern Observatory (Germany); Artie P. Hatzes, Thüringer Landessternwarte Tautenburg (Germany); Ulrike Heiter, Uppsala Univ. (Sweden); Derek J. Ives, Yves Jung, Hans-Ulrich Käufl, Florian Kerber, Barbara Klein, Jean-Louis Lizon, European Southern Observatory (Germany); Matthew Lockhart, Uppsala Univ. (Sweden); Tom Löwinger, Thüringer Landessternwarte Tautenburg (Germany); Thomas Marquart, Uppsala Univ. (Sweden); Ernesto Oliva, INAF - Osservatorio Astrofisico di Arcetri (Italy); Jérome Paufique, European Southern Observatory (Germany); Nikolai A. Piskunov, Uppsala Univ. (Sweden); Eszter Pozna, European Southern Observatory (Germany); Eric Stempels, Uppsala Univ. (Sweden) . . . . . [9147-208]

Characterization of new components for a miniaturized heterodyne infrared spectrometer, Pia Krause, Guido Sonnabend, Lucas Labadie, Manuela Sornig, Univ. zu Köln (Germany); Robert R. Thomson, Alexander Arriola Martiarena, Heriot-Watt Univ. (United Kingdom); Arian Rodenas, Univ. Rovira i Virgili (Spain)[9147-209]

Muse instrument performance through time from design to the sky, Patrick Caillier, Observatoire de Lyon (France) . . . . . [9147-224]

MUSE integration, alignment, and tests: description and lessons learnt, Alban Remillieux, Univ. de Lyon (France) and Observatoire de Lyon (France) and Institut de Recherche en Astrophysique et Planétologie (France); Louisa Adjali, Ctr. de Recherche Astronomique de Lyon (France); Heiko Anwand, Univ. Göttingen (Germany); Roland M. Bacon, Didier Boudon, Patrick Caillier, Lionel Capoani, Eric Daguisé, Ctr. de Recherche Astronomique de Lyon (France); Michel Dupieux, Institut de Recherche en Astrophysique et Planétologie (France); Mylène François, Ghaouti Hansali, Ctr. de Recherche Astronomique de Lyon (France); Thomas Hahn, Leibniz-Institut für Astrophysik Potsdam (Germany); Aurélien Jarno, Ctr. de Recherche Astronomique de Lyon (France); Andreas Kelz, Leibniz-Institut für Astrophysik Potsdam (Germany); Christof Köhler, Georg-August-Univ. Göttingen (Germany); Johan Kosmalski, Florence Laurent, Ctr. de Recherche Astronomique de Lyon (France); Marie Le Floch, Univ. Paul Sabatier (France); Jean-Louis Lizon, European Southern Observatory (Germany); Magali Loupias, Ctr. de Recherche Astronomique de Lyon (France); Antonio Manescau, European Southern Observatory (Germany); Jean-Emmanuel Migniau, Ctr. de Recherche Astronomique de Lyon (France); Harald Nicklas, Georg-August-Univ. Göttingen (Germany); Laurent P. Parès, Univ. Paul Sabatier (France); Arlette Pécontal-Rousset, Laure Piquéras, Ctr. de Recherche Astronomique de Lyon (France); Roland Reiss, European Southern Observatory (Germany); Edgard Renault, Ctr. de Recherche Astronomique de Lyon (France); Gero Rupprecht, European Southern Observatory (Germany); Ole Streicher, Leibniz-Institut für Astrophysik Potsdam (Germany); Joel R. D. Vernet, European Southern Observatory (Germany); Peter Weilbacher, Leibniz-Institut für Astrophysik Potsdam (Germany); Gérard Zins, Institut de Planétologie et d'Astrophysique de Grenoble (France). . . . . [9147-361]

MUSE installation on the VLT, Patrick Caillier, Observatoire de Lyon (France) . . . . . [9147-362]

Spectrophotometric calibration of the Swope and DuPont Telescopes for the Carnegie Supernova Project 2, Jean-Philippe Rheault, Nicholas P. Mondrik, Darren L. DePoy, Jennifer L. Marshall, Nicholas B. Suntzeff, Texas A&M Univ. (USA) . . . . . [9147-370]

CONFERENCE 9147 · LOCATION: ROOM 520C

MONDAY 23 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . MON 8:50 TO 10:00

Session Chair: **Luc Simard,** National Research Council of Canada - Herzberg Institute of Astrophysics (Canada)

08:50: **Welcome**

9:00: **James Webb Space Telescope: the road to first science observations** *(Plenary)*, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) [9143-501]

9:30: **The Square Kilometre Array: a physics machine for the 21st Century** *(Plenary)*, Philip Diamond, SKA Organisation (United Kingdom) . . [9143-502]

Coffee Break . . . . . Mon 10:00 to 10:30

SESSION 3

LOCATION: ROOM 520C . . . . . MON 10:30 TO 12:10

High Multiplex and Survey Instruments I

Session Chair: **Stephen S. Eikenberry,** Univ. of Florida (USA)

10:30: **The Keck cosmic web imager: status of a new integral field spectrograph for the W. M. Keck Observatory**, Patrick Morrissey, California Institute of Technology (USA) . . . . . [9147-19]

10:50: **WEAVE: the next generation fibre spectroscopy facility for the William Herschel telescope: project overview and update on the final design stage**, Gavin B. Dalton, Rutherford Appleton Lab. (United Kingdom) and Univ. of Oxford (United Kingdom); Scott C. Trager, Univ. of Groningen (Netherlands); Don Carlos Abrams, Isaac Newton Group of Telescopes (Spain); Piercarlo Bonifacio, Observatoire de Paris à Meudon (France); Jose Alfonso López Aguerri, Instituto de Astrofísica de Canarias (Spain); Kevin F. Middleton, Rutherford Appleton Lab. (United Kingdom); Chris R. Benn, Isaac Newton Group of Telescopes (Spain); Kevin M. Dee, Science and Technology Facilities Council (United Kingdom); Frédéric N. Sayède, Observatoire de Paris à Meudon (France); Ian J. Lewis, Univ. of Oxford (United Kingdom); Johan H. Pragt, ASTRON (Netherlands); Sergio Pico, Isaac Newton Group of Telescopes (Spain); Nicholas A. Walton, Univ. of Cambridge (United Kingdom); Jürg Rey, Instituto de Astrofísica de Canarias (Spain) and Isaac Newton Group of Telescopes (Spain); Carlos Allende Prieto, Instituto de Astrofísica de Canarias (Spain); Emilie Lhomé, Isaac Newton Group of Telescopes (Spain); Tibor Agócs, ASTRON (Netherlands); José Peñate Castro, Instituto de Astrofísica de Canarias (Spain); David L. Terrett, Rutherford Appleton Lab. (United Kingdom); Matthew Brock, James Gilbert, Univ. of Oxford (United Kingdom); Andrew W. Ridings, Isaac Newton Group of Telescopes (Spain); Isabelle Guinouard, Observatoire de Paris à Meudon (France); Mark A. W. Verheijen, Univ. of Groningen (Netherlands); Ian A. Tosh, Kevin Rogers, Rutherford Appleton Lab. (United Kingdom); Iain A. Steele, Liverpool John Moores Univ. (United Kingdom); Remko Stuik, Neils Tromp, ASTRON (Netherlands); Attila Jaskó, MTA Research Ctr. for Astronomy and Earth Sciences (Hungary); Jan Kragt, ASTRON (Netherlands); Christopher J. Mottram, Stuart D. Bates, Liverpool John Moores Univ. (United Kingdom); Francis James H. Gribbin, Isaac Newton Group of Telescopes (Spain); Luis Fernando Rodríguez-Ramos, Jose M. Delgado Hernandez, Instituto de Astrofísica de Canarias (Spain); Ian Skillen, Diego Cano Infantes, Isaac Newton Group of Telescopes (Spain); Michael J. Irwin, James R. Lewis, Eduardo Gonzalez-Solares, Univ. of Cambridge (United Kingdom); Neil O'Mahony, Carlos Martin, Isaac Newton Group of Telescopes (Spain) . . . . . [9147-20]

11:10: **4MOST: 4-metre multi-object spectroscopic telescope**, Roelof S. de Jong, Samuel C. Barden, Olga Bellido Tirado, Cristina Chiappini, Éric Depagne, Roger Haynes, Diana Johl, Olivier Schnurr, Axel D. Schwope, C. Jakob Walcher, Svend-Marian Bauer, Frank Dionies, Dionne M. Haynes, Andreas Kelz, Francisco S. Kitaura, Georg Lamer, Ivan Minchev, Volker Müller, Sebastián E. Nuza, Leibniz-Institut für Astrophysik Potsdam (Germany); Tilmann Piffl, Leibniz-Institut für Astrophysik Potsdam (Germany) and Univ. of Oxford (United Kingdom); Emil Popow, Allar Saviauk, Matthias Steinmetz, Uğur Ural, Roland Winkler, Lutz Wisotzki, Leibniz-Institut für Astrophysik Potsdam (Germany); Wolfgang R. Ansorge, RAMS-CON Management Consultants (Germany); Gabriella Frost, James Gilbert, Andrew I. Sheinis, Will Saunders, Australian Astronomical Observatory (Australia); Eduardo Gonzalez-Solares, Michael J. Irwin, Robert C. Kennicutt Jr., David M. P. King, Richard G. McMahon, Sergey Koposov, Ian R. Parry, Xiaowei Sun, Nicholas A. Walton, Univ. of Cambridge (United Kingdom); Gert Finger, Olaf Iwert, Mirko Krumpe, Jean-Louis Lizon, European Southern Observatory (Germany); Piercarlo Bonifacio, Observatoire de Paris à Meudon (France) and Univ. Paris 7-Denis Diderot (France); Mathieu Cohen, Observatoire de Paris à Meudon (France) and Univ. Paris 7- Denis Diderot (France); Patrick François, Pascal Jagourel, Shan B. Mignot, Observatoire de Paris à Meudon (France) and Univ. Paris 7-Denis Diderot (France); Paola Sartoretti, Observatoire de Paris à Meudon (France) and Univ. Paris 7- Denis Diderot (France); Ralf Bender, Frank U. Grupp, Hans-Joachim Hess, Florian Lang-Bardl, Bernard Muschielok, Univ.-Sternwarte München (Germany); Hans Böhringer, Thomas Boller, Angela Bongiorno, Marcella Brusa, Tom Dwelly, Andrea Merloni, Kirpal Nandra, Max-Planck-Institut für extraterrestrische Physik (Germany); Wilfried Boland, Leiden Observatory (Netherlands); Johan H. Pragt, ASTRON (Netherlands); Ramón Navarro, NOVA Optical Infrared Instrumentation Group (Netherlands); Gerrit Gerlofsma, Ronald Roelfsema, ASTRON (Netherlands); Gavin B. Dalton, Kevin F. Middleton, Ian A. Tosh, Rutherford Appleton Lab. (United Kingdom); Corrado Boeche, Elisabetta Caffau, Norbert Christlieb, Eva K. Grebel, Andreas Koch, Hans-G. Ludwig, Andreas Quirrenbach, Walter Seifert, Guido Thimm, Zentrum für Astronomie der Univ. Heidelberg (Germany); Amina Helmi, Scott C. Trager, Kapteyn Astronomical Institute (Netherlands); Sofia Feltzing, Lund Univ. (Sweden); Andreas Korn, Uppsala Univ. (Sweden) . . . . . [9147-21]

11:30: **MOONS: an optical and near-IR multi-object spectrograph for the Very Large telescope**, Michele Cirasuolo, UK Astronomy Technology Ctr. (United Kingdom); Jose M. Afonso, Univ. de Lisboa (Portugal); Marcella Carollo, ETH Zürich (Switzerland); Hector Flores, Observatoire de Paris à Meudon (France); Ernesto Oliva, INAF - Osservatorio Astrofisico di Arcetri (Italy); Ralf Bender, Univ.-Sternwarte München (Germany); Lex Kaper, NOVA Optical Infrared Instrumentation Group (Netherlands); Christopher J. Evans, UK Astronomy Technology Ctr. (United Kingdom); Roberto Maiolino, Univ. of Cambridge (United Kingdom); Hermine Schnetler, David W. Lunney, UK Astronomy Technology Ctr. (United Kingdom); Hans-Joachim Hess, Univ.-Sternwarte München (Germany); Alexandre Cabral Pereira, Univ. de Lisboa (Portugal); David C. Atkinson, Steven M. Beard, UK Astronomy Technology Ctr. (United Kingdom); Bianca Garilli, INAF - IASF Milano (Italy); Fernando Pedichini, INAF - Osservatorio Astronomico di Roma (Italy); Gert Finger, European Southern Observatory (Germany); Isabelle Guinouard, Frédéric Royer, Jean-Philippe Amans, Observatoire de Paris à Meudon (France); Johan H. Pragt, NOVA Optical Infrared Instrumentation Group (Netherlands); David Lee, UK Astronomy Technology Ctr. (United Kingdom); Leonardo Vanzi, Pontificia Univ. Católica de Chile (Chile); Martin Fisher, Univ. of Cambridge (United Kingdom); Mauro Centrone, INAF - Osservatorio Astronomico di Roma (Italy); Michael Wegner, Univ.-Sternwarte München (Germany); Miguel Torres, Pontificia Univ. Católica de Chile (Chile); David F. Buscher, Univ. of Cambridge (United Kingdom); David M. Montgomery, UK Astronomy Technology Ctr. (United Kingdom); Myriam Rodrigues, European Southern Observatory (Germany); Naidu Bezawada, Gillian S. Wright, Philip Rees II, Ramón Navarro, UK Astronomy Technology Ctr. (United Kingdom); Remko Stuik, NOVA Optical Infrared Instrumentation Group (Netherlands); Stephen Todd, William D. Taylor, UK Astronomy Technology Ctr. (United Kingdom)[9147-22]

11:50: **MEGARA: a new generation optical spectrograph for GTC**, Armando Gil de Paz, Jesús Gallego, Univ. Complutense de Madrid (Spain); Esperanza Carrasco, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Jorge Iglesias-Páramo, Instituto de Astrofísica de Andalucía (Spain); Francisco Manuel Sánchez Moreno, Univ. Politécnica de Madrid (Spain); José M. Vílchez, Instituto de Astrofísica de Andalucía (Spain); María Luisa García-Vargas, FRACTAL S.L.N.E (Spain) . . . . . [9147-23]

Lunch Break . . . . . Mon 12:10 to 13:20

SESSION 4

LOCATION: ROOM 520C . . . . . MON 13:20 TO 17:10

High Multiplex and Survey Instruments II

Session Chair: **Ian S. McLean,** Univ. of California, Los Angeles (USA)

13:20: **The WIYN one degree imager 2014: performance of the partially populated focal plane and Instrument upgrade path**, Daniel R. Harbeck, WIYN Observatory (USA); Todd Boroson, Las Cumbres Observatory Global Telescope Network (USA) and National Optical Astronomy Observatory (USA); Jayadev K. Rajagopal, National Optical Astronomy Observatory (USA); Andrey Yeatts, WIYN Observatory (USA); Charles Corson, National Optical Astronomy Observatory (USA); Wilson M. Liu, WIYN Observatory (USA); Ian P. Dell'Antonio, Brown Univ. (USA); Ralf Kotulla, Univ. of Wisconsin-Milwaukee (USA); Michael P. Lesser, David B. Ouellette, The Univ. of Arizona Imaging Technology Lab. (USA) . . . . . [9147-24]

13:40: **VIRUS: production and deployment of a massively replicated fiber integral field spectrograph for the upgraded Hobby-Eberly telescope**, Gary J. Hill, Sarah E. Tuttle, Niv Drory, Hanshin Lee, Brian L. Vattiat, The Univ. of Texas at Austin (USA); Darren L. DePoy, Jennifer L. Marshall, Texas A&M Univ. (USA); Andreas Kelz, Dionne M. Haynes, Leibniz-Institut für Astrophysik Potsdam (Germany); Maximilian H. Fabricius, Max-Planck-Institut für extraterrestrische Physik (Germany); Karl Gebhardt, The Univ. of Texas at Austin (USA); Richard D. Allen, Texas A&M Univ. (USA); Guillermo Blanc, Carnegie Observatories (USA); Taylor S. Chonis, The Univ. of Texas at Austin (USA); Mark E. Cornell, MIT Lincoln Lab. (USA); Gavin B. Dalton, Univ. of Oxford (United Kingdom); John M. Good, Phillip J. MacQueen, The Univ. of Texas at Austin (USA); Jeremy D. Murphy, Princeton Univ. (USA); Travis Prochaska, Texas A&M Univ. (USA); Thomas Jahn, Leibniz-Institut für Astrophysik Potsdam (Germany); Hermanus Kriel, Martin Landriau, The Univ. of Texas at Austin (USA); Harald Nicklas, Georg-August-Univ. Göttingen (Germany); Jason Ramsey, The Univ. of Texas at Austin (USA); Martin M. Roth, Leibniz-Institut für Astrophysik Potsdam (Germany); Richard Savage, The Univ. of Texas at Austin (USA); Jan M. Snigula, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9147-25]

14:00: **The construction, alignment, and installation of the VIRUS spectrograph**, Sarah E. Tuttle, Gary J. Hill, Hanshin Lee, Brian L. Vattiat, Eva Noyola, Niv Drory, The Univ. of Texas at Austin (USA); Mark E. Cornell, MIT Lincoln Lab. (USA); Trent Peterson, Taylor S. Chonis, The Univ. of Texas at Austin (USA); Richard D. Allen, Texas A&M Univ. (USA); Gavin B. Dalton, Univ. of Oxford (United Kingdom); Darren L. DePoy, Texas A&M Univ. (USA); Robert D. Edmonston, The Univ. of Texas at Austin (USA); Maximillian H. Fabricius, Max-Planck-Institut für extraterrestrische Physik (Germany); Andreas Kelz, Dionne M. Haynes, Leibniz-Institut für Astrophysik Potsdam (Germany); Martin Landriau, The Univ. of Texas at Austin (USA); Michael P. Lesser, The Univ. of Arizona (USA); Robert W. Leach, Astronomical Research Cameras, Inc. (USA); Jennifer L. Marshall, Texas A&M Univ. (USA); Jeremy D. Murphy, Princeton Univ. (USA); David Perry, The Univ. of Texas at Austin (USA); Travis Prochaska, Texas A&M Univ. (USA); Jason Ramsey, Richard Savage, The Univ. of Texas at Austin (USA) . . . . . [9147-26]

14:20: **Overview of the dark energy spectroscopic instrument**, Brenna L. Flaugher, Fermi National Accelerator Lab. (USA) . . . . . [9147-27]

14:40: **Progresses on Prime focus spectrograph: optical/near-infrared multi-fiber spectrograph at Subaru telescope**, Hajime Sugai, Naoyuki Tamura, Hiroshi Karoji, Atsushi Shimono, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Naruhisa Takato, Subaru Telescope, National Astronomical Observatory of Japan (USA); Masahiko Kimura, Youichi Ohyama, Institute of Astronomy and Astrophysics (Taiwan); Akitoshi Ueda, National Astronomical Observatory of Japan (Japan); Hrand Aghazarian, Jet Propulsion Lab. (USA); Márcio Vital de Arruda, Lab. Nacional de Astrofísica (Brazil); Robert H. Barkhouser, Charles L. Bennett, Johns Hopkins Univ. (USA); Steve Bickerton, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Alexandre Bozier, Lab. d'Astrophysique de Marseille (France); David F. Braun, Jet Propulsion Lab. (USA); Khanh Bui, California Institute of Technology (USA); Christopher M. Capocasale, Jet Propulsion Lab. (USA); Michael A. Carr, Princeton Univ. (USA); Bruno Castilho, Lab. Nacional de Astrofísica (Brazil); Yin-Chang Chang, Hsin-Yo Chen, Chueh-Yi Chou, Institute of Astronomy and Astrophysics (Taiwan); Olivia R. Dawson, Jet Propulsion Lab. (USA); Richard G. Dekany, California Institute of Technology (USA); Eric M. Ek, Jet Propulsion Lab. (USA); Richard S. Ellis, California Institute of Technology (USA); Robin J. English, Jet Propulsion Lab. (USA); Didier Ferrand, Lab. d'Astrophysique de Marseille (France); Décio Ferreira, Lab. Nacional de Astrofísica (Brazil); Charles D. Fisher, Jet Propulsion Lab. (USA); Mirek Golebiowski, Johns Hopkins Univ. (USA); James E. Gunn, Princeton Univ. (USA); Murdock Hart, Timothy M. Heckman, Johns Hopkins Univ. (USA); Paul T. P. Ho, Institute of Astronomy and Astrophysics (Taiwan); Stephen C. Hope, Johns Hopkins Univ. (USA); Larry E. Hovland, Jet Propulsion Lab. (USA); Shu-Fu Hsu, Yen-Sang Hu, Pin-Jie Huang, Institute of Astronomy and Astrophysics (Taiwan); Marc Jaquet, Lab. d'Astrophysique de Marseille (France); Jennifer Karr, Institute of Astronomy and Astrophysics (Taiwan); Jason G. Kempenaar, Matthew E. King, Jet Propulsion Lab. (USA); Olivier C. Le Fèvre, David Le Mignant, Lab. d'Astrophysique de Marseille (France); Hung-Hsu Ling, Institute of Astronomy and Astrophysics (Taiwan); Craig Loomis, Robert H. Lupton, Princeton Univ. (USA); Fabrice Madec, Lab. d'Astrophysique de Marseille (France); Peter H. Mao, California Institute of Technology (USA); Lucas S. Marrara, Lab. Nacional de Astrofísica (Brazil); Chaz Morantz, Jet Propulsion Lab. (USA); Hitoshi Murayama, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Antonio C. de Oliveira, Lab. Nacional de Astrofísica (Brazil); Claudia L. M. de Oliveira, Univ. de São Paulo (Brazil); Ligia S. de Oliveira, Lab. Nacional de Astrofísica (Brazil); Joseph D. Orndorff, Johns Hopkins Univ. (USA); Rodrigo M. P. de Paiva Vilaça, Lab. Nacional de Astrofísica (Brazil); Eamon J. Partos, Jet Propulsion Lab. (USA); Sandrine Pascal, Thomas Pegot-Ogier, Lab. d'Astrophysique de Marseille (France); Daniel J. Reiley, Reed L. Riddle, California Institute of Technology (USA); Leandro H. Santos, Jesulino B. dos Santos, Lab. Nacional de Astrofísica (Brazil); Mark A. Schwochert, Michael D. Seiffert, Jet Propulsion Lab. (USA); Stephen A. Smee, Johns Hopkins Univ. (USA); Roger M. Smith, California Institute of Technology (USA); Ronald E. Steinkraus, Jet Propulsion Lab. (USA); Laerte Sodré Jr., Univ. de São Paulo (Brazil); David N. Spergel, Princeton Univ. (USA); Christian Surace, Laurence Tresse, Clément Vidal, Sébastien Vives, Lab. d'Astrophysique de Marseille (France); Shiang-Yu Wang, Chih-Yi Wen, Institute of Astronomy and Astrophysics (Taiwan); Amy C. Wu, Jet Propulsion Lab. (USA); Chi-Hung Yan, Institute of Astronomy and Astrophysics (Taiwan) . . . . . [9147-28]

Coffee Break . . . . . Mon 15:00 to 15:30

15:30: **Results of the verification of the NIR MOS EMIR**, Francisco Garzón López, Instituto de Astrofísica de Canarias (Spain) and EMIR Team (Spain)[9147-29]

15:50: **DOTIFS: a new multi-IFU optical spectrograph for the 3.6-m Devasthal optical telescope**, Haeun Chung, Seoul National Univ. (Korea, Republic of) and Korea Institute for Advanced Study (Korea, Republic of); Anamparambu N. Ramaprakash, Inter-Univ. Ctr. for Astronomy and Astrophysics (India); Amitesh Omar, Aryabhatta Research Institute of Observational Sciences (India); Swara Ravindranath, Sabyasachi Chattopadhyay, Chaitanya V. Rajarshi, Pravin Khodade, Inter-Univ. Ctr. for Astronomy and Astrophysics (India) . . . . . [9147-270]

16:10: **Performance of the K-band multi-object spectrograph (KMOS) on the ESO VLT**, Ray M. Sharples, Durham Univ. (United Kingdom) . . . . . [9147-31]

16:30: **Demonstration of high-performance cryogenic probe arms for deployable IFUs**, Stephen S. Eikenberry, Charles H. Murphey, Scott A. Mullin, John G. Bennett, Steven N. Raines, Kendall Ackley, Richard D. Stelter, Alan Garner, Univ. of Florida (USA); Josep Sabater, Univ. de Barcelona (Spain); Sophia A. Eikenberry, Eastside High School (USA); Brian Chinn, Hipatia V. Donoso, Claudia S. Vega, Univ. of Florida (USA); José María Gómez, Jordi Torra, Univ. de Barcelona (Spain); Michael D. Herlevich, Richard Frommeyer, Paola Miller, Univ. of Florida (USA) . . . [9147-32]

16:50: **First light results from the Hermes spectrograph at the AAT**, Andrew I. Sheinis, Australian Astronomical Observatory (Australia); Samuel C. Barden, Leibniz-Institut für Astrophysik Potsdam (Germany); Daniela Carollo, Macquarie Univ. (Australia); Joss Bland-Hawthorn, The Univ. of Sydney (Australia); Jurek Brzeski, Scott Case, Vladimir Churilov, Warrick Couch, Robert Dean, Gayandhi DeSilva, Tony J. Farrell, Kristin Fiegert, Australian Astronomical Observatory (Australia); Kenneth C. Freeman, Research School of Astronomy & Astrophysics (Australia); Gabriella Frost, Luke Gers, Michael Goodwin, Doug Gray, Ron Heald, Jeroen Heijmans, Australian Astronomical Observatory (Australia); Damien J. Jones, Prime Optics (Australia); Urs Klauser, Yuriy Kondrat, Jon S. Lawrence, Steve Lee, Slavko Mali, Sarah Martell, Darren Mathews, Don Mayfield, Stan Miziarski, Rolf Muller, Naveen Pai, Robert Patterson, Ed Penny, Keith Shortridge, Scott Smedley, Greg Smith, Darren Stafford, Nick F. Staszak, Minh V. Vuong, Lewis G. Waller, Australian Astronomical Observatory (Australia); Elizabeth Wylie de Boer, Research School of Astronomy & Astrophysics (Australia); Pascal Xavier, Jessica R. Zheng, Ross Zhelem, Australian Astronomical Observatory (Australia); Daniel F. Zucker, Macquarie Univ. (Australia) . . . . . [9147-33]

LOCATION: ROOM 520C . . . . . 17:10 TO 17:30

POSTER POPS

Poster authors have been contacted and selected to make brief presentations.

POSTER SESSION–MONDAY

LOCATION: ROOM 516 . . . . . MON 17:30 TO 19:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Monday. The interactive poster session with authors in attendance will be Monday evening from 17:30 to 19:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Posters: Survey and High Multiplex Instruments

Fibre system of DESI, Jeremy R. Allington-Smith, Durham Univ. (United Kingdom); Claire L. Poppett, Lawrence Berkeley National Lab. (USA); Graham Murray, Durham Univ. (United Kingdom); Jerry Edelstein, Lawrence Berkeley National Lab. (USA); Colin Dunlop, Durham Univ. (United Kingdom); Robin Lafever, Lawrence Berkeley National Lab. (USA); David Bramall, Durham Univ. (United Kingdom); Robert Besuner, Lawrence Berkeley National Lab. (USA); Gordon Talbot, Durham Univ. (United Kingdom) . . . . . [9147-210]

MEGARA fiber bundles, Ana Perez-Calpena, María Luisa García-Vargas, FRACTAL S.L.N.E (Spain); Xabier Arrillaga, AVS Added Value Solutions (Spain); Armando Gil de Paz, Univ. Complutense de Madrid (Spain); Ernesto Sanchez-Blanco, Ismael Martinez-Delgado, FRACTAL S.L.N.E (Spain); Miguel A. Carrera, AVS Added Value Solutions (Spain); Jesús Gallego, Univ. Complutense de Madrid (Spain); Esperanza Carrasco, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Francisco Manuel Sánchez-Moreno, Univ. Politécnica de Madrid (Spain); Jorge Iglesias-Páramo, Instituto de Astrofísica de Andalucía (Spain) . . . . . [9147-211]

The DESI focal plane system, Joseph H. Silber, Lawrence Berkeley National Lab. (USA) . . . . . [9147-212]

Prime focus instrument of prime focus spectrograph for Subaru telescope, Shiang-Yu Wang, Academia Sinica (Taiwan); David F. Braun, Mark A. Schwochert, Jet Propulsion Lab. (USA); Pin-Jie Huang, Academia Sinica (Taiwan); Masahiko Kimura, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Hsin-Yo Chen, Academia Sinica (Taiwan); Daniel J. Reiley, Peter H. Mao, California Institute of Technology (USA); Charles D. Fisher, Jet Propulsion Lab. (USA); Chih-Yi Wen, Yin-Chang Chang, Chueh-Yi Chou, Yen-Sang Hu, Hung-Hsu Ling, Academia Sinica (Taiwan); Olivia R. Dawson, Eric M. Ek, Jason G. Kempenaar, Jet Propulsion Lab. (USA); Naoyuki Tamura, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Naruhisa Takato, National Astronomical Observatory of Japan (Japan); Youichi Ohyama, Academia Sinica (Taiwan); Hajime Sugai, Atsushi Shimono, Hiroshi Karoji, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Akitoshi Ueda, National Astronomical Observatory of Japan (Japan) . . . . . [9147-213]

CONFERENCE 9147 · LOCATION: ROOM 520C

MEGARA main optics optomechanics, Edgar Castillo-Domínguez, Álvaro Cuellar, Esperanza Carrasco, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Manuel Maldonado-Medina, FRACTAL S.L.N.E (Spain); Daniel Ferrusca Rodriguez, Miguel Velázquez de la Rosa, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Armando Gil de Paz, Jesús Gallego, Univ. Complutense de Madrid (Spain); Francisco Manuel Sánchez-Moreno, Univ. Politécnica de Madrid (Spain); Jorge Iglesias-Páramo, Instituto de Astrofísica de Andalucía (Spain). . . . . [9147-214]

Metrology camera system of prime focus spectrograph for Subaru telescope, Shiang-Yu Wang, Chueh-Yi Chou, Yin-Chang Chang, Pin-Jie Huang, Hsin-Yo Chen, Academia Sinica (Taiwan); Naoyuki Tamura, Kavli Institute for the Physics and Mathematics of the Universe (Japan) and The Univ. of Tokyo (Japan); Naruhisa Takato, Subaru Telescope, National Astronomical Observatory of Japan (Japan); Hung-Hsu Ling, Academia Sinica (Taiwan); James E. Gunn, Princeton Univ. (USA); Jennifer Karr, Chi-Hung Yan, Youichi Ohyama, Academia Sinica (Taiwan); Hiroshi Karoji, Kavli Institute for the Physics and Mathematics of the Universe (Japan) and The Univ. of Tokyo (Japan); Hajime Sugai, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Atsushi Shimono, Kavli Institute for the Physics and Mathematics of the Universe (Japan) and The Univ. of Tokyo (Japan); Akitoshi Ueda, National Astronomical Observatory of Japan (Japan) . . . . . [9147-215]

The 4x1 combiner of ESPRESSO fiber link, José Luis Rasilla, Félix Gracia Temich, Instituto de Astrofísica de Canarias (Spain); Francesco A. Pepe, Observatoire de Genèva (Switzerland); Gerardo Ávila, European Southern Observatory (Germany); Denis Mégevand, Observatoire de Genèva (Switzerland); Rafael Rebolo-López, Instituto de Astrofísica de Canarias (Spain); Filippo Maria M. Zerbi, INAF - Osservatorio Astronomico di Brera (Italy); Alexandre Cabral Pereira, Univ. de Lisboa (Portugal) . . . . . [9147-216]

Multiplexed astronomical images: advantages, method, and prototype instrument, Sagi Ben-Ami, Barak Zackay, Eran O. Ofek, Avishay Gal-Yam, Ilan Sagiv, Adam Rubin, Weizmann Institute of Science (Israel) . . . . . [9147-217]

BOMBOLO: a 3-arms optical imager for SOAR Observatory, Christian Dani Guzman Carmine, Rodolfo Angeloni, Thomas Puzia, Pontificia Univ. Católica de Chile (Chile); Damien J. Jones, Prime Optics (Australia) . . . . . [9147-218]

MMP: multi mini prism device for ESPRESSO APSU, prototyping, and integration, Marco Riva, Stefano dell'Agostino, Manuele Moschetti, Matteo Aliverti, INAF - Osservatorio Astronomico di Brera (Italy); Francesco A. Pepe, Observatoire de Genèva (Switzerland); Stefano Cristiani, INAF - Osservatorio Astronomico di Trieste (Italy); Denis Mégevand, Observatoire de Genèva (Switzerland); Alexandre Cabral Pereira, Univ. de Lisboa (Portugal); Filippo Maria M. Zerbi, Paolo Conconi, INAF - Osservatorio Astronomico di Brera (Italy) . . . . . [9147-219]

Volume phase holographic gratings for the Subaru prime focus spectrograph: performance measurements of the prototype grating set, Robert H. Barkhouser, Johns Hopkins Univ. (USA); James Arns, Kaiser Optical Systems, Inc. (USA); James E. Gunn, Princeton Univ. (USA) . . . . . [9147-220]

Hanle echelle spectrograph: optical fiber calibrations and instrument physical model development for calibrations, Anantha Chanumolu, Indian Institute of Astrophysics (India); Damien J. Jones, Prime Optics (Australia); S. Siram, Sivarani T., Sunetra Giridhar, Indian Institute of Astrophysics (India); Deon S. Grobler, KiwiStar Optics (New Zealand); Anand M. N., Anbhazhagan P., G. C. Anupama, Indian Institute of Astrophysics (India); David M. Cochrane, Peter J. Connor, Graeme Jonas, KiwiStar Optics (New Zealand); P. K. Mahesh, Anand Maitrey, Padmakar S. Parihar, Prabhu T.P., Ravi K., Indian Institute of Astrophysics (India); Tony Reed, Jimmy Romeril, KiwiStar Optics (New Zealand); Amit S. Kumar, Indian Institute of Astrophysics (India) . . . . . [9147-221]

Integration and test activities for the SUMIRE prime focus spectrograph at LAM: first results, Fabrice Madec, Jaquet Marc, Sandrine Pascal, Alexandre Bozier, Sébastien Vives, David Le Mignant, Didier Ferrand, Thomas Pegot-Ogier, Gilles Arthaud, Lab. d'Astrophysique de Marseille (France); Hajime Sugai, Naoyuki Tamura, Kavli Institute for the Physics and Mathematics of the Universe (Japan); James E. Gunn, Princeton Univ. (USA); Stephen A. Smee, Johns Hopkins Univ. (USA); Ligia S. de Oliveira, Lab. Nacional de Astrofísica (Brazil). . . . . [9147-222]

Efficient and affordable catadioptric spectrograph designs for 4MOST and Hector, Will Saunders, Anglo-Australian Observatory (Australia). . . . . [9147-223]

Performance characterization of SITELLE: a wide-field imaging spectrometer for the Canada-France-Hawaii telescope, Frederic J. Grandmont, Julie Mandar, ABB Analytical Measurement (Canada); Laurent Drissen, Univ. Laval (Canada); Marc R. Baril, Canada-France-Hawaii Telescope (USA); Simon Thibault, Univ. Laval (Canada) . . . . . [9147-226]

Current status of the spectrograph system for the SuMIRe/PFS at SUBARU, Sébastien Vives, David Le Mignant, Lab. d'Astrophysique de Marseille (France) and Aix-Marseille Univ. (France); James E. Gunn, Princeton Univ. (USA); Stephen A. Smee, Johns Hopkins Univ. (USA); Ligia S. de Oliveira, Oliveira Instrumentação Óptica Ltda (Brazil); Naoyuki Tamura, Hajime Sugai, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Robert H. Barkhouser, Johns Hopkins Univ. (USA); Alexandre Bozier, Lab. d'Astrophysique de Marseille (France) and Aix-Marseille Univ. (France); Michael A. Carr, Princeton Univ. (USA); Antonio C. de Oliveira, Lab. Nacional de Astrofísica (Brazil); Didier Ferrand, Lab. d'Astrophysique de Marseille (France) and Aix-Marseille Univ. (France); Mirek Golebiowski, Murdock Hart, Stephen C. Hope, Johns Hopkins Univ. (USA); Marc Jaquet, Fabrice Madec, Sandrine Pascal, Lab. d'Astrophysique de Marseille (France) and Aix-Marseille Univ. (France); Thomas Pegot-Ogier, Lab. d'Astrophysique de Marseille (France) and Aix Marseille Univ. (France); Márcio Vital de Arruda, Lab. Nacional de Astrofísica (Brazil) . . . . . [9147-227]

Focal ratio degradation performance of fiber positioning technology used in the dark energy spectroscopic instrument (DESI), Claire L. Poppett, Lawrence Berkeley National Lab. (USA); Jerry Edelstein, Robert Besuner, Univ. of California, Berkeley (USA); Joseph H. Silber, Lawrence Berkeley National Lab. (USA) . . . . . [9147-228]

Virtual MOONS: a focal plane simulator for the MOONS thousand-fiber NIR spectrograph, Gianluca Li Causi, Fernando Pedichini, Fabrizio Vitali, INAF - Osservatorio Astronomico di Roma (Italy); Ernesto Oliva, Debora Ferruzzi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Frédéric Royer, Observatoire de Paris à Meudon (France); Dario Lorenzetti, INAF - Osservatorio Astronomico di Roma (Italy) . . . . . [9147-229]

Design and performance of a F/#-conversion microlens for prime focus spectrograph at Subaru telescope, Naruhisa Takato, Yoko Tanaka, Subaru Telescope, National Astronomical Observatory of Japan (USA); James E. Gunn, Princeton Univ. (USA); Kohichi Waseda, National Astronomical Observatory of Japan (Japan); Hajime Sugai, Naoyuki Tamura, Hiroshi Karoji, Atsushi Shimono, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Masahiko Kimura, Kavli Institute for the Physics and Mathematics of the Universe (Japan) and Institute of Astronomy and Astrophysics (Taiwan); Youichi Ohyama, Institute of Astronomy and Astrophysics (Taiwan); Akitoshi Ueda, National Astronomical Observatory of Japan (Japan) . . . . . [9147-230]

Characterization and performances of ZBLAN fiber for infrared spectrographs, Andrea Tozzi, Ernesto Oliva, Marcella Iuzzolino, INAF - Osservatorio Astrofisico di Arcetri (Italy). . . . . [9147-231]

The hardware control system for WEAVE at the William Herschel telescope, Jose M. Delgado Hernandez, Luis Fernando Rodríguez-Ramos, Instituto de Astrofísica de Canarias (Spain); Diego Cano Infantes, Carlos Martin, Sergio Pico, Kevin M. Dee, Don Carlos Abrams, Isaac Newton Group of Telescopes (Spain); Ian J. Lewis, Univ. of Oxford (United Kingdom); Johan H. Pragt, ASTRON (Netherlands); Gavin B. Dalton, Rutherford Appleton Lab. (United Kingdom); Jose Alfonso López Aguerri, Instituto de Astrofísica de Canarias (Spain); Piercarlo Bonifacio, Observatoire de Paris à Meudon (France); Kevin F. Middleton, Rutherford Appleton Lab. (United Kingdom); Scott C. Trager, Univ. of Groningen (Netherlands)[9147-232]

An innovative fiber scrambler for precise radial velocities at Keck Observatory, Julien F. P. Spronck, Leiden Univ. (Netherlands); Debra A. Fischer, Zachary A. Kaplan, Colby A. Jurgenson, Andrew E. Szymkowiak, Yale Univ. (USA) . [9147-233]

New 4-mm motor characterization for astronomy, Guillermo Gonzalez de-Rivera, Univ. Autónoma de Madrid (Spain); Laurent Jenni, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Nasib Fahim, Univ. Autónoma de Madrid (Spain); Justo Sánchez, Instituto de Astrofísica de Andalucía (Spain); Majid Charif, FAULHABER MINIMOTOR SA (Switzerland); Hannes Bleuler, Mohamed Bouri, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Javier Garrido, Univ. Autónoma de Madrid (Spain); Denis Gillet, Jean-Paul Kneib, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Teresa Latorre, Consejo Superior de Investigaciones Científicas (Spain); Francisco Prada, Univ. Autónoma de Madrid (Spain) and Consejo Superior de Investigaciones Científicas (Spain). . . . [9147-234]

4MOST fibre feed prototyping: preliminary testing and performance, Dionne M. Haynes, Roger Haynes, Roland Winkler, Katjana Ehrlich, Frank Dionies, Svend-Marian Bauer, Allar Saviauk, Éric Depagne, Roelof S. de Jong, Olga Bellido Tirado, Andreas Kelz, Leibniz-Institut für Astrophysik Potsdam (Germany); Will Saunders, Australian Astronomical Observatory (Australia); C. Jakob Walcher, Manfred Woche, Leibniz-Institut für Astrophysik Potsdam (Germany) . . . . . [9147-235]

Scrambling and modal noise mitigation in the habitable zone planet finder fiber feed, Arpita Roy, Samuel Halverson, Suvrath Mahadevan, Lawrence W. Ramsey, The Pennsylvania State Univ. (USA). . . . . [9147-236]

Development of a new readout system for the near-infrared detector of HONIR, Takahiro Ui, Hiroshima Univ. (Japan); Shigeyuki Sako, The Univ. of Tokyo (Japan); Takuya Yamashita, National Astronomical Observatory of Japan (Japan); Hiroshi Akitaya, Hiroshima Univ. (Japan); Hidehiko Nakaya, National Astronomical Observatory of Japan (Japan); Yuki Moritani, Ryosuke Itoh, Katsutoshi Takaki, Takeshi Urano, Issei Ueno, Takashi Ohsugi, Michitoshi Yoshida, Hiroshima Univ. (Japan); Hikaru Nakao, Hokkaido Univ. (Japan); Yasuhito Hashiba, The Univ. of Tokyo (Japan) . . . . . [9147-237]

Okayama Astrophysical Observatory wide field camera, Kenshi Yanagisawa, Yasuhiro Shimizu, Kiichi Okita, Daisuke Kuroda, Hisashi Koyano, Hideyuki Izumiura, National Astronomical Observatory of Japan (Japan); Michitoshi Yoshida, Hiroshima Univ. (Japan); Koji Ohta, Kyoto Univ. (Japan); Nobuyuki Kawai, Tokyo Institute of Technology (Japan); Tomoyasu Yamamuro, Optcraft (Japan) . . . . . [9147-238]

Polarization properties of a birefringent fiber optic image slicer for diffraction-limited dual-beam spectropolarimetry, Thomas A. Schad, Haosheng Lin, Univ. of Hawai'i (USA). . . . . [9147-239]

The S4I prototype: a beam-slicer dedicated to the new generation multichannel subtractive double pass for EST imaging spectropolarimetry, Frédéric N. Sayède, Observatoire de Paris à Meudon (France); Pierre Mein, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Jean-Philippe Amans, Observatoire de Paris à Meudon (France); Daniel Crussaire, Regis Lecocguen, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France) . . . . . [9147-240]

Design and manufacturing challenges of the Keck cosmic web imager, Mateusz Matuszewski, California Institute of Technology (USA) . . . . . [9147-241]

The design of the WEAVE spectrograph, Kevin Rogers, Rutherford Appleton Lab. (United Kingdom); Remko Stuik, Leiden Univ. (Netherlands) and NOVA Optical Infrared Instrumentation Group (Netherlands); Iain A. Steele, Liverpool John Moores Univ. (United Kingdom); Johan H. Pragt, ASTRON (Netherlands); Kevin F. Middleton, Rutherford Appleton Lab. (United Kingdom); Stuart D. Bates, Liverpool John Moores Univ. (United Kingdom); Jan Kragt, Niels Tromp, Dirk Lesman, ASTRON (Netherlands); Emilie Lhomé, Isaac Newton Group of Telescopes (Spain); Gavin B. Dalton, Rutherford Appleton Lab. (United Kingdom) and Univ. of Oxford (United Kingdom); Scott C. Trager, Univ. of Groningen (Netherlands); Ramón Navarro, NOVA Optical Infrared Instrumentation Group (Netherlands); Don Carlos Abrams, Isaac Newton Group of Telescopes (Spain); Ian A. Tosh, Rutherford Appleton Lab. (United Kingdom); Attila Jaskó, MTA Research Ctr. for Astronomy and Earth Sciences (Hungary); Carlos Martin, Neil O'Mahony, Sergio Pico, Diego Cano Infantes, Isaac Newton Group of Telescopes (Spain); Jose M. Delgado Hernandez, Luis Fernando Rodríguez-Ramos, Instituto de Astrofísica de Canarias (Spain) . . . . . [9147-242]

The 4MOST instrument concept overview, Roger Haynes, Roelof S. de Jong, Samuel C. Barden, Olivier Schnurr, Olga Bellido Tirado, Éric Depagne, C. Jakob Walcher, Dionne M. Haynes, Roland Winkler, Svend-Marian Bauer, Allar Saviauk, Frank Dionies, Cristina Chiappini, Axel D. Schwope, Matthias Steinmetz, Leibniz-Institut für Astrophysik Potsdam (Germany); Richard G. McMahon, Univ. of Cambridge (United Kingdom); Sofia Feltzing, Lund Observatory (Sweden); Patrick François, Observatoire de Paris à Meudon (France); Scott C. Trager, Kapteyn Astronomical Institute (Netherlands); Ian R. Parry, Michael J. Irwin, Nicholas A. Walton, David M. P. King, Xiaowei Sun, Eduardo Gonzalez-Solares, Univ. of Cambridge (United Kingdom); Ian A. Tosh, Rutherford Appleton Lab. (United Kingdom); Gavin B. Dalton, Univ. of Oxford (United Kingdom); Kevin F. Middleton, Rutherford Appleton Lab. (United Kingdom); Piercarlo Bonifacio, Pascal Jagourel, Shan B. Mignot, Mathieu Cohen, Jean-Philippe Amans, Frédéric Royer, Paola Sartoretti, Observatoire de Paris à Meudon (France); Johan H. Pragt, Gerrit Gerlofsma, Ronald Roelfsema, Ramón Navarro, ASTRON (Netherlands); Guido Thimm, Walter Seifert, Trifon Trifonov, Zentrum für Astronomie der Univ. Heidelberg (Germany); Wenli Xu, Optical System Engineering (Germany); Florian Lang-Bardl, Bernard Muschielok, Jörg Schlichter, Hans-Joachim Hess, Univ.-Sternwarte München (Germany); Frank U. Grupp, Hans Böhringer, Thomas Boller, Tom Dwelly, Ralf Bender, Max-Planck-Institut für extraterrestrische Physik (Germany); Piero Rosati, Olaf Iwert, Gert Finger, Jean-Louis Lizon, European Southern Observatory (Germany); Will Saunders, Andrew I. Sheinis, Gabriella Frost, Lewis G. Waller, Tony J. Farrell, Australian Astronomical Observatory (Australia) . . . . . [9147-243]

A new smaller and cost-effective fiber positioner robot for large-scale spectroscopic surveys, Francisco Prada, Instituto de Astrofísica de Andalucía (Spain); Xabier Arrillaga, AVS Added Value Solutions (Spain); Santiago Becerril, Instituto de Astrofísica de Andalucía (Spain); Miguel A. Carrera, AVS Added Value Solutions (Spain); Majid Charif, FAULHABER MINIMOTOR SA (Switzerland); Jean-Paul Kneib, Ecole Polytechnique Fédérale de Lausanne (Spain); Claude Lachat, FAULHABER MINIMOTOR SA (Switzerland); Teresa Latorre, Consejo Superior de Investigaciones Científicas (Spain); Justo Sánchez, Instituto de Astrofísica de Andalucía (Spain); Denis Gillet, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Javier Garrido, Univ. Autónoma de Madrid (Spain); Mohamed Bouri, Laleh Makarem, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Guillermo Gonzalez de-Rivera, Univ. Autónoma de Madrid (Spain); Gregoire Bagnoud, FAULHABER MINIMOTOR SA (Switzerland); Nasib Fahim, Univ. Autónoma de Madrid (Spain); Hannes Bleuler, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Jose Luis Castaño, Univ. Autónoma de Madrid (Spain); Laurent Jenni, Ecole Polytechnique Fédérale de Lausanne (Spain); Markus Hug, FAULHABER MINIMOTOR SA (Switzerland). . . . . [9147-244]

Development of a simultaneous two-color near-infrared multi-object spectrograph SWIMS for the TAO 6.5-m telescope, Kentaro Motohara, Masahiro Konishi, Hidenori Takahashi, Ken Tateuchi, Yutaro Kitagawa, Soya Todo, Natsuko M. Kato, Tsutomu Aoki, Kentaro Asano, Mamoru Doi, Takafumi Kamizuka, Kimiaki Kawara, Kotaro Kohno, The Univ. of Tokyo (Japan); Shintaro Koshida, Pontificia Univ. Católica de Chile (Chile); Takeo Minezaki, Takashi Miyata, Tomoki Morokuma, Shigeyuki Sako, Takao Soyano, Yoichi Tamura, Toshihiko Tanabe, Masuo Tanaka, Ken'ichi Tarusawa, Mizuho Uchiyama, Kazushi Okada, Yuzuru Yoshii, The Univ. of Tokyo (Japan) . . . . . [9147-245]

Sky-background variations from NIR narrow-band imaging, Mathieu Puech, Yanbin Yang, Myriam Rodrigues, Karen Disseau, Hector Flores, François Hammer, Observatoire de Paris à Meudon (France). . . . . [9147-246]

Accuracy research for survey telescope fiber position measurement, Zengxiang Zhou, Zhigang Liu, Hongzhuan Hu, Jianping Wang, Chao Zhai, Jiaru Chu, Univ. of Science and Technology of China (China) . . . . . [9147-247]

Development of multi-object spectroscopy unit for simultaneous-color wide-field infrared multi-object spectrograph, Hidenori Takahashi, Kentaro Motohara, Masahiro Konishi, Natsuko M. Kato, Ken Tateuchi, Yutaro Kitagawa, Soya Todo, The Univ. of Tokyo (Japan) . . . . . [9147-248]

The DESI multi-object spectrographs, Jerry Edelstein, Patrick N. Jelinsky, Robert Besuner, Univ. of California, Berkeley (USA); Claire L. Poppett, Joseph H. Silber, Lawrence Berkeley National Lab. (USA); Michael J. Sholl, Univ. of California, Berkeley (USA); Pierre-Henri Carton, Commissariat à l'Énergie Atomique (France) . . . . . [9147-250]

Achieving decameter-class velocity precision with a multi-object spectrograph, John I. Bailey III, Mario Mateo, Univ. of Michigan (USA); Jeffrey D. Crane, Stephen A. Shectman, Ian B. Thompson, Carnegie Observatories (USA) . . . . . [9147-251]

Wide FastCam: a wide field imaging camera for the TCS, Gaizka Murga, IDOM Ingenieria y Consultoria S.A. (Spain); Alejandro Oscoz Abad, Roberto L. López, Instituto de Astrofísica de Canarias (Spain) . . . . . [9147-252]

DESI wide field corrector, Michael J. Sholl, Univ. of California, Berkeley (USA); Ming Liang, National Optical Astronomy Observatory (USA); Peter Doel, David Brooks, Univ. College London (United Kingdom); Gaston Gutierrez, Stephen Kent, Fermi National Accelerator Lab. (USA); Michael Lampton, Space Sciences Lab. (USA) . . . . . [9147-253]

MEGARA cryostat advanced design, Daniel Ferrusca Rodriguez, Edgar Castillo-Domínguez, Miguel Velázquez de la Rosa, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [9147-254]

Performance of the southern African large telescope's high resolution spectrograph (HRS), Lisa A. Crause, South African Astronomical Observatory (South Africa); Ray M. Sharples, David Bramall, Jurgen Schmoll, Paul Clark, Eddy J. Younger, Durham Univ. (United Kingdom); Luke M. G. Tyas, Southern African Large Telescope (South Africa); Sean G. Ryan, Univ. of Hertfordshire (United Kingdom); Janus D. Brink, Ockert J. Strydom, Southern African Large Telescope (South Africa); David A. H. Buckley, South African Astronomical Observatory (South Africa); Martin Wilkinson, Steven M. Crawford, Brent Miszalski, Southern African Large Telescope (South Africa) . . . . . [9147-256]

VIRUS instrument enclosures, Travis Prochaska, Richard D. Allen, Erika Cook, David Baker, Darren L. DePoy, Jennifer L. Marshall, Texas A&M Univ. (USA); Gary J. Hill, David Perry, The Univ. of Texas at Austin (USA); Brian L. Vattiat, Texas A&M Univ. (USA); Richard Savage, Hermanus Kriel, John M. Good, The Univ. of Texas at Austin (USA) . . . . . [9147-257]

Presenting a high accuracy Theta-Phi-style fiber-positioner prototype with a 15-mm pitch, Marco H. Häuser, Florian Lang-Bardl, Josef Richter, Hans-Joachim Hess, Adrian Degwert, Ralf Kosyra, Univ.-Sternwarte München (Germany); Ulrich Hopp, Univ.-Sternwarte München (Germany), Max-Planck-Institut für extraterrestrische Physik (Germany); Ralf Bender, Univ.-Sternwarte München (Germany) . . . . . [9147-258]

All sky scanning cloud monitor for NLOT site survey, Tarun K. Sharma, Padmakar S. Parihar, Ravinder K. Banyal, Madan Mohan Kemkar, Indian Institute of Astrophysics (India) . . . . . [9147-259]

ROS2: a multichannel vision for the robotic REM telescope, Emilio Molinari, Telescopio Nazionale Galileo (Spain) and INAF - IASF Milano (Italy); Stefano Covino, Giuseppe Crimi, INAF - Osservatorio Astronomico di Brera (Italy); Francesco D'Alessio, INAF - Osservatorio Astronomico di Roma (Italy); Salvatore Incorvaia, INAF - IASF Milano (Italy); Dino Fugazza, INAF - Osservatorio Astronomico di Brera (Italy); Paolo Spanò, NRC - Herzburg Institute of Astrophysics (Canada); Giorgio Toso, INAF - IASF Milano (Italy); Daniela Tresoldi, INAF - Osservatorio Astronomico di Brera (Italy); Fabrizio Vitali, INAF - Osservatorio Astronomico di Roma (Italy) . . . . . [9147-260]

Towards a spectroscopic survey of one hundred thousand spatially-resolved-galaxies with Hector, Jon S. Lawrence, Australian Astronomical Observatory (Australia); Joss Bland-Hawthorn, Julia J. Bryant, Gerald N. Cecil, The Univ. of Sydney (Australia); Robert Content, Australian Astronomical Observatory (Australia); Scott Croom, The Univ. of Sydney (Australia); Luke Gers, Peter Gillingham, Australian Astronomical Observatory (Australia); Samuel N. Richards, The Univ. of Sydney (Australia); Will Saunders, Nick F. Staszak, Australian Astronomical Observatory (Australia) . . . . . [9147-261]

Monitoring the atmospheric throughput at Cerro Tololo Inter-American Observatory with aTmCam, Ting Li, Darren L. DePoy, Jennifer L. Marshall, Daniel Q. Nagasawa, Don W. Carona, Texas A&M Univ. (USA). . . . . [9147-262]

Methods for the detection and the characterization of low mass companions using the IFS of SPHERE, Alice Zurlo, Lab. d'Astrophysique de Marseille (France) and INAF - Osservatorio Astronomico di Padova (Italy); Dino Mesa, Raffaele Gratton, Riccardo U. Claudi, Silvano Desidera, Enrico Giro, INAF - Osservatorio Astronomico di Padova (Italy); Jean-Luc Beuzit, Institut de Planétologie et d'Astrophysique de Grenoble (France); Kjetil Dohlen, Lab. d'Astrophysique de Marseille (France); David Mouillet, Pascal Puget, Institut de Planétologie et d'Astrophysique de Grenoble (France); François Wildi, Univ. of Geneve (Switzerland); Markus Feldt, Ole Moeller-Nilsson, Max-Planck-Institut für Astronomie (Germany); Andrea Baruffolo, Daniela Fantinel, Bernardo Salasnich, INAF - Osservatorio Astronomico di Padova (Italy); Markus E. Kasper, European Southern Observatory (Germany); Anne Costille, Lab. d'Astrophysique de Marseille (France); Jean-François Sauvage, Institut de Planétologie et d'Astrophysique de Grenoble (France); Arthur Vigan, Lab. d'Astrophysique de Marseille (France); Claire Moutou, Lab. d'Astrophysique de Marseille (France) and Canada-France-Hawaii Telescope (USA); Maud P. Langlois, Univ. de Lyon (France); Jacopo Antichi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Alexey Pavlov, Neil Zimmerman, Max-Planck-Institut für Astronomie (Germany); Massimo Turatto, INAF - Osservatorio Astrofisico di Arcetri (Italy); Michael R. Meyer, Sascha P. Quanz, ETH Zürich (Switzerland); Mickaël Bonnefoy, Lab. d'Astrophysique de l'Observatoire de Grenoble (France) . . . . . [9147-263]

MEGARA optical manufacturing process, Esperanza Carrasco, Fermin-Salomon Granados-Agustín, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [9147-264]

High speed wide field CMOS camera for Transneptunian Automatic Occultation Survey (TAOS~II), Shiang-Yu Wang, Academia Sinica (Taiwan); John C. Geary, Stephen M. Amato, Harvard-Smithsonian Ctr. for Astrophysics (USA); Yen-Sang Hu, Hung-Hsu Ling, Pin-Jie Huang, Academia Sinica (Taiwan); Gabor Furesz, Harvard-Smithsonian Ctr. for Astrophysics (USA); Hsin-Yo Chen, Yin-Chang Chang, Academia Sinica (Taiwan); Andrew Szentgyorgyi, Harvard-Smithsonian Ctr. for Astrophysics (USA); Matthew J. Lehner, Academia Sinica (Taiwan); Timothy J. Norton, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9147-265]

Final optical design for the WEAVE two-degree prime focus corrector, Tibor Agócs, ASTRON (Netherlands); Don Carlos Abrams, Emilie Lhomé, Kevin M. Dee, Isaac Newton Group of Telescopes (Spain); Gavin B. Dalton, Rutherford Appleton Lab. (United Kingdom) and Univ. of Oxford (United Kingdom); Kevin F. Middleton, Rutherford Appleton Lab. (United Kingdom); Piercarlo Bonifacio, Observatoire de Paris à Meudon (France); Jose Alfonso López Aguerri, Instituto de Astrofísica de Canarias (Spain); Scott C. Trager, Kapteyn Astronomical Institute (Netherlands) . . . . . [9147-266]

The guider and wavefront curvature sensor subsystem for the Large Synoptic Survey telescope, Vincent J. Riot, Lawrence Livermore National Lab. (USA); Peter E. Doherty, Harvard Univ. (USA); Charles F. Claver, LSST Corp. (USA); Kirk Arndt, Purdue Univ. (USA); David K. Gilmore, SLAC National Accelerator Lab. (USA); Paul O'Connor, Brookhaven National Lab. (USA); Jacques Sebag, LSST Corp. (USA); Christopher W. Stubbs, Harvard Univ. (USA); Michael Warner, Cerro Tololo Inter-American Observatory (Chile) . . . . . [9147-267]

HETDEX / VIRUS: testing and performance of 33,000 optical fibres, Andreas Kelz, Thomas Jahn, Dionne M. Haynes, Leibniz-Institut für Astrophysik Potsdam (Germany); Gary J. Hill, The Univ. of Texas at Austin (USA); Jeremy D. Murphy, Princeton Univ. (USA); Monika Rutowska, Ole Streicher, Justus Neumann, Leibniz-Institut für Astrophysik Potsdam (Germany); Harald Nicklas, Georg-August-Univ. Göttingen (Germany); Christer Sandin, Leibniz-Institut für Astrophysik Potsdam (Germany) . . . . . [9147-269]

PAUCam shutter and external filter trays, Ferràn Grañena, Luis Lopez, Javier Gaweda, Carles Arteche, Otger Ballester, Ester Majà, Institut de Física d'Altes Energies (Spain); Ricard Casas, ICE - Institut de Ciències de l'Espai (Spain) . . . . . [9147-271]

A multi-pixel room-temperature local oscillator sub-system for array receivers at 1.9 THz, Jose V. Siles, Imran Mehdi, Choonsup Lee, Robert H. Lin, Peter J. Bruneau, Erich T. Schlecht, Jonathan H. Kawamura, Paul F. Goldsmith, Jet Propulsion Lab. (USA) . . . . . [9147-272]

MOS target-acquisition/fibre-positioning and their impacts on throughput: lessons from AF2, Lilian Dominquez, Diego Cano Infantes, Cecilia Fariña, Richard A. Bassom, Neil O'Mahony, Jure Skvarc, Émilie Lhomé, Chris R. Benn, Marc Balcells, Don Carlos Abrams, Isaac Newton Group of Telescopes (Spain)[9147-374]

The Zwicky transient facility observing system, Richard G. Dekany, Roger M. Smith, Paul Gardner, Stephen Kaye, John L. Cromer, Daniel J. Reiley, Khanh Bui, Eric C. Bellm, Shrinivas R. Kulkarni, California Institute of Technology (USA); Matthew Hoff, Christopher Bebek, Lawrence Berkeley National Lab. (USA) . . . . . [9147-375]

Subaru prime focus spectrograph test and calibration system, Graham Murray, Cornelis M. Dubbeldam, Durham Univ. (United Kingdom); Sandrine Pascal, Sébastien Vives, Lab. d'Astrophysique de Marseille (France) . . . . . [9147-376]

TUESDAY 24 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . TUE 8:50 TO 10:00

Session Chair: **Gillian S. Wright,** UK Astronomy Technology Ctr. (United Kingdom)

8:50: **SPIE Fellows Awards** presented by H. Philip Stahl, President of SPIE. The following individuals will be recognized for their contributions to SPIE and the scientific community: **Mark Clampin,** NASA Goddard Space Flight Ctr. (United States); **Gary Matthews,** Exelis Inc. (United States); **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (United States)

9:00: **Gaia: scientific in-orbit performance** *(Plenary),* Timo Prusti, European Space Agency (Netherlands) . . . . . [9143-503]

9:30: **ALMA Update** *(Plenary)*, Pierre Cox, Joint ALMA Observatory (Chile); Stuartt A. Corder, National Radio Astronomy Observatory (Chile) [9143-504]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 5

LOCATION: ROOM 520C . . . . . TUE 10:30 TO 12:10

High Multiplex and Survey Instruments III

Session Chair: **Julia J. Bryant,** The Univ. of Sydney (Australia)

10:30: **KOSMOS and COSMOS: new facility instruments for the NOAO 4-m telescopes**, Paul Martini, The Ohio State Univ. (USA); Jay Elias, National Optical Astronomy Observatory (USA); Sean Points, National Optical Astronomy Observatory (Chile); David Sprayberry, National Optical Astronomy Observatory (USA); Mark A. Derwent, Raymond Gonzalez, Thomas P. O'Brien, Daniel P. Pappalardo, Richard W. Pogge, Rebecca A. Stoll, Ross Zhelem, The Ohio State Univ. (USA); Phil Daly, Michael J. Fitzpatrick, Ron George, Ron Harris, Mark Hunten, Gary Poczulp, Steve Rath, Roger Repp, Robert Seaman, Mark Trueblood, Kathie Zelaya, National Optical Astronomy Observatory (USA). . . . . [9147-34]

10:50: **TAIPAN: optical spectroscopy with StarBugs**, Kyler Kuehn, Jon S. Lawrence, David M. Brown, Scott Case, Australian Astronomical Observatory (Australia); Matthew Colless, The Australian National Univ. (Australia); Robert Content, Luke Gers, Michael Goodwin, Andrew M. Hopkins, Michael Ireland, Nuria P. F. Lorente, Rolf Muller, Vijay Nichani, Azizi Rakman, Will Saunders, Nick F. Staszak, Julia Tims, Lewis G. Waller, Australian Astronomical Observatory (Australia). . . . . [9147-35]

11:10: **SITELLE: first light**, Laurent Drissen, Univ. Laval (Canada) and Canada-France-Hawaii Telescope (Canada) . . . . . [9147-36]

11:30: **mxSPEC: a massively multiplexed full-disk spectroheliograph for solar physics research**, Haosheng Lin, Univ. of Hawai'i (USA) . . . . . [9147-37]

11:50: **BATMAN: a DMD-based multi-object spectrograph on Galileo telescope**, Frédéric Zamkotsian, Lab. d'Astrophysique de Marseille (France); Paolo Spanò, INAF - Osservatorio Astronomico di Brera (Italy); Patrick Lanzoni, Lab. d'Astrophysique de Marseille (France); Marco Riva, INAF - Osservatorio Astronomico di Brera (Italy); Luciano Nicastro, INAF - IASF Bologna (Italy); Emilio Molinari, Telescopio Nazionale Galileo (Spain); Paolo Di Marcantonio, INAF - Osservatorio Astronomico di Trieste (Italy); Filippo Maria M. Zerbi, INAF - Osservatorio Astronomico di Brera (Italy); Luca Valenziano, INAF - IASF Bologna (Italy) . . . . . [9147-38]

Lunch Break . . . . . Tue 12:10 to 13:20

SESSION 6

LOCATION: ROOM 520C . . . . . TUE 13:20 TO 17:30

High Spectral Resolution Instruments I

Session Chair: **Suzanne K. Ramsay,** European Southern Observatory (Germany)

13:20: **Infrared Doppler instrument (IRD) for the Subaru telescope to search for Earth-like planets around nearby M-dwarfs**, Takayuki Kotani, National Astronomical Observatory of Japan (Japan); Motohide Tamura, National Astronomical Observatory of Japan (Japan) and The Univ. of Tokyo (Japan); Hiroshi Suto, Jun Nishikawa, National Astronomical Observatory of Japan (Japan); Bun'ei Sato, Tokyo Institute of Technology (Japan); Wako Aoki, National Astronomical Observatory of Japan (Japan); Tomonori Usuda, Subaru Telescope, National Astronomical Observatory of Japan (USA); Takashi Kurokawa, Tokyo Univ. of Agriculture and Technology (Japan) and National Astronomical Observatory of Japan (Japan); Ken Kashiwagi, Tokyo Univ. of Agriculture and Technology (Japan); Shogo Nishiyama, National Astronomical Observatory of Japan (Japan); Yuji Ikeda, Photocoding (Japan); Donald N. B. Hall, Klaus W. Hodapp, Univ. of Hawai'i (USA); Jun Hashimoto, The Univ. of Oklahoma (USA); Jun-Ichi Morino, National Astronomical Observatory of Japan (Japan); Yasushi Okuyama, Yosuke Tanaka, Shota Suzuki, Tokyo Univ. of Agriculture and Technology (Japan); Jungmi Kwon, National Astronomical Observatory of Japan (Japan); Takuya Suenaga, Dehyun Oh, Haruka Baba, The Graduate Univ. for Advanced Studies (Japan); Norio Narita, Eiichiro Kokubo, National Astronomical Observatory of Japan (Japan); Yutaka Hayano, Subaru Telescope, National Astronomical Observatory of Japan (USA); Hideyuki Izumiura, Eiji Kambe, National Astronomical Observatory of Japan (Japan); Tomoyuki Kudo, Subaru Telescope, National Astronomical Observatory of Japan (USA); Nobuhiko Kusakabe, Masahiro Ikoma, The Univ. of Tokyo (Japan); Yasunori Hori, National Astronomical Observatory of Japan (Japan); Masashi Omiya, Hidenori Genda, Tokyo Institute of Technology (Japan); Akihiko Fukui, National Astronomical Observatory of Japan (Japan); Yuka Fujii, Tokyo institute of Technology (Japan); Olivier Guyon, Subaru Telescope, National Astronomical Observatory of Japan (USA); Hiroki Harakawa, Tokyo Institute of Technology (Japan); Masahiko Hayashi, National Astronomical Observatory of Japan (Japan); Masahide Hidai, Tokai Univ. (Japan); Teruyuki Hirano, Masayuki Kuzuhara, Tokyo Institute of Technology (Japan); Masahiro Machida, Kyusyu Univ. (Japan); Taro Matsuo, Tetsuya Nagata, Kyoto Univ. (Japan); Hirohi Onuki, Tokyo Institute of Technology (Japan); Masahiro Ogihara, Nagoya Univ. (Japan); Hideki Takami, National Astronomical Observatory of Japan (Japan); Naruhisa Takato, Subaru Telescope, National Astronomical Observatory of Japan (USA); Yasuhiro H. Takahashi, The Univ. of Tokyo (Japan); Chihiro Tachinami, Tokyo Institute of Technology (Japan); Hiroshi Terada, Subaru Telescope, National Astronomical Observatory of Japan (USA); Hajime Kawahara, The Univ. of Tokyo (Japan) . . . . . [9147-39]

13:40: **SPIRou: the near-infrared spectropolarometer/high-precision velocimeter for the Canada-France-Hawaii telescope**, René Doyon, Univ. de Montréal (Canada); Jean-François Donati, Institut de Recherche en Astrophysique et Planétologie (France); Étienne Artigau, Univ. de Montréal (Canada); Xavier Delfosse, François B. Hénault, Patrick Rabou, Institut de Planétologie et d'Astrophysique de Grenoble (France); Simon Thibault, Univ. Laval (Canada); Driss Kouach, Sébastien Baratchart, Laurent P. Parès, Yoan Micheau, Institut de Recherche en Astrophysique et Planétologie (France); François Dolon, Lab. d'Astrophysique de Marseille (France); Olivier Hernandez, Philippe Vallée, Univ. de Montréal (Canada); David Loop, Vladimir A. Reshetov, NRC - Herzburg Institute of Astrophysics (Canada); Francesco A. Pepe, Observatoire de Genèva (Switzerland); François Bouchy, Lab. d'Astrophysique de Marseille (Switzerland); Shiang-Yu Wang, Academia Sinica (Taiwan); Gregory Barrick, Canada-France-Hawaii Telescope (USA) . . . . . [9147-40]

14:00: **NRES: the network of robotic Echelle spectrographs**, Jason D. Eastman, Las Cumbres Observatory Global Telescope Network (USA); Timothy M. Brown, Las Cumbres Observatory Global Telescope Network (USA) and Univ. of Colorado at Boulder (USA); John Hygelund, Las Cumbres Observatory Global Telescope Network (USA); Stuart I. Barnes, Stuart Barnes Optical Design (Netherlands); Julian C. van Eyken, Las Cumbres Observatory Global Telescope Network (USA)[9147-41]

14:20: **High resolution broad-band spectroscopy in the NIR using the triplespec externally dispersed interferometer at the Hale telescope**, David J. Erskine, Lawrence Livermore National Lab. (USA); Jerry Edelstein, Martin M. Sirk, Edward H. Wishnow, Yuzo Ishikawa, Eliza McDonald, Van Shourt, Univ. of California, Berkeley (USA) . . . . . [9147-42]

14:40: **A design for high-resolution spectroscopy with adaptive optics at the Large Binocular telescope**, Robert O. Reynolds, Large Binocular Telescope Observatory (USA). . . . . [9147-43]

15:00: **CRIRES+: a cross-dispersed high resolution infrared spectrograph for the ESO VLT**, Roman Follert, Thüringer Landessternwarte Tautenburg (Germany); Reinhold J. Dorn, European Southern Observatory (Germany); Ernesto Oliva, INAF - Osservatorio Astrofisico di Arcetri (Italy); Jean-Louis Lizon, European Southern Observatory (Germany); Artie P. Hatzes, Thüringer Landessternwarte Tautenburg (Germany); Nikolai A. Piskunov, Uppsala Univ. (Sweden); Ansgar Reiners, Ulf Seemann, Georg-August-Univ. Göttingen (Germany); Eric Stempels, Ulrike Heiter, Thomas Marquart, Matthew Lockhart, Uppsala Univ. (Sweden); Guillem Anglada-Escude, Georg-August-Univ. Göttingen (Germany); Tom Löwinger, Thüringer Landessternwarte Tautenburg (Germany); Dietrich Baade, Jason Grunhut, Paul Bristow, Barbara Klein, Yves Jung, Derek J. Ives, Florian Kerber, Eszter Pozna, Jérome Paufique, Hans-Ulrich Käufl, European Southern Observatory (Germany) . . . . . [9147-44]

Coffee Break . . . . . Tue 15:20 to 15:50

15:50: **On-sky performance of a high resolution silicon immersion grating spectrometer**, Jian Ge, Scott Powell, Bo Zhao, Sidney L. Schofield, Frank Varosi, Craig D. Warner, Jian Liu, Sirinrat Sithajan, Univ. of Florida (USA); Matthew W. Muterspaugh, Michael H. Williamson, Tennessee State Univ. (USA) . . . . . [9147-45]

16:10: **First flights of the EXES science instrument on SOFIA**, Matthew J. Richter, Curtis DeWitt, Univ. of California, Davis (USA); Kristin R. Kulas, Mark E. McKelvey, NASA Ames Research Ctr. (USA); Michael E. Case, Univ. of California, Davis (USA) . . . . . [9147-46]

16:30: **A laser frequency comb featuring sub-cm/s precision for routine operation on HARPS**, Rafael A. Probst, Max-Planck-Institut für Quantenoptik (Germany); Gaspare Lo Curto, Gerardo Ávila, European Southern Observatory (Germany); Bruno L. Canto Martins, Jose Renan de Medeiros, Univ. Federal do Rio Grande do Norte (Brazil); Massimiliano Esposito, Jonai Isai González Hernández, Instituto de Astrofísica de Canarias (Spain); Theodor W. Hänsch, Max-Planck-Institut für Quantenoptik (Germany); Ronald Holzwarth, Max-Planck-Institut für Quantenoptik (Germany) and Menlo Systems GmbH (Germany); Florian Kerber, European Southern Observatory (Germany); I. C. Leão, Univ. Federal do Rio Grande do Norte (Brazil); Antonio Manescau, Luca Pasquini, European Southern Observatory (Germany); Rafael Rebolo-López, Instituto de Astrofísica de Canarias (Spain); Tilo Steinmetz, Max-Planck-Institut für Quantenoptik (Germany) and Menlo Systems GmbH (Germany); Thomas Udem, Max-Planck-Institut für Quantenoptik (Germany) . . . . . [9147-47]

16:50: **Design and early performance of IGRINS (immersion grating infrared spectrometer)**, Chan Park, In-Soo Yuk, Moo-Young Chun, Korea Astronomy and Space Science Institute (Korea, Republic of); Soojong Pak, Kyung Hee Univ. (Korea, Republic of); Kang-Min Kim, Korea Astronomy and Space Science Institute (Korea, Republic of); Michael D. Pavel, Hanshin Lee, The Univ. of Texas at Austin (USA); Heeyoung Oh, Ueejeong Jeong, Korea Astronomy and Space Science Institute (Korea, Republic of); Chae Kyung Sim, Hye-In Lee, Huynh Anh Nguyen Le, Kyung Hee Univ. (Korea, Republic of); Joseph Strubhar, Michael Gully-Santiago, The Univ. of Texas at Austin (USA); Jae Sok Oh, Sang-Mok Cha, Bongkon Moon, Kwijong Park, Korea Astronomy and Space Science Institute (Korea, Republic of); Cynthia B. Brooks, The Univ. of Texas at Austin (USA); Kyeong Yeon Ko, Univ. of Science and Technology (Korea, Republic of); Jeong-Yeol Han, Jakyoung Nah, Korea Astronomy and Space Science Institute (Korea, Republic of); Peter C. Hill, The Univ. of Texas at Austin (USA); Sungho Lee, SELab, Inc. (Korea, Republic of); Stuart I. Barnes, The Univ. of Texas at Austin (USA) and McDonald Observatory (USA); Byeong-Gon Park, Korea Astronomy and Space Science Institute (Korea, Republic of); Daniel T. Jaffe, The Univ. of Texas at Austin (USA) . . . . . [9147-48]

17:10: **High resolution near IR spectroscopy with GIANO-TNG**, Livia Origlia, INAF - Osservatorio Astronomico di Bologna (Italy); Ernesto Oliva, Carlo Baffa, Gilberto Falcini, Elisabetta Giani, INAF - Osservatorio Astrofisico di Arcetri (Italy); Marcella Iuzzolino, INAF- Arcetri Observatory (Italy); Fabrizio Massi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Paolo Montegriffo, INAF - Osservatorio Astronomico di Bologna (Italy); Nicoletta Sanna, INAF - Osservatorio Astrofisico di Arcetri (Italy); Salvatore Scuderi, INAF - Osservatorio Astrofisico di Catania (Italy); Mauro Sozzi, Andrea Tozzi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Ilaria Carleo, Bolgna University, Dept. of Physics and Astronomy (Italy) and INAF, Padova Observatory (Italy); Raffaele Gratton, INAF - Padova Observatory (Italy); Francesca Ghinassi, Marcello Lodi, Telescopio Nazionale Galileo (Spain). . . . . [9147-49]

CONFERENCE 9147 · LOCATION: ROOM 520C

WEDNESDAY 25 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . WED 9:00 TO 10:00

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

9:00: **Highlights from the Multi Unit Spectroscopic Explorer (MUSE): a 2nd generation VLT instrument for the VLT** *(Plenary)*, Roland M. Bacon, Observatoire de Lyon (France). . . . . [9147-506]

9:30: **Canadian Space Astronomy: past, present and future** *(Plenary)*, John B. Hutchings, NRC - Herzberg Institute of Astrophysics (Canada) [9143-505]

Coffee Break . . . . . Wed 10:00 to 10:30

SESSION 7

LOCATION: ROOM 520C . . . . . WED 10:30 TO 12:10

High Spectral Resolution Instruments II

Session Chair: **Ramón J. García López,** Instituto de Astrofísica de Canarias (Spain)

10:30: **CARMENES instrument overview**, Andreas Quirrenbach, Landessternwarte Heidelberg (Germany) and Carmenes Consortium, Landessternwarte Heidelberg (Germany); Pedro J. Amado, Instituto de Astrofísica de Andalucía (Spain) [9147-50]

10:50: **The habitable-zone planet finder: status update on the development of a stabilized fiber-fed near-infrared spectrograph for the for the Hobby-Eberly telescope**, Suvrath Mahadevan, Lawrence W. Ramsey, Chad F. Bender, Ryan C. Terrien, Samuel Halverson, Arpita Roy, Frederick R. Hearty, Eric I. Levi, Paul Robertson, The Pennsylvania State Univ. (USA); Matt J. Nelson, Univ. of Virginia (USA); Christian Schwab, The Pennsylvania State Univ. (USA) . . . . . [9147-51]

11:10: **ESPRESSO: the radial velocity machine for the VLT**, Denis Mégevand, Observatoire de Genève (Switzerland); Filippo Maria M. Zerbi, INAF - Osservatorio Astronomico di Brera (Italy); Alexandre Cabral Pereira, Univ. de Lisboa (Portugal); Paolo Di Marcantonio, INAF - Osservatorio Astronomico di Trieste (Italy); Francesco A. Pepe, Observatoire de Genève (Switzerland); Stefano Cristiani, INAF - Osservatorio Astronomico di Trieste (Italy); Rafael Rebolo-López, Instituto de Astrofísica de Canarias (Spain); Nuno C. Santos, Univ. do Porto (Portugal); Johannes K. Dekker, European Southern Observatory (Germany); Manuel Abreu, Univ. de Lisboa (Portugal); Manuel Amate Plasencia, Instituto de Astrofísica de Canarias (Spain); Gerardo Ávila, European Southern Observatory (Germany); Veronica Baldini, INAF - Osservatorio Astronomico di Trieste (Italy); Timothy Bandy, Christopher Broeg, Univ. Bern (Switzerland); Roberto Cirami, INAF - Osservatorio Astronomico di Trieste (Italy); João M. P. Coelho, Univ. de Lisboa (Portugal); Paolo Conconi, INAF - Osservatorio Astronomico di Brera (Italy); Igor Coretti, Guido Cupani, Valentina D'Odorico, INAF - Osservatorio Astronomico di Trieste (Italy); Vincenzo De Caprio, INAF - Osservatorio Astronomico di Brera (Italy); Bernard-Alexis Delabre, Reinhold J. Dorn, European Southern Observatory (Germany); Pedro Figueira, Ctr. de Astrofísica da Univ. do Porto (Portugal); Ana B. Fragoso Lopez, Instituto de Astrofísica de Canarias (Spain); Samuele Galeotta, INAF - Osservatorio Astronomico di Trieste (Italy); Ludovic Genolet, Observatoire de Genève (Switzerland); Ricardo Gomes, Univ. de Lisboa (Portugal); Jonai Isai González Hernández, Instituto de Astrofísica de Canarias (Spain); Ian Hughes, Observatoire de Genève (Switzerland); Olaf Iwert, Florian Kerber, European Southern Observatory (Germany); Marco Landoni, Univ. degli Studi dell'Insubria (Italy); Jean-Louis Lizon, European Southern Observatory (Germany); Christophe Lovis, Charles Maire, Observatoire de Genève (Switzerland); Marco Mannetta, INAF - Osservatorio Astronomico di Trieste (Italy); Carlos J. A. P. Martins, Ctr. de Astrofísica da Univ. do Porto (Portugal); Paolo Molaro, INAF - Osservatorio Astronomico di Trieste (Italy); Manuel A. Monteiro, Ctr. de Astrofísica da Univ. do Porto (Portugal); António Oliveira, Univ. de Lisboa (Portugal); José Luis Rasilla, Instituto de Astrofísica de Canarias (Spain); Marco Riva, INAF - Osservatorio Astronomico di Brera (Italy); Samuel Santana Tschudi, Instituto de Astrofísica de Canarias (Spain); Pedro Santos, Univ. de Lisboa (Portugal); Danuta Sosnowska, Observatoire de Genève (Switzerland); Sergio Sousa, Ctr. de Astrofísica da Univ. do Porto (Portugal); Fabio Tenegi, Instituto de Astrofísica de Canarias (Spain); Giorgio Toso, INAF - Osservatorio Astronomico di Brera (Italy); Eros Vanzella, Matteo Viel, INAF - Osservatorio Astronomico di Trieste (Italy); Maria-Rosa Zapatero Osorio, Univ. de Madrid (Spain). . . . . [9147-52]

11:30: **PIMMS Echelle: the next generation of compact diffraction limited spectrographs for arbitrary input beams**, Christopher H. Betters, Sergio G. Leon-Saval, Joss Bland-Hawthorn, The Univ. of Sydney (Australia) . . . . . [9147-53]

11:50: **Progress on the Gemini high-resolution optical spectrograph (GHOST) instrument**, Michael Ireland, Australian Astronomical Observatory (Australia); Gregory S. Burley, NRC - Herzberg Institute of Astrophysics (Canada); Vladimir Churilov, Gabriella Frost, Jon S. Lawrence, Australian Astronomical Observatory (Australia); David Loop, NRC - Herzberg Institute of Astrophysics (Canada); Peter McGregor, The Australian National Univ. (Australia); Sarah Martell, Australian Astronomical Observatory (Australia); Alan McConnachie, John Pazder, Vladimir A. Reshetov, NRC - Herzberg Institute of Astrophysics (Canada); Gordon Robertson, Andrew I. Sheinis, Nick F. Staszak, Julia Tims, Australian Astronomical Observatory (Australia); Peter Young, The Australian National Univ. (Australia); Ross Zhelem, Australian Astronomical Observatory (Australia). . . . . [9147-54]

Lunch/Exhibition Break . . . . . Wed 12:10 to 13:20

SESSION 8

LOCATION: ROOM 520C . . . . . WED 13:20 TO 17:30

High Spatial Resolution Instruments I

Session Chair: **Hideki Takami,** National Astronomical Observatory of Japan (Japan)

13:20: **The integral field spectrograph for the Gemini planet imager**, James E. Larkin, Jeffrey K. Chilcote, Theodore Aliado, Univ. of California, Los Angeles (USA); Brian J. Bauman, Lawrence Livermore National Lab. (USA); George Brims, John M. Canfield, Univ. of California, Los Angeles (USA); Daren Dillon, Univ. of California Observatories (USA); René Doyon, Univ. de Montréal (Canada); Jennifer S. Dunn, NRC - Herzberg Institute of Astrophysics (Canada); Michael P. Fitzgerald, Univ. of California, Los Angeles (USA); James R. Graham, Univ. of California, Berkeley (USA); Stephen J. Goodsell, Markus Hartung, Gemini Observatory (Chile); Patrick J. Ingraham, Stanford Univ. (USA); Christopher A. Johnson, Evan Kress, Univ. of California, Los Angeles (USA); Quinn M. Konopacky, Dunlap Institute for Astronomy & Astrophysics (Canada); Bruce A. Macintosh, Stanford Univ. (USA) and Lawrence Livermore National Lab. (USA); Kenneth G. Magnone, Univ. of California, Los Angeles (USA); Jérôme Maire, Dunlap Institute for Astronomy & Astrophysics (Canada); Ian S. McLean, Univ. of California, Los Angeles (USA); David W. Palmer, Lawrence Livermore National Lab. (USA); Marshall D. Perrin, Space Telescope Science Institute (USA); Carlos Quiroz, Naru Sadakuni, Gemini Observatory (Chile); Leslie Saddlemyer, NRC - Herzberg Institute of Astrophysics (Canada); Simon Thibault, Univ. Laval (Canada); Sandrine J. Thomas, NASA Ames Research Ctr. (USA) and Univ. of California Observatories (USA); Philippe Vallée, Univ. de Montréal (Canada); Jason L. Weiss, Univ. of California, Los Angeles (USA)[9147-55]

13:40: **The SPHERE IFS at work**, Riccardo U. Claudi, Enrico Giro, Massimo Turatto, Andrea Baruffolo, INAF - Osservatorio Astronomico di Padova (Italy); Pietro Bruno, INAF - Osservatorio Astrofisico di Catania (Italy); Enrico Cascone, Vincenzo De Caprio, INAF - Osservatorio Astronomico di Capodimonte (Italy); Silvano Desidera, INAF - Osservatorio Astronomico di Padova (Italy); Reinhold J. Dorn, European Southern Observatory (Germany); Daniela Fantinel, INAF - Osservatorio Astronomico di Padova (Italy); Gert Finger, European Southern Observatory (Germany); Raffaele Gratton, Giancarlo Farisato, Luigi Lessio, INAF - Osservatorio Astronomico di Padova (Italy); Jean-Louis Lizon, European Southern Observatory (Germany); Dino Mesa, Bernardo Salasnich, INAF - Osservatorio Astronomico di Padova (Italy); Salvatore Scuderi, INAF - Osservatorio Astrofisico di Catania (Italy); Alice Zurlo, INAF - Osservatorio Astronomico di Padova (Italy); Jacopo Antichi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Kjetil Dohlen, Lab. d'Astrophysique de Marseille (France); Jean-Luc Beuzit, Pascal Puget, Institut de Planétologie et d'Astrophysique de Grenoble (France); Norbert Hubin, Markus E. Kasper, European Southern Observatory (Germany) . . . . . [9147-56]

14:00: **The LINC-NIRVANA high resolution imager: challenges from the lab to first light**, Thomas M. Herbst, Max-Planck-Institut für Astronomie (Germany); Roberto Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy); Andreas Eckart, Univ. zu Köln (Germany); Gerd P. Weigelt, Max-Planck-Institut für Radioastronomie (Germany) . . . . . [9147-57]

14:20: **LUCI^2: binocular and LGS/NGS AO modes of LUCI at the LBT**, Peter Buschkamp, Max-Planck-Institut für extraterrestrische Physik (Germany); Walter Seifert, Landessternwarte Heidelberg (Germany); Kai Polsterer, Heidelberger Institut für Theoretische Studien (Germany); Jochen Heidt, Landessternwarte Heidelberg (Germany); Sebastian Rabien, Hans Gemperlein, Max-Planck-Institut für extraterrestrische Physik (Germany); Roland Kurt Gredel, Michael Lehmitz, Max-Planck-Institut für Astronomie (Germany); Gilles Orban de Xivry, Max-Planck-Institut für extraterrestrische Physik (Germany); Alexander Pramskiy, Ruhr-Univ. Bochum (Germany); Walfried Raab, Max-Planck-Institut für extraterrestrische Physik (Germany); David Thompson, Michele D. De La Peña, Large Binocular Telescope Observatory (USA); Julian Ziegleder, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9147-58]

14:40: **Operation and performance of the mid-infrared camera, NOMIC, on the Large Binocular telescope**, William F. Hoffmann, Philip M. Hinz, Denis Defrère, Jarron M. Leisenring, Andrew J. Skemer, Paul A. Arbo, Manny Montoya, The Univ. of Arizona (USA); Bertrand Mennesson, Jet Propulsion Lab. (USA) and California Institute of Technology (USA) . . . . . [9147-59]

15:00: **FRIDA, the diffraction limited NIR imager and IFS for the Gran Telescopio Canarias: status report**, José Alberto Lopez, Univ. Nacional Autónoma de México (Mexico); José Acosta-Pulido, Instituto de Astrofísica de Canarias (Spain); Luis C. Álvarez, Univ. Nacional Autónoma de México (Mexico); Vicente Bringas, Ctr. de Ingenieria y Desarollo Industrial (Mexico); Nicolás Cardiel, Univ. Complutense de Madrid (Spain); David M. Clark, Univ. Nacional Autónoma de México (Mexico); Adi Corrales, Ctr. de Ingenieria y Desarrollo Industrial (Mexico); Salvador Cuevas, Oscar Chapa, Univ. Nacional Autónoma de México (Mexico); Jose Javier Díaz Garcia, Instituto de Astrofísica de Canarias (Spain); Stephen S. Eikenberry, Univ. of Florida (USA); María del Carmen Eliche Moral, Univ. Complutense de Madrid (Spain); Carlos Espejo, Rubén A. Flores-Meza, Jorge Fuentes Fernandez, Univ. Nacional Autónoma de México (Mexico); Jesús Gallego, Univ. Complutense de Madrid (Spain); José Leonardo Garcés, Univ. Nacional Autónoma de México (Mexico); Francisco Garzón López, Instituto de Astrofísica de Canarias (Spain); Peter Hammersley, European Southern Observatory (Germany); Carolina Keiman, Gerardo Lara, Univ. Nacional Autónoma de México (Mexico); Pablo López, Instituto de Astrofísica de Canarias (Spain); Diana Lucero, Ctr. de Ingenieria y Desarrollo Industrial (Mexico); Heidy Moreno Arce, Instituto de Astrofísica de Canarias (Spain); Sergio Pascual, Univ. Complutense de Madrid (Spain); Jesús Patrón Recio, Almudena Prieto, Instituto de Astrofísica de Canarias (Spain); Alberto Rodriguez, Berenice Rodriguez, Ctr. de Ingenieria y Desarrollo Industrial (Mexico); Beatriz Sánchez, Univ. Nacional Autónoma de México (Mexico); Diana Torres, Jorge A. Uribe, Ctr. de Ingenieria y Desarrollo Industrial (Mexico); Alan M. Watson, Univ. Nacional Autónoma de México (Mexico) . . . . . [9147-60]

Coffee Break . . . . . Wed 15:20 to 15:50

15:50: **Development and recent results from the Subaru coronagraphic extreme adaptive optics system**, Nemanja Jovanovic, Olivier Guyon, Subaru Telescope, National Astronomical Observatory of Japan (USA); Frantz Martinache, Observatoire de la Côte d'Azur (France); Christophe S. Clergeon, Garima Singh, Tomoyuki Kudo, Subaru Telescope, National Astronomical Observatory of Japan (USA); Kevin E. Newman, The Univ. of Arizona (USA); Jonas G. Kühn, Eugene Serabyn, Jet Propulsion Lab. (USA); Barnaby R. Norris, Peter G. Tuthill, Paul N. Stewart, The Univ. of Sydney (Australia); Elsa Huby, Guy S. Perrin, Observatoire de Paris à Meudon (France); Sylvestre Lacour, Sebastien Vievard, Observatoire de Paris (France); Naoshi Murakami, Fumika Oshiyama, Hokkaido Univ. (Japan); Yosuke Minowa, Yutaka Hayano, Olivier Lai, Subaru Telescope, National Astronomical Observatory of Japan (USA); Franck Marchis, SETI Institute (USA); Gaspard Duchêne, Univ. of California, Berkeley (USA); Takayuki Kotani, National Astronomical Observatory of Japan (Japan); Julien Woillez, European Southern Observatory (Chile) . . . . . [9147-61]

16:10: **High contrast polarimetry in the infrared with SPHERE on the VLT**, Maud P. Langlois, Ctr. de Recherche Astronomique de Lyon (France); Kjetil Dohlen, Arthur Vigan, Alice Zurlo, Claire Moutou, Lab. d'Astrophysique de Marseille (France); Hans Martin Schmid, ETH Zürich (Switzerland); Julien Milli, European Southern Observatory (Germany); Jean-Luc Beuzit, Institut de Planétologie et d'Astrophysique de Grenoble (France); Anthony Boccaletti, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Michael Carle, Anne Costille, Lab. d'Astrophysique de Marseille (France); Reinhold J. Dorn, European Southern Observatory (Germany); Laurence Gluck, Institut de Planétologie et d'Astrophysique de Grenoble (France); Norbert Hubin, European Southern Observatory (Germany); Markus Feldt, Max-Planck-Institut für Astronomie (Germany); Markus E. Kasper, Jean-Louis Lizon, European Southern Observatory (Germany); Fabrice Madec, David Le Mignant, Lab. d'Astrophysique de Marseille (France); David Mouillet, Pascal Puget, Institut de Planétologie et d'Astrophysique de Grenoble (France); Jean-François Sauvage, ONERA (France); François Wildi, Observatoire de Genève (Switzerland) . . . . . [9147-62]

16:30: **High-precision polarimetry at the Mont-Mégantic Observatory with the new polarimeter POMM**, Pierre Bastien, Olivier Hernandez, Loïc Albert, Étienne Artigau, René Doyon, David Lafrenière, Antony F. G. Moffat, Nicole St-Louis, Univ. de Montréal (Canada) . . . . . [9147-63]

16:50: **High-resolution imaging in the visible on large ground-based telescopes**, Craig D. MacKay, Univ. of Cambridge (United Kingdom); Rafael Rebolo-López, Instituto de Astrofísica de Canarias (Spain); Jonathan Crass, David M. P. King, Univ. of Cambridge (United Kingdom); Victor González Escalera, Marta Puga Antolín, Instituto de Astrofísica de Canarias (Spain); Antonio Pérez Garrido, Univ. Politécnica de Cartagena (Spain); Lucas Labadie, Univ. zu Köln (Germany); Roberto L. López, Alejanrdo Oscoz Abad, Jorge Andrés Pérez Prieto, Luis Fernando Rodríguez-Ramos, Sergio Velasco, Isidro Villó, Instituto de Astrofísica de Canarias (Spain) . . . . . [9147-64]

17:10: **First performance of the GeMS+GMOS system**, Pascale Hibon, Gemini Observatory (Chile); Benoît Neichel, Lab. d'Astrophysique de Marseille (France); Benjamin Prout, Francois Rigaut, The Australian National Univ. (Australia); Vincent Garrel, Gemini Observatory (Chile); Fabrice Vidal, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France) . . . . . [9147-65]

LOCATION: ROOM 520C . . . . . 17:30 TO 17:50

POSTER POPS

Poster authors have been contacted and selected to make brief presentations.

POSTER SESSION–WEDNESDAY

LOCATION: ROOM 516 . . . . . .WED 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Wednesday. The interactive poster session with authors in attendance will be Wednesday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Posters: High Spectral and Spatial Resolution Instruments

Gemini planet imager observational calibrations XI: non-redundant masking on GPI, Alexandra Z Greenbaum, Johns Hopkins Univ. (USA); Anthony Cheetham, The Univ. of Sydney (Australia); Anand Sivaramakrishnan, Laurent A. Pueyo, Marshall D. Perrin, Space Telescope Science Institute (USA); Schuyler G. Wolff, Johns Hopkins Univ. (USA); Sandrine J. Thomas, NASA Ames Research Ctr. (USA); Patrick J. Ingraham, Univ. de Montréal (Canada); Barnaby R. Norris, Peter G. Tuthill, The Univ. of Sydney (Australia) . . . . . [9147-135]

InnoPOL: an EMCCD imaging polarimeter and 85-element curvature AO system on the 3.6-m AEOS telescope, David M. Harrington, Institute for Astronomy (USA) and Kiepenheuer-Institut für Sonnenphysik (Germany); Svetlana Berdyugina, Kiepenheuer-Institut für Sonnenphysik (Germany); Jeffrey R. Kuhn, Christ Ftaclas, Mark R. Chun, Institute for Astronomy (USA); Daniel Gisler, Kiepenheuer-Institut für Sonnenphysik (Germany) . . . . . [9147-274]

APSU @ ESPRESSO: final design towards the integration, Marco Riva, Paolo Conconi, INAF - Osservatorio Astronomico di Brera (Italy); Francesco A. Pepe, Observatoire de Genèva (Switzerland); Filippo Maria M. Zerbi, INAF - Osservatorio Astronomico di Brera (Italy); Stefano Cristiani, INAF - Osservatorio Astronomico di Trieste (Italy); Alexandre Cabral Pereira, Univ. de Lisboa (Portugal); Denis Mégevand, Observatoire de Genèva (Switzerland); Manuele Moschetti, Matteo Aliverti, INAF - Osservatorio Astronomico di Brera (Italy) . . . . . [9147-275]

Optical design of a diffraction-limited Doppler spectrometer for Large Binocular telescope, Bo Zhao, Univ. of Florida (USA); Justin Crepp, Andrew Bechter, Eric Bechter, Ryan Ketterer, Univ. of Notre Dame (USA) . . . . . [9147-276]

Design of a radial velocity spectrometer for the Moletai Astronomical Observatory, Colby A. Jurgenson, Debra A. Fischer, Yale Univ. (USA); Fernando G. Santoro, Giant Magellan Telescope Project (USA); Rebecca A. Stoll, Tyler M. McCracken, Andrew E. Szymkowiak, Yale Univ. (USA) . . . . . [9147-277]

ESPRESSO front end: modular opto-mechanical integration for astronomical instrumentation, Marco Riva, Matteo Aliverti, Manuele Moschetti, Marco Landoni, INAF - Osservatorio Astronomico di Brera (Italy); Francesco A. Pepe, Denis Mégevand, Observatoire de Genèva (Switzerland); Filippo Maria M. Zerbi, INAF - Osservatorio Astronomico di Brera (Italy); Stefano Cristiani, INAF - Osservatorio Astronomico di Trieste (Italy); Alexandre Cabral Pereira, Univ. de Lisboa (Portugal) . . . . . [9147-278]

Gemini planet imager observational calibrations IV: wavelength calibration and flexure correction for the integral field spectograph, Schuyler G. Wolff, Johns Hopkins Univ. (USA); Marshall D. Perrin, Space Telescope Science Institute (USA); Jérôme Maire, Dunlap Institute for Astronomy & Astrophysics (Canada); Patrick J. Ingraham, Stanford Univ. (USA); Fredrik T. Rantakyrö, Pascale Hibon, Gemini Observatory (Chile) . . . . . [9147-279]

RHEA: the replicable high-resolution asteroseismology and exoplanet spectrograph, Tobias Feger, Carlos Bacigalupo, Joao Bento, Michael Ireland, Izabela Spaleniak, Aaron C. Rizzuto, Macquarie Univ. (Australia); Timothy R. Bedding, The Univ. of Sydney (Australia); Quentin A. Parker, Macquarie Univ. (Australia) and Australian Astronomical Observatory (Australia) . . . . . [9147-280]

CONFERENCE 9147 · LOCATION: ROOM 520C

SHARK (system for coronagraphy with high order adaptive optics from R to K band): a proposal for the LBT 2nd generation instrumentation, Jacopo Farinato, INAF - Osservatorio Astronomico di Padova (Italy); Fernando Pedichini, INAF - Osservatorio Astronomico di Monte Porzio (Italy); Enrico Pinna, INAF - Osservatorio Astrofisico di Arcetri (Italy); Francesca Baciotti, Carlo Baffa, Luca Carbonaro, INAF - Osservatorio Astronomico di Arcetri (Italy); Mauro Centrone, INAF - Osservatorio Astronomico di Monte Porzio (Italy); Silvano Desidera, Marco Dima, INAF - Osservatorio Astronomico di Padova (Italy); Simone Esposito, INAF - Osservatorio Astronomico di Arcetri (Italy); Adriano Fontana, Emanuele Giallongo, INAF - Osservatorio Astronomico di Monte Porzio (Italy); Davide Greggio, INAF - Osservatorio Astronomico di Padova (Italy); Philip M. Hinz, The Univ. of Arizona (USA); Raffaele Gratton, INAF - Osservatorio Astronomico di Padova (Italy); Franco Lisi, INAF - Osservatorio Astronomico di Arcetri (Italy); Demetrio Magrin, Roberto Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy); Eleonora Sani, INAF - Osservatorio Astronomico di Arcetri (Italy); Marco Stangalini, INAF - Osservatorio Astronomico di Monte Porzio (Italy) . . . . . [9147-281]

Gemini planet imager observational calibrations III: empirical measurement methods and applications of high resolution microlens PSFs, Patrick J. Ingraham, Stanford Univ. (USA); Jean-Baptiste Ruffio, SETI Institute (USA); Marshall D. Perrin, Space Telescope Science Institute (USA); Jérôme Maire, Dunlap Institute for Astronomy & Astrophysics (Canada); Schuyler G. Wolff, Space Telescope Science Institute (USA); Christian Marois, NRC - Herzberg Institute of Astrophysics (Canada); Zachary H. Draper, Univ. of Victoria (Canada); Franck Marchis, SETI Institute (USA); Vincent Fesquet, Gemini Observatory (Chile). . . . . [9147-282]

Development of a 830-1350 nm frequency Comb for planet-finding in the NIR, Gabriel G. Ycas, Scott A. Diddams, National Institute of Standards and Technology (USA); Steven N. Osterman, Univ. of Colorado at Boulder (USA); Suvrath Mahadevan, The Pennsylvania State Univ. (USA). . . . . [9147-283]

A laser locked Fabry-Perot etalon with 3 cm/s stability for spectrograph calibration, Yulia V. Gurevich, Yale Univ. (USA); Julian Stürmer, Landessternwarte Heidelberg (Germany); Christian Schwab, The Pennsylvania State Univ. (USA); Thorsten Fuehrer, Technische Univ. Darmstadt (Germany); Steve K. Lamoreaux, Los Alamos National Lab. (USA); Andreas Quirrenbach, Landessternwarte Heidelberg (Germany); Thomas Walther, Technische Univ. Darmstadt (Germany) . . . . . [9147-284]

Optimizing atmospheric dispersion correction for precision radial velocities with a fiber-fed spectrograph, Rebecca A. Stoll, Colby A. Jurgenson, Debra A. Fischer, Tyler M. McCracken, Yale Univ. (USA) . . . . . [9147-285]

Gemini planet imager observational calibrations II: detector performance and calibration, Patrick J. Ingraham, Stanford Univ. (USA); Marshall D. Perrin, Space Telescope Science Institute (USA); Jean-Baptiste Ruffio, SETI Institute (USA); Naru Sadakuni, Gemini Observatory (Chile); Jérôme Maire, Dunlap Institute for Astronomy & Astrophysics (Canada); Jeffrey K. Chilcote, James E. Larkin, Univ. of California, Los Angeles (USA); Franck Marchis, SETI Institute (USA) . . . . [9147-286]

How to inject light efficiently into single-mode fibers, Nemanja Jovanovic, Subaru Telescope, National Astronomical Observatory of Japan (USA); Christian Schwab, The Pennsylvania State Univ. (USA); Olivier Guyon, Subaru Telescope, National Astronomical Observatory of Japan (USA); Frantz Martinache, Observatoire de la Côte d'Azur (France); Nick Cvetojevic, The Univ. of Sydney (Australia). . . . . [9147-287]

Manufacturing, integration, and test results of the MATISSE cold optics bench, Felix Bettonvil, ASTRON (Netherlands) and Leiden Univ. (Netherlands); Gabby Aitink-Kroes, Tibor Agócs, Albert P. van Duin, Eddy Elswijk, Menno de Haan, Rik ter Horst, Jan Kragt, Sjouke Kuindersma, ASTRON (Netherlands); Ramón Navarro, Ronald Roelfsema, NOVA Optical Infrared Instrumentation Group (Netherlands); Menno Schuil, ASTRON (Netherlands); Niels Tromp, NOVA Optical Infrared Instrumentation Group (Netherlands); Lars Venema, ASTRON (Netherlands); Attila Jaskó, MTA Research Ctr. for Astronomy and Earth Sciences (Hungary) [9147-288]

Concept and optical design of the cross-dispersed module for CRIRES+, Ernesto Oliva, Andrea Tozzi, Debora Ferruzzi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Roman Follert, Artie P. Hatzes, Thüringer Landessternwarte Tautenburg (Germany); Nikolai A. Piskunov, Ulrike Heiter, Eric Stempels, Thomas Marquart, Uppsala Univ. (Sweden); Ansgar Reiners, Ulf Seemann, Guillem Anglada-Escude, Georg-August-Univ. Göttingen (Germany); Reinhold J. Dorn, Jean-Louis Lizon, Paul Bristow, Dietrich Baade, Barbara Klein, Yves Jung, Derek J. Ives, Florian Kerber, Eszter Pozna, Jerome Paufique, Hans-Ulrich Käufl, European Southern Observatory (Germany); Tom Löwinger, Thüringer Landessternwarte Tautenburg (Germany) . . . . . [9147-289]

Opto-mechanical design of a new cross dispersion unit for the CRIRES+ high resolution spectrograph for the VLT, Jean-Louis Lizon, Barbara Klein, European Southern Observatory (Germany); Ernesto Oliva, INAF - Osservatorio Astrofisico di Arcetri (Italy); Tom Löwinger, Thüringer Landessternwarte Tautenburg (Germany); Guillem Anglada-Escude, Georg-August-Univ. Göttingen (Germany); Dietrich Baade, Paul Bristow, Reinhold J. Dorn, European Southern Observatory (Germany); Roman Follert, Thüringer Landessternwarte Tautenburg (Germany); Jason Grunhut, European Southern Observatory (Germany); Artie P. Hatzes, Thüringer Landessternwarte Tautenburg (Germany); Ulrike Heiter, Uppsala Univ. (Sweden); Derek J. Ives, Yves Jung, Florian Kerber, European Southern Observatory (Germany); Matthew Lockhart, Thomas Marquart, Uppsala Univ. (Sweden); Jérome Paufique, European Southern Observatory (Germany); Nikolai A. Piskunov, Uppsala Univ. (Sweden); Eszter Pozna, European Southern Observatory (Germany); Ansgar Reiners, Ulf Seemann, Georg-August-Univ. Göttingen (Germany); Eric Stempels, Uppsala Univ. (Sweden) . . . . . [9147-290]

HiJaK: the high-resolution J, H and K spectrometer, Philip S. Muirhead, Zachary J. Hall, Mark Veyette, Boston Univ. (USA). . . . . [9147-291]

Combining vector-phase coronagraphy with dual-beam polarimetry, Frans Snik, Gilles Otten, Matthew A. Kenworthy, Leiden Univ. (Netherlands); Dimitri Mawet, European Southern Observatory (Chile). . . . . [9147-293]

An atmospheric turbulence and telescope simulator for the development of AOLI, Marta Puga Antolín, Roberto L. López, Víctor González Escalera, Rafael Rebolo-López, Luis Fernando Rodríguez-Ramos, Alejandro Oscoz Abad, Sergio Velasco, Instituto de Astrofísica de Canarias (Spain); David M. P. King, Craig D. MacKay, Jonathan Crass, Univ. of Cambridge (United Kingdom); Antonio Pérez Garrido, Univ. Politécnica de Cartagena (Spain); Lucas Labadie, Univ. zu Köln (Germany) . . . . . [9147-294]

Stable imaging for astronomy, Mathilde Beaulieu, Observatoire de la Côte d'Azur (France); Lyu Abe, Lab. J.L. Lagrange (France); Farrokh Vakili, Yves Bresson, Sebastien Ottogalli, Olivier Preis, Jean-Pierre Rivet, Observatoire de la Côte d'Azur (France) . . . . . [9147-295]

Adapting a very high resolution echelle spectrograph to an 8-meter class telescope, Robert O. Reynolds, Large Binocular Telescope Observatory (USA) . . . . . [9147-297]

Development of compact and ultra-high-resolution spectrograph with multi-GHz optical frequency comb, Mamoru Endo, The Univ. of Tokyo (Japan) and Exploratory Research for Advanced Technology (Japan); Takashi Sukegawa, Canon Inc. (Japan); Alissa Silva, Institute of Solid State Physics (Japan) and Exploratory Research for Advanced Technology (Japan); Yohei Kobayashi, Institute for Solid State Physics (Japan) and Exploratory Research for Advanced Technology (Japan). . . . . [9147-298]

The habitable-zone planet finder calibration system, Samuel Halverson, Suvrath Mahadevan, Lawrence W. Ramsey, Ryan C. Terrien, Arpita Roy, Christian Schwab, Chad F. Bender, Frederick R. Hearty, Eric I. Levi, The Pennsylvania State Univ. (USA); Gabriel G. Ycas, Univ. of Colorado at Boulder (USA) and National Institute of Standards and Technology (USA); Scott A. Diddams, National Institute of Standards and Technology (USA); Steven N. Osterman, Univ. of Colorado at Boulder (USA) . . . . . [9147-299]

A stable and inexpensive wavelength comb for precise wavelength calibration of astronomical spectrographs, Tobias Feger, Michael Ireland, Joao Bento, Carlos Bacigalupo, Macquarie Univ. (Australia); Quentin A. Parker, Macquarie Univ. (Australia) and Australian Astronomical Observatory (Australia) . . . . . [9147-300]

Performance modeling of an upgraded NIRSPEC on Keck, Emily C. Martin, Michael P. Fitzgerald, Ian S. McLean, Theodore Aliado, George Brims, Christopher A. Johnson, Kenneth G. Magnone, Eric Wang, Jason L. Weiss, Univ. of California, Los Angeles (USA). . . . . [9147-301]

Optical cavity qualification of the 'Tor Vergata' Fabry-Pérot interferometer, Luca Giovannelli, Francesco Berrilli, Dario Del Moro, Univ. degli Studi di Roma "Tor Vergata" (Italy); Vincenzo Greco, Istituto Nazionale di Ottica (Italy); Roberto Piazzesi, Univ. degli Studi di Roma "Tor Vergata" (Italy); Andrea Sordini, Istituto Nazionale di Ottica (Italy); Marco Stangalini, Univ. degli Studi di Roma "Tor Vergata" (Italy) . . . . . [9147-304]

Gemini planet imager observational calibrations VII: on-sky polarimetric performance of the Gemini planet imager, Sloane J. Wiktorowicz, Univ. of California, Santa Cruz (USA); Max Millar-Blanchaer, Dunlap Institute for Astronomy & Astrophysics (Canada) and Univ. of Toronto (Canada); Marshall D. Perrin, Space Telescope Science Institute (USA); James R. Graham, Univ. of California, Berkeley (USA); Michael P. Fitzgerald, Univ. of California, Los Angeles (USA); Jérôme Maire, Dunlap Institute for Astronomy & Astrophysics (Canada) and Univ. of Toronto (Canada); Patrick J. Ingraham, Stanford Univ. (USA) and Univ. de Montréal (Canada); Dmitry Savransky, Cornell Univ. (USA) and Lawrence Livermore National Lab. (USA); Bruce A. Macintosh, Lawrence Livermore National Lab. (USA) and Stanford Univ. (USA); Sandrine J. Thomas, NASA Ames Research Ctr. (USA); Jeffrey K. Chilcote, Univ. of California, Los Angeles (USA); Zachary H. Draper, Univ. of Victoria (Canada); Inseok Song, Univ. of Georgia (USA). . . . . [9147-305]

Gemini planet imager observational calibrations V: astrometry and distortion, Quinn M. Konopacky, Univ. of Toronto (Canada); Sandrine J. Thomas, NASA Ames Research Ctr. (USA); Bruce A. Macintosh, Stanford Univ. (USA); Daren Dillon, Univ. of California, Santa Cruz (USA); Naru Sadakuni, Gemini Observatory (Chile); Jérôme Maire, Univ. of Toronto (Canada); Christian Marois, NRC-Dominion Astrophysical Observatory (Canada); Patrick J. Ingraham, Stanford Univ. (USA); Franck Marchis, SETI Institute (USA); Marshall D. Perrin, Space Telescope Science Institute (USA); James R. Graham, Jason J. Wang, Univ. of California, Berkeley (USA); Katie M. Morzinski, The Univ. of Arizona (USA); Laurent A. Pueyo, Space Telescope Science Institute (USA); Jeffrey K. Chilcote, Univ. of California, Los Angeles (USA); Daniel C. Fabrycky, The Univ. of Chicago (USA); Sasha Hinkley, California Institute of Technology (USA); Paul R. Kalas, Univ. of California, Berkeley (USA); James E. Larkin, Univ. of California, Los Angeles (USA); Ben R. Oppenheimer, American Museum of Natural History (USA); Jennifer Patience, Arizona State Univ. (USA); Leslie Saddlemyer, NRC-Dominion Astrophysical Observatory (Canada); Anand Sivaramakrishnan, Space Telescope Science Institute (USA) and Stony Brook Univ. (USA) and American Museum of Natural History (USA) . . . . . [9147-306]

Gemini planet imager observational calibrations VI: photometric and spectroscopic calibration for the integral field spectrograph, Jérôme Maire, Dunlap Institute for Astronomy & Astrophysics (Canada); Patrick J. Ingraham, Stanford Univ. (USA); Marshall D. Perrin, Space Telescope Science Institute (USA); Dmitry Savransky, Lawrence Livermore National Lab. (USA); Jason J. Wang, Univ. of California, Berkeley (USA); Jean-Baptiste Ruffio, SETI Institute (USA); Schuyler G. Wolff, Johns Hopkins Univ. (Canada); Christian Marois, NRC - Herzberg Institute of Astrophysics (Canada); Laurent A. Pueyo, Space Telescope Science Institute (Canada); Sandrine J. Thomas, NASA Ames Research Ctr. (USA); Max Millar-Blanchaer, Quinn M. Konopacky, Dunlap Institute for Astronomy & Astrophysics (Canada); Jeffrey K. Chilcote, James E. Larkin, Jason L. Weiss, Univ. of California, Los Angeles (USA); James R. Graham, Univ. of California, Berkeley (USA); Bruce A. Macintosh, Stanford Univ. (USA); René Doyon, Univ. de Montréal (Canada); Anand Sivaramakrishnan, Space Telescope Science Institute (USA); Alexandra Z. Greenbaum, Johns Hopkins Univ. (USA); Abhijith Rajan, Jennifer Patience, Arizona State Univ. (USA). . . . . [9147-307]

A robotic, compact, and extremely high resolution optical spectrograph for a Close-in Super-Earth survey, Jian Ge, Scott Powell, Bo Zhao, Frank Varosi, Jian Liu, Rui Li, Sirinrat Sithajan, Sidney L. Schofield, Univ. of Florida (USA); Matthew W. Muterspaugh, Michael H. Williamson, Tennessee State Univ. (USA) . . . . [9147-308]

Characterization of the instrumental polarization induced by VLT/UT4 with NACO, Jozua de Boer, Leiden Observatory (Netherlands) and European Southern Observatory (Chile); Julien H. V. Girard, Dimitri Mawet, European Southern Observatory (Chile); Frans Snik, Christoph U. Keller, Leiden Observatory (Netherlands); Julien Milli, European Southern Observatory (Chile) and Univ. Joseph Fourier (France) . . . . . [9147-309]

The upgrade of a high dispersion spectro-plaimeter, VESPolA: circular polarimetery mode and extremely high resolution mode, Takayuki Arasaki, Kyoto Sangyo Univ. (Japan); Yuji Ikeda, Kyoto Sangyo Univ. (Japan) and Photocoding (Japan); Akika Nakamichi, Hideyo Kawakita, Kyoto Sangyo Univ. (Japan). . . . . [9147-310]

FIDEOS: a high resolution echelle spectrograph for the 1-m telescope at La Silla, Amokrane Berdja, Leonardo Vanzi, Marcelo S. Tala, Matias Jones, Pontificia Univ. Católica de Chile (Chile) . . . . . [9147-311]

The Gemini high-resolution optical spectrograph (GHOST) bench spectrograph preliminary optical design, John Pazder, NRC - Herzberg Institute of Astrophysics (Canada) . . . . . [9147-312]

Performance evaluation for optical modules of IGRINS, Kyeong Yeon Ko, Jeong-Yeol Han, Jakyoung Nah, In-Soo Yuk, Heeyoung Oh, Chan Park, Jae Sok Oh, Moo-Young Chun, Korea Astronomy and Space Science Institute (Korea, Republic of); Hanshin Lee, The Univ. of Texas at Austin (USA); Kang-Min Kim, Ueejeong Jeong, Korea Astronomy and Space Science Institute (Korea, Republic of); Soojong Pak, Kyung Hee Univ. (Korea, Republic of); Daniel T. Jaffe, Michael D. Pavel, Michael Gully-Santiago, The Univ. of Texas at Austin (USA) . . . . . [9147-313]

HARPSN @ TNG, two year harvesting data: performances and results, Rosario Cosentino, Telescopio Nazionale Galileo (Spain); Francesco A. Pepe, Observatoire de Genèva (Switzerland); Andrew C. Cameron, Univ. of St. Andrews (United Kingdom); David Latham, Harvard-Smithsonian Ctr. for Astrophysics (USA); Emilio Molinari, Telescopio Nazionale Galileo (Spain); Stéphane Udry, Christophe Lovis, Observatoire de Genèva (Switzerland) . . . . . [9147-314]

Development of infrared echelle spectrograph and mid-infrared heterodyne spectrometer on a small telescope at Haleakala, Hawaii for planetary observation, Takeshi Sakanoi, Yasumasa Kasaba, Masato Kagitani, Hiromu Nakagawa, Tohoku Univ. (Japan); Jeffrey R. Kuhn, Shoichi Okano, Univ. of Hawai'i (USA) . . . . . [9147-315]

ERIS: the exoplanet high-resolution image simulator for CHARIS, Mary Anne Peters-Limbach, Tyler D. Groff, N. Jeremy Kasdin, Princeton Univ. (USA)[9147-316]

The solar system at 10 parsec: exploiting the ExAO of LBT in the visual wavelengths, Marco Stangalini, Fernando Pedichini, INAF - Osservatorio Astronomico di Roma (Italy); Enrico Pinna, INAF - Osservatorio Astrofisico di Arcetri (Italy); Mauro Centrone, INAF - Osservatorio Astronomico di Roma (Italy); Simone Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy); Jacopo Farinato, INAF - Osservatorio Astronomico di Padova (Italy); Emanuele Giallongo, INAF - Osservatorio Astronomico di Roma (Italy); Fernando Quirós-Pacheco, INAF - Osservatorio Astrofisico di Arcetri (Italy) . . . . . [9147-317]

Results and characterization of an EMCCD-based spectrograph for high temporal resolution, Philippe Richelet, Univ. de Montréal (Canada) and Nüvü Caméras Inc. (Canada); Olivier Daigle, Nüvü Caméras Inc. (Canada); René Doyon, Étienne Artigau, Univ. de Montréal (Canada); Oleg Djazovski, Canadian Space Agency (Canada) . . . . . [9147-318]

SPRAT: spectrograph for the rapid analysis of transients, Andrzej S. Piascik, Iain A. Steele, Stuart D. Bates, Christopher J. Mottram, Robert M. Barnsley, Robert J. Smith, Liverpool John Moores Univ. (United Kingdom) . . . . . [9147-319]

DIPOL-2: a double-image high precision polarimeter, Vilppu Piirola, Andrei Berdyugin, Univ. of Turku (Finland); Svetlana Berdyugina, Kiepenheuer-Institut für Sonnenphysik (Germany) . . . . . [9147-321]

H.O.R.S. a new visiting instrument for G.T.C. based on the Utrecht Echelle spectrograph, Jose Peñate Castro, Félix Gracia Temich, Juan Calvo Tovar, Carlos Allende Prieto, Instituto de Astrofísica de Canarias (Spain) . . . . . [9147-322]

ESPRESSO exposure meter: a chromatic approach to radial velocity, Marco Landoni, Marco Riva, INAF - Osservatorio Astronomico di Brera (Italy); Francesco A. Pepe, Observatoire de Genèva (Switzerland); Filippo Maria M. Zerbi, Istituto Nazionale di Astrofisica (Italy); Alexandre Cabral Pereira, Univ. de Lisboa (Portugal); Stefano Cristiani, INAF - Osservatorio Astronomico di Trieste (Italy); Denis Mégevand, Observatoire de Genèva (Switzerland); Paolo Conconi, INAF - Osservatorio Astronomico di Brera (Italy) . . . . . [9147-323]

First calibration and visible wavelength observations of Khayyam, a tunable spatial heterodyne spectroscopy (SHS), Sona Hosseini, Univ. of California, Davis (USA); Walter Harris, The Univ. of Arizona (USA) . . . . . [9147-324]

The metrology system of the multi object spectrograph MOONS, Miguel Torres, Leonardo Vanzi, Rolando Dunner, Francisco Belmar, Louise C. Dauvin, Tzu Chen, Pontificia Universidad Catolica de Chile (Chile) . . . . . [9147-325]

Broadband astrocomb at the HARPS-N spectrograph for Earth-like exoplanet searches, Nicholas Langellier, Chih-Hao Li, Alexander G. Glenday, Gabor Furesz, Harvard-Smithsonian Ctr. for Astrophysics (USA); Guoqing Chang, Hamburg Univ. (Germany); Hung-Wen Chen, Jinkang Lim, Massachusetts Institute of Technology (USA); Andrew Szentgyorgyi, Dimitar D. Sasselov, David F. Phillips, Harvard-Smithsonian Ctr. for Astrophysics (USA); Franz X. Kärtner, Massachusetts Institute of Technology (USA) and Hochschule für Angewandte Wissenschaften Hamburg (Germany); Ronald L. Walsworth, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9147-326]

A coronagraph based on two spatial light modulators for active amplitude apodizing and phase correction, Jiangpei Dou, Nanjing Institute of Astronomical Optics & Technology (China); Deqing Ren, California State Univ., Northridge (USA) and Nanjing Institute of Astronomical Optics & Technology (China); Yongtian Zhu, Xi Zhang, Gang Zhao, Nanjing Institute of Astronomical Optics & Technology (China); Chengchao Liu, Nanjing Institute of Astronomical Optics & Technology (China) and Univ. of Chinese Academy of Sciences (China) . . . . . [9147-328]

Novel infrared polarimeter for the ESO CRIRES+ instrument, Matthew Lockhart, Nikolai A. Piskunov, Eric Stempels, Uppsala Univ. (Sweden); Göran Olofsson, Stockholm University (Sweden); Michael Escuti, North Carolina State Univ. (USA); Ernesto Oliva, INAF - Osservatorio Astrofisico di Arcetri (Italy); Hans-Ulrich Käufl, European Southern Observatory (Germany); Ulrike Heiter, Thomas Marquart, Uppsala University (Sweden); Guillem Anglada-Escude, Georg-August-Universität (Germany); Dietrich Baade, Paul Bristow, Reinhold J Dorn, European Southern Observatory (Germany); Roman Follert, Thüringer Landessternwarte (Germany); Domingo Gojak, Jason H Grunhut, European Southern Observatory (Germany); Artie Hatzes, Thüringer Landessternwarte (Germany); Derek Ives, Yves Jung, Florian Kerber, Barbara Klein, Jean-Louis Lizon, European Southern Observatory (Germany); Tom Löwinger, Thüringer Landessternwarte (Germany); Jerome Paufique, Eszter Pozna, European Southern Observatory (Germany); Ansgar Reiners, Ulf Seemann, Georg-August-Universität (Germany); Elena Valenti, European Southern Observatory (Germany) . . . . . [9147-329]

ESPRESSO Coudé-Train: complexities of a simultaneous optical feeding from the four VLT unit telescopes, Alexandre Cabral Pereira, Manuel Abreu, João M. P. Coelho, Ricardo Gomes, Univ. de Lisboa (Portugal); Manuel A. Monteiro, Univ. do Porto (Portugal); António Oliveira, Pedro Santos, Univ. de Lisboa (Portugal); Gerardo Ávila, Bernard-Alexis Delabre, European Southern Observatory (Germany); Paolo Di Marcantonio, Igor Coretti, INAF - Osservatorio Astronomico di Trieste (Italy); Nuno C. Santos, Univ. do Porto (Portugal); Filippo Maria M. Zerbi, INAF - Osservatorio Astronomico di Brera (Italy); Denis Mégevand, Observatoire de Genèva (Switzerland). . . . . [9147-330]

SiFAP@TNG: a fast multichannel astronomical photometer based on silicon photo multipliers mounted at the Telescopio Nazionale Galileo, Filippo Ambrosino, Franco Meddi, Corinne Rossi, Silvia Sclavi, Univ. degli Studi di Roma La Sapienza (Italy); Roberto Nesci, INAF-IAPS (Italy); Ivan Bruni, INAF - Osservatorio Astronomico di Bologna (Italy); Adriano Ghedina, Luis Riverol, Fundación Galileo Galilei - INAF (Spain); Luca Di Fabrizio, Telescopio Nazionale Galileo (Spain) . . . . . [9147-371]

Photometric study of the Paranal observatory using MASS database, Abdelouahed Abahamid, Univ. Cadi Ayyad (Morocco); Marc S. Sarazin, European Southern Observatory (Germany) . . . . . [9147-373]

THURSDAY 26 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . THU 9:00 TO 10:00

Session Chair: **Masanori Iye,** National Astronomical Observatory of Japan (Japan)

9:00: **Hyper Suprime-Cam for Weak Gravitational Lensing Survey** *(Plenary)*, Satoshi Miyazaki, National Astronomical Observatory of Japan (Japan) . . . . . [9143-507]

9:30: **Transiting Exoplanet Survey Satellite (TESS)** *(Plenary)*, George R. Ricker Jr., Massachusetts Institute of Technology (USA) . . . . . [9143-508]

Coffee Break . . . . . Thu 10:00 to 10:30

SESSION 9

LOCATION: ROOM 520C . . . . . THU 10:30 TO 11:50

High Spatial Resolution Instruments II

Session Chair: **Maureen L. Savage,** SOFIA / USRA (USA)

10:30: **ERIS: preliminary design phase overview**, Harald Kuntschner, Liselotte Jochum, Paola Amico, Enrico Marchetti, Johannes K. Dekker, Matteo Accardo, Roland Brast, Martin Brinkmann, Ralf D. Conzelmann, Bernard-Alexis Delabre, Michel Duchateau, Enrico Fedrigo, Gert Finger, Christoph Frank, Fernando Gago Rodriguez, Barbara Klein, Jens Knudstrup, Miska Le Louarn, Lars Lundin, Andrea Modigliani, Michael Mueller, Mark Neeser, Sebastien Tordo, Elena Valenti, European Southern Observatory (Germany); Frank Eisenhauer, Eckhard Sturm, Helmut Feuchtgruber, Michael Hartl, Reiner Hofmann, Heinrich Huber, Max-Planck-Institut für extraterrestrische Physik (Germany); Markus P. Plattner, European Southern Observatory (Germany); Josef Schubert, Karl Tarantik, Erich Wiezorrek, Max-Planck-Institut für extraterrestrische Physik (Germany); Michael R. Meyer, Sascha P. Quanz, Adrian M. Glauser, Jarron M. Leisenring, ETH Zürich (Switzerland); Harald Weisz, Ingenieursbureau für den Maschinenbau (Germany); Simone Esposito, Marco Xompero, Guido Agapito, Jacopo Antichi, Valdemaro Biliotti, Marco Bonaglia, Runa Briguglio, Luca Carbonaro, Giovanni Cresci, Luca Fini, Enrico Pinna, Alfio T. Puglisi, Fernando Quirós-Pacheco, Armando Riccardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Carmelo Arcidiacono, INAF - Osservatorio Astronomico di Capodimonte (Italy); Gianluca Di Rico, Mauro Dolci, INAF - Osservatorio Astronomico di Teramo (Italy). . . . . [9147-66]

10:50: **High-contrast planet imager for Kyoto 4-m segmented telescope**, Taro Matsuo, Kyoto Univ. (Japan); Naoshi Murakami, Hokkaido Univ. (Japan); Takayuki Kotani, National Astronomical Observatory of Japan (Japan); Hajime Kawahara, The Univ. of Tokyo (Japan); Noriaki Natsume, Masaru Kino, Kyoto Univ. (Japan); Hiroaki Imada, Univ. of Tsukuba (Japan); Mikio Kurita, Kyoto Univ. (Japan); Masatsugu Iribe, Hideya Nishida, Osaka Electro-Communication Univ. (Japan); Manabu Kida, Hirofumi Kitou, Hokkaido Univ. (Japan); Kumi Ishikawa, RIKEN (Japan); Yutaka Uda, Osaka Electro-Communication Univ. (Japan); Hitoshi Tokoro, Nano-Optonics Research Institute (Japan); Tetsuya Nagata, Fumihide Iwamuro, Kyoto Univ. (Japan); Noriaki Miura, Kitami Institute of Technology (Japan); Shin Oya, Subaru Telescope, National Astronomical Observatory of Japan (Armenia); Yoichi Itoh, Univ. of Hyogo (Japan); Hiroshi Shibai, Osaka Univ. (Japan); Motohide Tamura, The Univ. of Tokyo (Japan). . . . . [9147-67]

11:10: **Construction and status of the CHARIS high contrast imaging spectrograph**, Tyler D. Groff, N. Jeremy Kasdin, Mary Anne Peters-Limbach, Michael Galvin, Michael A. Carr, Michael W. McElwain, Princeton Univ. (USA); Timothy D. Brandt, Institute for Advanced Study (USA); Gillian Knapp, Norman Jarosik, Craig Loomis, Princeton Univ. (USA); Kyle Mede, The Univ. of Tokyo (Japan); Markus Janson, Queens Univ. (United Kingdom); Olivier Guyon, Nemanja Jovanovic, Subaru Telescope, National Astronomical Observatory of Japan (USA); Frantz Martinache, Observatoire de la Côte d'Azur (France); Naruhisa Takato, Subaru Telescope, National Astronomical Observatory of Japan (USA); Masahiko Hayashi, Subaru Telescope, National Astronomical Observatory of Japan (Japan). . . . . [9147-68]

11:30: **A prototype polarimetric integral field unit for EPICS: design and first on-sky results**, Michiel Rodenhuis, Gerard van Harten, Ronniy Joseph, Christoph U. Keller, Leiden Observatory (Netherlands) . . . . . [9147-69]

LOCATION: ROOM 520C . . . . . 11:50 TO 12:10

POSTER POPS

Poster authors have been contacted and selected to make brief presentations.

Lunch/Exhibition Break . . . . . Thu 12:10 to 13:20

SESSION 10

LOCATION: ROOM 520C . . . . . THU 13:20 TO 18:00

Instruments for Extremely Large Telescopes

Session Chair: **Luc Simard,** NRC - Herzberg Institute of Astrophysics (Canada)

13:20: **The status of the instrument development program for the Giant Magellan telescope** *(Invited Paper)*, George Jacoby, Antonin H. Bouchez, Giant Magellan Telescope Project (USA); Matthew Colless, The Australian National Univ. (Australia); Darren L. DePoy, Texas A&M Univ. (USA); Daniel T. Jaffe, The Univ. of Texas at Austin (USA); Peter McGregor, The Australian National Univ. (Australia); Stephen A. Shectman, Carnegie Observatories (USA); Andrew Szentgyorgyi, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9147-70]

13:45: **The E-ELT instrument roadmap: a status report** *(Invited Paper)*, Suzanne K. Ramsay, Mark M. Casali, Juan C. Gonzalez, Norbert Hubin, European Southern Observatory (Germany) . . . . . [9147-71]

14:10: **GMACS: a wide field, multi-object, moderate-resolution, optical spectrograph for the Giant Magellan telescope**, Darren L. DePoy, Jennifer L. Marshall, Casey Papovich, Ting Li, Travis Prochaska, Texas A&M Univ. (USA) . . . . . [9147-72]

14:30: **METIS: the mid-infrared E-ELT imager and spectrograph**, Bernhard R. Brandl, Leiden Univ. (Netherlands); Alistair Glasse, UK Astronomy Technology Ctr. (United Kingdom); Manuel Guedel, Univ. Wien (Austria); Rainer Lenzen, Max-Planck-Institut für Astronomie (Germany); Michael R. Meyer, ETH Zürich (Switzerland); Frank Molster, Leiden Univ. (Netherlands) and NOVA Optical Infrared Instrumentation Group (Netherlands); Eric J. Pantin, CEA-Ctr. de SACLAY (France); Lars Venema, ASTRON (Netherlands); Christoffel Waelkens, Katholieke Univ. Leuven (Belgium). . . . . [9147-73]

14:50: **GMTNIRS (Giant Magellan telescope near-infrared spectrograph): optimizing the design for maximum science productivity and minimum risk**, Daniel T. Jaffe, The Univ. of Texas at Austin (USA); Stuart I. Barnes, Stuart Barnes Optical Design (New Zealand); Cynthia B. Brooks, Michael Gully-Santiago, The Univ. of Texas at Austin (USA); Soojong Pak, Kyung Hee Univ. (Korea, Republic of); Chan Park, In-Soo Yuk, Korea Astronomy and Space Science Institute (Korea, Republic of) . . . . . [9147-74]

Coffee Break . . . . . Thu 15:10 to 15:40

15:40: **HIRES: the high resolution spectrograph for the E-ELT**, Filippo Maria M. Zerbi, Istituto Nazionale di Astrofisica (Italy); François Bouchy, Lab. d'Astrophysique de Marseille (France); Johan Fynbo, Univ. of Copenhagen (Denmark); Roberto Maiolino, Univ. of Cambridge (United Kingdom); Nikolai A. Piskunov, Uppsala Univ. (Sweden); Rafael Rebolo-López, Instituto de Astrofísica de Canarias (Spain); Nuno C. Santos, Univ. do Porto (Portugal); Klaus G. Strassmeier, Leibniz-Institut für Astrophysik Potsdam (Germany); Stéphane Udry, Observatoire de Genèva (Switzerland); Leonardo Vanzi, Pontificia Univ. Católica de Chile (Chile); Marco Riva, INAF - Osservatorio Astronomico di Brera (Italy); Isabelle Boisse, Lab. d'Astrophysique de Marseille (France); Xavier Bonfils, Univ. Joseph Fourier (France); David F. Buscher, Univ. of Cambridge (United Kingdom); Alexandre Cabral Pereira, Univ. de Lisboa (Portugal); Paolo Di Marcantonio, INAF - Osservatorio Astronomico di Trieste (Italy); Igor DiVarano, Leibniz-Institut für Astrophysik Potsdam (Germany); David Henry, UK Astronomy Technology Ctr. (United Kingdom); Manuel A. Monteiro, Univ. do Porto (Portugal); Timothy J. Morris, Graham Murray, Durham Univ. (United Kingdom); Ernesto Oliva, INAF - Osservatorio Astrofisico di Arcetri (Italy); Ian R. Parry, Univ. of Cambridge (United Kingdom); Francesco A. Pepe, Observatoire de Genèva (Switzerland); Andreas Quirrenbach, Landessternwarte Heidelberg (Germany); José Luis Rasilla, Instituto de Astrofísica de Canarias (Spain); Philip Rees II, UK Astronomy Technology Ctr. (United Kingdom); Eric Stempels, Uppsala Univ. (Sweden); Luca Valenziano, INAF - IASF Bologna (Italy); Martyn Wells, UK Astronomy Technology Ctr. (United Kingdom); François Wildi, Observatoire de Genèva (Switzerland); Livia Origlia, INAF - Osservatorio Astronomico di Bologna (Italy); Carlos Allende Prieto, Instituto de Astrofísica de Canarias (Spain); Andrea Chiavassa, Lab. J.L. Lagrange (France); Stefano Cristiani, INAF - Osservatorio Astronomico di Trieste (Italy); Pedro Figueira, Univ. do Porto (Portugal); Bengt Gustafsson, Uppsala Univ. (Sweden); Artie P. Hatzes, Thüringer Landessternwarte Tautenburg (Germany); Martin Haehnelt, Univ. of Cambridge (United Kingdom); Kevin Heng, Univ. Bern (Switzerland); Garik Israelian, Instituto de Astrofísica de Canarias (Spain); Oleg Kochukhov, Uppsala Univ. (Sweden); Christophe Lovis, Observatoire de Genèva (Switzerland); Carlos J. A. P. Martins, Univ. do Porto (Portugal); Pasquier Noterdaeme, Patrick Petitjean, Institut d'Astrophysique de Paris (France); Thomas Puzia, Pontificia Univ. Católica de Chile (Chile); Didier Queloz, Univ. of Cambridge (United Kingdom); Ansgar Reiners, Georg-August-Univ. Göttingen (Germany); Manuela Zoccali, Pontificia Univ. Católica de Chile (Chile) . . . . . [9147-75]

16:00: **The infrared imaging spectrograph (IRIS) for TMT: instrument overview**, Anna M. Moore, California Institute of Technology (USA); James E. Larkin, Univ. of California, Los Angeles (USA); Shelley A. Wright, Univ. of Toronto (Canada); Brian J. Bauman, Lawrence Livermore National Lab. (USA); Jennifer S. Dunn, NRC - Herzberg Institute of Astrophysics (Canada); Andrew Phillips, Univ. of California Observatories (USA); Ryuji Suzuki, National Astronomical Observatory of Japan (Japan); Kai Zhang, National Astronomical Observatories (China) and Nanjing Institute of Astronomical Optics & Technology (China); Theodore Aliado, George Brims, John M. Canfield, Univ. of California, Los Angeles (USA); Shaojie Chen, Dunlap Institute for Astronomy & Astrophysics (Canada); Richard G. Dekany, Alex Delacroix, California Institute of Technology (USA); Tuan Do, Dunlap Institute for Astronomy & Astrophysics (Canada); Brent L. Ellerbroek, Thirty Meter Telescope Observatory Corp. (USA); Glen Herriot, NRC - Herzberg Institute of Astrophysics (Canada); Bungo Ikenoue, National Astronomical Observatory of Japan (Japan); Christopher A. Johnson, Univ. of California, Los Angeles (USA); Elliot Meyer, Univ. of Toronto (Canada); Yoshiyuki Obuchi, National Astronomical Observatory of Japan (Japan); John Pazder, Vladimir A. Reshetov, NRC - Herzberg Institute of Astrophysics (Canada); Reed L. Riddle, California Institute of Technology (USA); Sakae Saito, National Astronomical Observatory of Japan (Japan); Luc Simard, NRC-Dominion Astrophysical Observatory (Canada) and National Research Council Canada (Canada); Roger M. Smith, California Institute of Technology (USA); Ji Man Sohn, Univ. of California, Los Angeles (USA); Fumihiro Uraguchi, Tomonori Usuda, National Astronomical Observatory of Japan (Japan); Eric Wang, Jason L. Weiss, Univ. of California, Los Angeles (USA); Robert Wooff, NRC - Herzberg Institute of Astrophysics (Canada) . . . . . [9147-76]

16:20: **HARMONI: the first light integral field spectrograph for the E-ELT**, Niranjan A. Thatte, Univ. of Oxford (United Kingdom); Ian Bryson, UK Astronomy Technology Ctr. (United Kingdom); Fraser Clarke, Univ. of Oxford (United Kingdom); Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom); Matthias Tecza, Univ. of Oxford (United Kingdom); Roland M. Bacon, Alban Remillieux, Observatoire de Lyon (France); Evencio Mediavilla, José Miguel Herreros Linares, Instituto de Astrofísica de Canarias (Spain); Santiago Arribas, Ctr. de Astrobiología (Spain); Christopher J. Evans, David W. Lunney, UK Astronomy Technology Ctr. (United Kingdom); Thierry Fusco, ONERA (France) and Lab. d'Astrophysique de Marseille (France); Kieran O'Brien, Univ. of Oxford (United Kingdom); Ian A. Tosh, Rutherford Appleton Lab. (United Kingdom); Derek J. Ives, Gert Finger, European Southern Observatory (Germany); Ryan Houghton, Roger L. Davies, James D. Lynn, Jamie R. Allen, Simon D. Zieleniewski, Sarah Kendrew, Univ. of Oxford (United Kingdom); Arlette Pécontal-Rousset, Johan Kosmalski, Johan Richard, Ctr. de Recherche Astronomique de Lyon (France); Angus M. Gallie, David M. Montgomery, UK Astronomy Technology Ctr. (United Kingdom); Gérard Zins, Institut de Planétologie et d'Astrophysique de Grenoble (France); David Freeman, Kidger Optics Associates (United Kingdom); Begona García-Lorenzo, Luis Fernando Rodríguez-Ramos, Jorge Sánchez, Elvio Hernandez Suarez, Alberto Bueno, Instituto de Astrofísica de Canarias (Spain); Adolfo Garcia-Marin, SENER Ingeniería y Sistemas S.A. (Spain). . . . . [9147-77]

16:40: **A preliminary design for the GMT-consortium large Earth finder (G-CLEF)**, Andrew Szentgyorgyi, Harvard-Smithsonian Ctr. for Astrophysics (USA); Jacob Bean, The Univ. of Chicago (USA); Moo-Young Chun, Korea Astronomy and Space Science Institute (Korea, Republic of); Jeffrey D. Crane, Carnegie Observatories (USA); Harland Epps, Lick Observatory (USA) and Univ. of California Observatories (USA); Ian N. Evans, Janet Evans, Harvard-Smithsonian Ctr. for Astrophysics (USA); Anna Frebel, Massachusetts Institute of Technology (USA); Gabor Furesz, Alexander G. Glenday, Harvard-Smithsonian Ctr. for Astrophysics (USA); Christian Dani Guzman Carmine, Andrés Jordán, Pontificia Univ. Católica de Chile (Chile); Kang-Min Kim, Korea Astronomy and Space Science Institute (Korea, Republic of); Chih-Hao Li, Kenneth McCracken, Mark A. Mueller, Timothy J. Norton, Mark Ordway, Harvard-Smithsonian Ctr. for Astrophysics (USA); Byeong-Gon Park, Chan Park, Korea Astronomy and Space Science Institute (Korea, Republic of); David F. Phillips, David A. Plummer, William A. Podgorski, Harvard-Smithsonian Ctr. for Astrophysics (USA); Andreas Seifahrt, The Univ. of Chicago (USA); Alan Uomoto, Carnegie Observatories (USA); Ronald L. Walsworth, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9147-78]

17:00: **MOSAIC at E-ELT: a MOS for astrophysics, IGM, and cosmology**, François Hammer, Observatoire de Paris à Meudon (France); Beatriz Barbuy, Univ. de São Paulo (Brazil); Jean-Gabriel Cuby, Lab. d'Astrophysique de Marseille (France); Lex Kaper, Univ. van Amsterdam (Netherlands); Simon L. Morris, Durham Univ. (United Kingdom); Christopher J. Evans, UK Astronomy Technology Ctr. (United Kingdom); Pascal Jagourel, Mathieu Puech, Observatoire de Paris à Meudon (France) . . . . . [9147-79]

17:20: **Conceptual design of the MOBIE imaging spectrograph for the TMT**, Bruce C. Bigelow, Giant Magellan Telescope Project (USA); Matthew V. Radovan, Lick Observatory (USA) and Univ. of California, Santa Cruz (USA); Rebecca Bernstein, Carnegie Observatories (USA) and Giant Magellan Telescope Project (USA); Peter M. Onaka, Hubert Yamada, Sidik Isani, Univ. of Hawai'i (USA); Satoshi Miyazaki, Shinobu Ozaki, National Astronomical Observatory of Japan (Japan). . . . . [9147-80]

17:40: **Potential of astrophotonic spectrographs for ELTs**, Nicolas Blind, Max-Planck-Institut für extraterrestrische Physik (Germany) and Institut de Planétologie et d'Astrophysique de Grenoble (France); Etienne P. Le Coarer, Pierre Kern, Institut de Planétologie et d'Astrophysique de Grenoble (France); Joss Bland-Hawthorn, The Univ. of Sydney (Australia) . . . . . [9147-81]

POSTER SESSION–THURSDAY

LOCATION: ROOM 516 . . . . . THU 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Thursday. The interactive poster session with authors in attendance will be Thursday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Extremely Large Telescopes and Instruments

Design and analysis of a large-diameter precision optical mount for NFIRAOS, Joeleff Fitzsimmons, Alexis Hill, NRC - Herzberg Institute of Astrophysics (Canada) . . . . . [9147-303]

Architecture of the instrument control system for HARMONI, Luis Fernando Rodríguez-Ramos, Instituto de Astrofísica de Canarias (Spain); Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom); Arlette Pécontal-Rousset, Univ. de Lyon (France); Kieran O'Brien, Univ. of Oxford (United Kingdom); David W. Lunney, UK Astronomy Technology Ctr. (United Kingdom); Fraser Clarke, Univ. of Oxford (United Kingdom); José Miguel Herreros Linares, Instituto de Astrofísica de Canarias (Spain); Matthias Tecza, Univ. of Oxford (United Kingdom); Ian Bryson, UK Astronomy Technology Ctr. (United Kingdom); Niranjan A. Thatte, Univ. of Oxford (United Kingdom). . . . . [9147-331]

A novel systems engineering approach to the design of a precision radial velocity spectrograph: the GMT-Consortium Large Earth Finder (G-CLEF), William A. Podgorski, Harvard-Smithsonian Ctr. for Astrophysics (USA); Jacob Bean, The Univ. of Chicago (USA); Henry Bergner, Harvard-Smithsonian Ctr. for Astrophysics (USA); Moo-Young Chun, Korea Astronomy and Space Science Institute (Korea, Republic of); Jeffrey D. Crane, Carnegie Observatories (USA); Gabor Furesz, Harvard-Smithsonian Ctr. for Astrophysics (USA); Christian Dani Guzman Carmine, Pontificia Univ. Católica de Chile (Chile); Kang-Min Kim, Korea Astronomy and Space Science Institute (Korea, Republic of); Kenneth McCracken, Mark A. Mueller, Timothy J. Norton, Sang Park, Andrew Szentgyorgyi, Harvard-Smithsonian Ctr. for Astrophysics (USA); Alan Uomoto, Carnegie Observatories (USA); In-Soo Yuk, Korea Astronomy and Space Science Institute (Korea, Republic of) . . . . . [9147-333]

The infrared imaging spectrograph (IRIS) for TMT: volume phase holographic grating performance testing and discussion, Shaojie Chen, Changchun Institute of Optics, Fine Mechanics and Physics (China) . . . . . [9147-334]

CONFERENCE 9147 · LOCATION: ROOM 520C

Development of a subwavelength grating vortex coronagraph of topological charge 4 (SG-VC4), Christian Delacroix, Olivier Absil, Brunella Carlomagno, Pierre Piron, Univ. de Liège (Belgium); Pontus Forsberg, Mikael Karlsson, Uppsala Univ. (Sweden); Dimitri Mawet, European Southern Observatory (Chile); Serge Habraken, Jean Surdej, Univ. de Liège (Belgium) . . . . . [9147-335]

Integral field spectroscopy of high redshift galaxies with the HARMONI instrument on the European Extremely Large telescope, Sarah Kendrew, Simon D. Zielenewski, Niranjan A. Thatte, Julien Devriendt, Ryan Houghton, Univ. of Oxford (United Kingdom); Thierry Fusco, ONERA (France); Matthias Tecza, Fraser Clarke, Kieran O'Brien, Univ. of Oxford (United Kingdom) . . . . . [9147-336]

Trade-off study for high resolution spectroscopy in the near infrared with ELT telescopes: seeing limited vs. diffraction limited instruments, Ernesto Oliva, Nicoletta Sanna, INAF - Osservatorio Astrofisico di Arcetri (Italy); Livia Origlia, INAF - Osservatorio Astronomico di Bologna (Italy); Giovanni Cresci, Fabrizio Massi, INAF - Osservatorio Astrofisico di Arcetri (Italy). . . . . [9147-337]

Simulations of high-z galaxy observations with an ELT-MOS, Karen Disseau, Observatoire de Paris à Meudon (France) and Univ. Paris 7-Denis Diderot (France); Mathieu Puech, Yanbin Yang, Hector Flores, François Hammer, Observatoire de Paris à Meudon (France); Laura Pentericci, INAF - Osservatorio Astronomico di Roma (Italy) . . . . . [9147-338]

All-sky homogeneity of PWV and sky brightness temperature over Paranal, Richard R. Querel, Univ. de Chile (Chile) and National Institute of Water and Atmospheric Research (New Zealand); Florian Kerber, European Southern Observatory (Germany) . . . . . [9147-339]

Simulating observations with HARMONI: the integral field spectrograph for the E-ELT, Simon D. Zieleniewski, Niranjan A. Thatte, Ryan Houghton, Sarah Kendrew, Fraser Clarke, Matthias Tecza, Univ. of Oxford (United Kingdom) . . . . . [9147-340]

The MANIFEST fibre positioning system for the Giant Magellan telescope, Jon S. Lawrence, David M. Brown, Jurek Brzeski, Scott Case, Australian Astronomical Observatory (Australia); Matthew Colless, The Australian National Univ. (Australia); Tony J. Farrell, Luke Gers, James Gilbert, Michael Goodwin, Andrew M. Hopkins, Kyler Kuehn, Nuria P. F. Lorente, Stan Miziarski, Rolf Muller, Vijay Nichani, Azizi Rakman, Will Saunders, Nick F. Staszak, Julia Tims, Lewis G. Waller, Australian Astronomical Observatory (Australia) . . . . . [9147-341]

A mechanical design concept for EAGLE on the revised E-ELT, Cornelis M. Dubbeldam, Durham Univ. (United Kingdom); Peter Hastings, Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom) . . . . . [9147-342]

Science requirements for the MOSAIC concept for a multi-object spectrograph for the E-ELT, Christopher J. Evans, UK Astronomy Technology Ctr. (United Kingdom); Mathieu Puech, Observatoire de Paris à Meudon (France); Beatriz Barbuy, Univ. de São Paulo (Brazil); Jean-Gabriel Cuby, Lab. d'Astrophysique de Marseille (France); Lex Kaper, Univ. van Amsterdam (Netherlands); François Hammer, Observatoire de Paris à Meudon (France); Simon L. Morris, Durham Univ. (United Kingdom) . . . . . [9147-343]

The spectrograph units for the HARMONI integral field spectrograph, Kieran O'Brien, Jamie R. Allen, James D. Lynn, Niranjan A. Thatte, Univ. of Oxford (United Kingdom); Ian Bryson, UK Astronomy Technology Ctr. (United Kingdom); Fraser Clarke, Univ. of Oxford (United Kingdom); Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom); Matthias Tecza, Univ. of Oxford (United Kingdom) . . . . . [9147-344]

The impact and compensation of the chromatic errors for astrometry on MICADO, Remko Stuik, Leiden Univ. (Netherlands) and NOVA Optical Infrared Instrumentation Group (Netherlands); Tibor Agócs, NOVA Optical- Infrared Instrumentation Group (Netherlands); Gijs Verdoes Kleijn, Eline Tolstoy, Univ. of Groningen (Netherlands); Ramón Navarro, NOVA Optical Infrared Instrumentation Group (Netherlands); Michael Hartl, Richard Davies, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9147-345]

Mid-IR AGPMs for ELT applications, Brunella Carlomagno, Olivier Absil, Christian Delacroix, Univ. de Liège (Belgium); Dimitri Mawet, European Southern Observatory (Chile); Jean Surdej, Serge Habraken, Univ. de Liège (Belgium); Mikael Karlsson, Pontus Forsberg, Ernesto Vargas Catalan, Uppsala Univ. (Sweden); Pierre Piron, Aïssa Jolivet, Univ. de Liège (Belgium) . . . . . [9147-346]

The opto-mechanical design of the GMT-consortium large earth finder (G-CLEF), Mark A. Mueller, Harvard-Smithsonian Ctr. for Astrophysics (USA); Jacob Bean, The Univ. of Chicago (USA); Henry Bergner, Harvard-Smithsonian Ctr. for Astrophysics (USA); Moo-Young Chun, Korea Astronomy and Space Science Institute (Korea, Republic of); Jeffrey D. Crane, Carnegie Observatories (USA); Gabor Furesz, Thomas M. Gauron, Harvard-Smithsonian Ctr. for Astrophysics (USA); Christian Dani Guzman Carmine, Pontificia Univ. Católica de Chile (Chile); Edward Hertz, Harvard-Smithsonian Ctr. for Astrophysics (USA); Andrés Jordán, Pontificia Univ. Católica de Chile (Chile); Kang-Min Kim, Korea Astronomy and Space Science Institute (Korea, Republic of); Kenneth McCracken, Timothy J. Norton, Mark Ordway, Harvard-Smithsonian Ctr. for Astrophysics (USA); Chan Park, Korea Astronomy and Space Science Institute (Korea, Republic of); Sang Park, William A. Podgorski, Andrew Szentgyorgyi, Harvard-Smithsonian Ctr. for Astrophysics (USA); Alan Uomoto, Carnegie Observatories (USA); In-Soo Yuk, Korea Astronomy and Space Science Institute (Korea, Republic of) . . . . [9147-347]

SKA pulsar search: technological challenges and best algorithms development, Carlo Baffa, INAF - Osservatorio Astrofisico di Arcetri (Italy) and SKA Time Domain Team, SKAO (United Kingdom). . . . . [9147-348]

The infrared imaging spectrograph (IRIS) for TMT: reflective ruled diffraction grating performance testing and discussion, Elliot Meyer, Univ. of Toronto (Canada) and Dunlap Institute for Astronomy & Astrophysics (Canada); Shaojie Chen, Dunlap Institute for Astronomy & Astrophysics (Canada); Shelley A. Wright, Univ. of Toronto (Canada) and Dunlap Institute for Astronomy & Astrophysics (Canada); Anna M. Moore, California Institute of Technology (USA); James E. Larkin, Univ. of California, Los Angeles (USA); Jerome Marie, Dunlap Institute for Astronomy & Astrophysics (Canada); Etsuko Mieda, Univ. of Toronto (Canada) and Dunlap Institute for Astronomy & Astrophysics (Canada); Luc Simard, NRC - Herzberg Institute of Astrophysics (Canada). . . . . [9147-349]

Three possible types of apodized coronagraphs for the E-ELT PCS instrument, Alexis Carlotti, Univ. Joseph Fourier (France); Laurent A. Pueyo, Space Telescope Science Institute (USA); Dimitri Mawet, European Southern Observatory (Chile); Mamadou N'Diaye, Space Telescope Science Institute (USA) . . . . . [9147-350]

The high-contrast imaging modes of MICADO, Pierre Baudoz, Anthony Boccaletti, Sylvestre Lacour, Raphaël Galicher, Yann Clénet, Damien Gratadour, Éric Gendron, Jean-Tristan M. Buey, Gérard Rousset, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Michael Hartl, Richard Davies, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9147-351]

An aperture masking mode for the MICADO instrument, Sylvestre Lacour, Pierre Baudoz, Éric Gendron, Anthony Boccaletti, Yann Clénet, Jean-Tristan M. Buey, Zoltan Hubert, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Michael Hartl, Richard Davies, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9147-352]

The G-CLEF spectrograph optical design: an update to the white pupil echelle configuration, Gabor Furesz, Harvard-Smithsonian Ctr. for Astrophysics (USA); Harland Epps, Univ. of California Observatories (USA) and Univ. of California, Santa Cruz (USA); Stuart I. Barnes, Stuart Barnes Optical Design (Netherlands); Jacob Bean, The Univ. of Chicago (USA); Moo-Young Chun, Korea Astronomy and Space Science Institute (Korea, Republic of); Jeffrey D. Crane, Carnegie Observatories (USA); Christian Dani Guzman Carmine, Pontificia Univ. Católica de Chile (Chile); Kang-Min Kim, Korea Astronomy and Space Science Institute (Korea, Republic of); Kenneth McCracken, Mark A. Mueller, Timothy J. Norton, Harvard-Smithsonian Ctr. for Astrophysics (USA); Chan Park, Korea Astronomy and Space Science Institute (Korea, Republic of); William A. Podgorski, Andrew Szentgyorgyi, Harvard-Smithsonian Ctr. for Astrophysics (USA); Alan Uomoto, Carnegie Observatories (USA); In-Soo Yuk, Korea Astronomy and Space Science Institute (Korea, Republic of) . . . . . [9147-353]

On-instrument wavefront sensor design for the TMT infrared imaging spectrograph (IRIS) update, Jennifer S. Dunn, Robert Wooff, Vladimir A. Reshetov, John Pazder, Jenny Atwood, Luc Simard, Leslie Saddlemyer, NRC - Herzberg Institute of Astrophysics (Canada); Roger M. Smith, Caltech Optical Observatories (USA); Shelley A. Wright, Univ. of Toronto (Canada); Brent L. Ellerbroek, Thirty Meter Telescope Observatory Corp. (USA); Anna M. Moore, California Institute of Technology (USA); James E. Larkin, Univ. of California, Los Angeles (USA); Richard G. Dekany, Caltech Optical Observatories (USA) . . . . . [9147-354]

ATST visible broadband imager interference filters, Friedrich Wöger, National Solar Observatory (USA) . . . . . [9147-355]

Optical and mechanical design of the fore-optics of HARMONI, Jorge Sánchez Capuchino, Elvio Hernandez Suarez, Alberto Bueno, Instituto de Astrofísica de Canarias (Spain); Niranjan A. Thatte, Univ. of Oxford (United Kingdom); Ian Bryson, UK Astronomy Technology Ctr. (United Kingdom); Fraser Clarke, Matthias Tecza, Univ. of Oxford (United Kingdom) . . . . . [9147-356]

Beating the heat! Automated characterization of piezoelectric tubes for Starbugs, Rafal P. Piersiak, Australian Astronomical Observatory (Australia) and Stony Brook Univ. (USA); Michael Goodwin, James Gilbert, Rolf Muller, Australian Astronomical Observatory (Australia) . . . . . [9147-357]

Wireless software update system based on Zigbee for LAMOST, Su Li, Yonggang Gu, Yi Jin, Chao Zhai, Univ. of Science and Technology of China (China) . . . . . [9147-358]

Cryogenic testing of components for the HARMONI spectrograph, Jamie R. Allen, Kieran O'Brien, James D. Lynn, Niranjan A. Thatte, Univ. of Oxford (United Kingdom); Ian Bryson, UK Astronomy Technology Ctr. (United Kingdom); Fraser Clarke, Univ. of Oxford (United Kingdom); Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom); Matthias Tecza, Univ. of Oxford (United Kingdom) . . . . . [9147-359]

Giano preslit, Andrea Tozzi, Ernesto Oliva, Marcella Iuzzolino, INAF - Osservatorio Astrofisico di Arcetri (Italy). . . . . [9147-360]

Simultaneous phase and amplitude retrieval with COFFEE: from theory to laboratory results, Baptiste Paul, ONERA (France) and Lab. d'Astrophysique de Marseille (France); Jean-François Sauvage, Laurent Mugnier, ONERA (France); Kjetil Dohlen, Lab. d'Astrophysique de Marseille (France); Thierry Fusco, ONERA (France) and Lab. d'Astrophysique de Marseille (France); Marc Ferrari, Lab. d'Astrophysique de Marseille (France) . . . . . [9147-363]

Infrared differential imager and spectrograph for SPHERE: performance assessment for on-sky operation, Maud P. Langlois, Ctr. de Recherche Astronomique de Lyon (France); Arthur Vigan, Kjetil Dohlen, Claire Moutou, Lab. d'Astrophysique de Marseille (France); Jean-Luc Beuzit, Institut de Planétologie et d'Astrophysique de Grenoble (France); Anthony Boccaletti, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Michael Carle, Anne Costille, Lab. d'Astrophysique de Marseille (France); Reinhold J. Dorn, European Southern Observatory (Germany); Laurence Gluck, Institut de Planétologie et d'Astrophysique de Grenoble (France); Cécile Gry, Lab. d'Astrophysique de Marseille (France); Norbert Hubin, European Southern Observatory (Germany); Markus Feldt, Max-Planck-Institut für Astronomie (Germany); Markus E. Kasper, European Southern Observatory (Germany); Fabrice Madec, David Le Mignant, Lab. d'Astrophysique de Marseille (France); Jean-Louis Lizon, European Southern Observatory (Germany); David Mouillet, Institut de Planétologie et d'Astrophysique de Grenoble (France); Alain Origne, Lab. d'Astrophysique de Marseille (France); Pascal Puget, Institut de Planétologie et d'Astrophysique de Grenoble (France); Jean-François Sauvage, ONERA (France); François Wildi, Observatoire de Genève (Switzerland); Alice Zurlo, Lab. d'Astrophysique de Marseille (France). . . . . [9147-365]

Fully cryogenic phased array prototype camera for the Arecibo radio telescope, German Cortes-Medellin, Stephen Parshley, Amit Vishwas, Donald B. Campbell, Cornell Univ. (USA) . . . . . [9147-366]

LOTUCE2: a dome-seeing instrument for the E-ELT, Amokrane Berdja, Christian Dani Guzman Carmine, Norman Saez, Nicole David, Nicolás S. Dubost Alligier, Pontificia Univ. Católica de Chile (Chile); Marc S. Sarazin, European Southern Observatory (Germany); Aziz Ziad, Univ. Nice Sophia-Antipolis (France). [9147-367]

The infrared imaging spectrograph (IRIS) for TMT: overview of innovative science programs, Shelley A. Wright, Univ. of Toronto (Canada); James E. Larkin, Univ. of California, Los Angeles (USA); Anna M. Moore, Caltech Optical Observatories (USA); Luc Simard, NRC-Dominion Astrophysical Observatory (Canada); Tuan Do, Univ. of Toronto (Canada); Mate Adamkovics, Univ. of California, Berkeley (USA); Lee Armus, Infrared Processing and Analysis Ctr. (USA); Aaron J. Barth, Univ. of California, Irvine (USA); Joshua S. Bloom, Univ. of California, Berkeley (USA); Patrick Cote, Timothy J. Davidge, NRC-Dominion Astrophysical Observatory (Canada); Brent L. Ellerbroek, Thirty Meter Telescope Observatory Corp. (USA); Andrea M. Ghez, Univ. of California, Los Angeles (USA); Lei Hai, Shanghai Astronomical Observatory (China); David Law, Univ. of Toronto (Canada); Leo Meyer, Univ. of California, Los Angeles (USA); Michael C. Liu, Jessica R. Lu, Univ. of Hawai'i (USA); Bruce A. Macintosh, Standford Univ. (USA); Shude Mao, National Astronomical Observatories (China); Christian Marois, NRC-Dominion Astrophysical Observatory (Canada); Matthias Schoeck, Thirty Meter Telescope Observatory Corp. (USA); Ryuji Suzuki, National Astronomical Observatory of Japan (Japan); Jonathan C. Tan, Univ. of Florida (USA); Tommaso Treu, Univ. of California, Santa Barbara (USA); Tomonori Usuda, National Astronomical Observatory of Japan (Japan) . . . . . [9147-369]

Drift scanning technique for mid infrared background subtraction, Stephanie Heikamp, Leiden Observatory (Netherlands); Bernhard R. Brandl, Leiden Univ. (Netherlands); Christoph U. Keller, Leiden Observatory (Netherlands); Lars Venema, ASTRON (Netherlands); Eric J. Pantin, CEA-Ctr. de SACLAY (France); Ralf Siebenmorgen, Derek J. Ives, Florian Kerber, European Southern Observatory (Germany) . . . . . [9147-372]

CONFERENCE 9148 · LOCATION: ROOM 518A

Sunday–Friday 22–27 June 2014 • Proceedings of SPIE Vol. 9148

Adaptive Optics Systems IV


(Marchetti)


(Close)


(Véran)

Conference Chairs: **Enrico Marchetti,** European Southern Observatory (Germany); **Laird M. Close,** The Univ. of Arizona (USA); **Jean-Pierre Véran,** National Research Council Canada (Canada)

Program Committee: **Emiliano Diolaiti,** INAF - Osservatorio Astronomico di Bologna (Italy); **Celine D'Orgeville,** Research School of Astronomy & Astrophysics, Australian National Univ. (Australia); **Brent L. Ellerbroek,** Thirty Meter Telescope Observatory Corp. (USA); **Simone Esposito,** INAF - Osservatorio Astrofisico di Arcetri (Italy); **Thierry Fusco,** ONERA (France); **Donald Gavel,** Univ. of California, Santa Cruz (USA); **Michael Hart,** Hart Scientific Consulting International L.L.C. (USA); **Yutaka Hayano,** Subaru Telescope, National Astronomical Observatory of Japan (USA); **Glen Herriot,** National Research Council Canada (Canada); **Norbert Hubin,** European Southern Observatory (Germany); **Markus Kasper,** European Southern Observatory (Germany); **Caroline Kulcsar,** Institut d'Optique (France); **Anne-Marie Lagrange,** Institut de Planétologie et d'Astrophysique de Grenoble (France); **Bruce A. Macintosh,** Lawrence Livermore National Lab. (USA); **Pierre-Yves Madec,** European Southern Observatory (Germany); **Richard M. Myers,** Durham Univ. (United Kingdom); **Francois Rigaut,** The Australian National Univ. (Australia); **Andrei Tokovinin,** National Optical Astronomy Observatory (USA); **Mitchell Troy,** Jet Propulsion Lab. (USA); **Peter L. Wizinowich,** W. M. Keck Observatory (USA)

SUNDAY 22 JUNE

SESSION 1

LOCATION: ROOM 518A . . . . . SUN 9:00 TO 10:25

Status of Current AO Instrument Projects I

Session Chair: **Enrico Marchetti,** European Southern Observatory (Germany)

9:00: **ESO adaptive optics facility progress and first laboratory test results** *(Invited Paper)*, Robin Arsenault, Pierre-Yves Madec, Jérome Paufique, Paolo La Penna, Stefan Stroebele, Elise Vernet, Jean-Francois Pirard, Wolfgang K. Hackenberg, Harald Kuntschner, Johann Kolb, Aurea Garcia Rissmann, Miska Le Louarn, Paola Amico, Norbert Hubin, Jean-Louis Lizon, Robert Ridings, Jose A. Abad, Gerhard Fischer, Volker Heinz, Mario Kiekebusch, Javier Argomedo, Ralf D. Conzelmann, Sebastien Tordo, Robert H. Donaldson, Christian Soenke, Philippe R. Duhoux, Enrico Fedrigo, Bernard-Alexis Delabre, Andrea Jost, Michel Duchateau, Mark Downing, Javier R. Moreno, Antonio Manescau, Domenico Bonaccini Calia, Marco Quattri, Christophe Dupuy, Ivan M. Guidolin, Mauro Comin, Ronald Guzman, Bernard Buzzoni, Jutta Quentin, Steffan A. Lewis, Paul D. Jolley, Maximilian Kraus, Thomas Pfrommer, European Southern Observatory (Germany); Roberto Biasi, Microgate S.r.l. (Italy); Daniele Gallieni, A.D.S. International S.r.l. (Italy); Remko Stuik, Leiden Observatory (Netherlands); Wilhelm G. Kaenders, Bernhard Ernstberger, Axel Friedenauer, TOPTICA Photonics AG (Germany) . . . . . [9148-1]

9:25: **Large Binocular telescope interferometer adaptive optics (LBTIAO): on-sky performance and lessons learned**, Vanessa P. Bailey, Philip M. Hinz, Vidhya Vaitheeswaran, The Univ. of Arizona (USA); Alfio T. Puglisi, Simone Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy) . . . . . [9148-2]

9:45: **MagAO: status and performance of the Magellan adaptive optics system**, Katie M. Morzinski, The Univ. of Arizona (USA) and MagAO Team (USA); Laird M. Close, Jared R. Males, Philip M. Hinz, The Univ. of Arizona (USA); Alfio T. Puglisi, INAF - Osservatorio Astrofisico di Arcetri (Italy) . . . . . [9148-3]

10:05: **ShaneAO: wide science spectrum adaptive optics system for the Lick Observatory**, Donald Gavel, Renate Kupke, Daren Dillon, Andrew P. Norton, Christopher T. Ratliff, Gerald Cabak, Andrew Phillips, Constance Rockosi, Rosalie C. McGurk, Srikar Srinath, Michael Peck, Michael Saylor, James Ward, William T. S. Deich, Univ. of California, Santa Cruz (USA) . . . . . [9148-76]

Coffee Break . . . . . Sun 10:25 to 10:55

SESSION 2

LOCATION: ROOM 518A . . . . . SUN 10:55 TO 12:20

Laser Guide Star Systems I

Session Chair: **Celine D'Orgeville,** Research School of Astronomy & Astrophysics (Australia)

10:55: **Sodium laser guide star facilities for adaptive optics** *(Invited Paper)*, Domenico Bonaccini Calia, European Southern Observatory (Germany) . . . [9148-5]

11:20: **Series production of next-generation guide-star lasers at TOPTICA**, Martin Enderlein, Axel Friedenauer, Robin Schwerdt, Bernhard Ernstberger, Patrick Leisching, Wilhelm G. Kaenders, TOPTICA Photonics AG (Germany); Daoping Wei, Vladimir I. Karpov, Wallace R. L. Clements, MPB Communications Inc. (Canada) . . . . . [9148-6]

11:40: **Laser guide star facility developments at W. M. Keck Observatory**, Jason C. Chin, Peter L. Wizinowich, Edward Wetherell, Randall D. Campbell, Sylvain Cetre, Scott Lilley, Drew W. Medeiros, Sam Ragland, Rachel Rampy, Thomas E. Stalcup Jr., Kevin Tsubota, Pete Tucker, W. M. Keck Observatory (USA) . . [9148-7]

12:00: **LGS Adaptive optics system with long-pulsed sodium laser on 1.8 meter telescope 2013-2014 observing campaign**, Kai Wei, Min Li, Shanqiu Chen, Institute of Optics and Electronics (China); Shiyong Xie, Yong Bo, Technical Institute of Physics and Chemistry (China); Xianghui Xue, Univ. of Science and Technology of China (China); Xianmei Qian, Anhui Institute of Optics and Fine Mechanics (China); Junwei Zuo, Pengyuan Wang, Technical Institute of Physics and Chemistry (China); Feng Cheng, Luchun Zhou, Xiaojun Zhang, Donghong Chen, Yang Gao, Institute of Optics and Electronics (China); Xuewu Cheng, Wuhan Institute of Physics and Mathematics (China); Chaolong Cui, Xiaoqing Wu, Anhui Institute of Optics and Fine Mechanics (China); Yu Zhou, Yunnan Observatories (China); Kai Jin, Institute of Optics and Electronics (China) and Univ. of Science and Technology of China (China); Tingdi Chen, Univ. of Science and Technology of China (China); Yu Shen, Qi Bian, Ji Yao, Technical Institute of Physics and Chemistry (China); Changchun Jiang, Institute of Optics and Electronics (China); Qinjun Peng, Technical Institute of Physics and Chemistry (China); Changhui Rao, Institute of Optics and Electronics (China); Zuyan Xu, Technical Institute of Physics and Chemistry (China); Yudong Zhang, Institute of Optics and Electronics (China) . . . . . [9148-8]

Lunch Break . . . . . Sun 12:20 to 13:50

SESSION 3

LOCATION: ROOM 518A . . . . . SUN 13:50 TO 16:20

Astronomy with AO I

Session Chair: **Laird M. Close,** The Univ. of Arizona (USA)

13:50: **Six thousand laser-AO observations: first results from the Robo-AO Large Surveys**, Nicholas M. Law, The Univ. of North Carolina at Chapel Hill (USA); Christoph Baranec, Univ. of Hawai'i (USA); Reed L. Riddle, California Institute of Technology (USA); Timothy D. Morton, Princeton Univ. (USA) . . . . . [9148-9]

14:10: **Massive young clusters, the Galactic Center, and astrometry** *(Invited Paper)*, Jessica R. Lu, Univ. of Hawai'i (USA); Mark R. Morris, Andrea M. Ghez, Univ. of California, Los Angeles (USA); Benoît Neichel, Lab. d'Astrophysique de Marseille (France); Francois Rigaut, The Australian National Univ. (Australia) . . . . . [9148-10]

14:35: **Galactic astronomy with AO: the study of nearby star clusters** *(Invited Paper)*, Timothy J. Davidge, NRC - Herzberg Institute of Astrophysics (Canada) . . . . . [9148-11]

Coffee Break . . . . . Sun 15:00 to 15:30

15:30: **Supernovae and extragalactic astronomy with laser guide star adaptive optics** *(Invited Paper)*, Stuart D. Ryder, Australian Astronomical Observatory (Australia); Seppo Mattila, Erkki Kankare, Univ. of Turku (Finland) and Tuorla Observatory (Finland); Petri Vaisanen, South African Astronomical Observatory (South Africa) . . . . . [9148-12]

15:55: **Extra-galactic spectroscopy with AO** *(Invited Paper)*, Richard Davies, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9148-13]

SESSION 4

LOCATION: ROOM 518A . . . . . SUN 16:20 TO 17:20

Wavefront Correction I

Session Chair: **Norbert Hubin,** European Southern Observatory (Germany)

16:20: **Living with adaptive secondary mirrors: 365/7/24**, Julian C. Christou, Large Binocular Telescope Observatory (USA); Guido Brusa Zappellini, The Univ. of Arizona (USA); Juan C. Guerra Ramon, Douglas L. Miller, Michael Wagner, Michael J. Lefebvre, Large Binocular Telescope Observatory (USA) . . . . . [9148-14]

16:40: **Recent results and future DMs for astronomy and for space applications at Cilas**, Jean-Christophe Sinquin, Arnaud Bastard, Emmanuel Beaufort, CILAS (France); Thomas Berkefeld, Kiepenheuer-Institut für Sonnenphysik (Germany); Laurent Cadiergues, Ctr. National d'Etudes Spatiales (France); Vincent Costes, Centre National d'Etudes Spatiales (CNES) (France); Raphaël Cousty, CILAS (France); Charles Dekhtiar, Frédéric Di Gesu, Airbus Defence and Space (France); Xavier Gilbert, Catherine Grèzes-Besset, Denis Groeninck, CILAS (France); Markus Hartung, Gemini Observatory (Chile); Hélène Krol, Aurélien Moreau, Pierre Morin, Hubert Pagès, Richard Palomo, CILAS (France); Göran Scharmer, The Institute for Solar Physics (Sweden); Dirk Soltau, Kiepenheuer-Institut für Sonnenphysik (Germany); Jean-Pierre Véran, Herzberg Institute of Astrophysics NRCC (Canada) . . . . . [9148-15]

17:00: **Piezoelectric deformable mirror technologies for astronomy at IOE, CAS**, Chunlin Guan, Xinlong Fan, Xiaojun Zhang, Hong Zhou, Jinbo Mu, Lixia Xue, Hao Xian, Changhui Rao, Yudong Zhang, Ning Ling, Wenhan Jiang, Institute of Optics and Electronics (China) . . . . . [9148-16]

POSTER SESSION–SUNDAY

LOCATION: ROOM 516 . . . . . SUN 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Sunday. The interactive poster session with authors in attendance will be Sunday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Posters: Status of Current AO Instrument Projects

Second generation adaptive optics system of the New Solar telescope at Big Bear Solar Observatory, Wenda Cao, Nicolas Gorceix, Sergiy Shumko, Big Bear Solar Observatory (USA); Thomas R. Rimmele, Jose Marino, National Solar Observatory (USA); Philip R. Goode, Big Bear Solar Observatory (USA) . . [9148-96]

The ground layer correction: the heart of the LINC-NIRVANA, Kalyan Kumar Radhakrishnan Santhakumari, Max Planck Institute for Astronomy (Germany); Luca Marafatto, INAF - Osservatorio Astronomico di Padova (Italy) and Univ. degli Studi di Padova (Italy); Maria Bergomi, Valentina Viotto, Jacopo Farinato, Roberto Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy); Thomas M. Herbst, Thomas Bertram, Max-Planck-Institut für Astronomie (Germany); Marco Dima, INAF - Osservatorio Astronomico di Padova (Italy); Peter Bizenberger, Florian Briegel, Frank Kittmann, Lars Mohr, Max-Planck-Institut für Astronomie (Germany); Demetrio Magrin, INAF - Osservatorio Astronomico di Padova (Italy) . . . . [9148-97]

ULTIMATE-SUBARU: project status, Yutaka Hayano, Subaru Telescope, National Astronomical Observatory of Japan (USA); Masayuki Akiyama, Tohoku Univ. (Japan); Takashi Hattori, Ikuru Iwata, Subaru Telescope, National Astronomical Observatory of Japan (USA); Tadayuki Kodama, National Astronomical Observatory of Japan (Japan); Olivier Lai, Subaru Telescope (USA) and Gemini Observatory (USA); Yosuke Minowa, Subaru Telescope, National Astronomical Observatory of Japan (USA); Yoshito Ono, Tohoku Univ. (Japan); Shin Oya, Koki Takiura, Ichi Tanaka, Yoko Tanaka, Nobuo Arimito, Subaru Telescope, National Astronomical Observatory of Japan (USA) . . . . . [9148-98]

Integration and bench testing for the GRAVITY Coudé IR adaptive optics (CIAO) wavefront sensor, Casey P. Deen, Max-Planck-Institut für Astronomie (Germany); Pengqian Yang, Max-Planck-Institut für Astronomie (Germany) and Peking Univ. (China); Yann Clénet, Éric Gendron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Marcos Suarez Valles, European Southern Observatory (Germany); Stefan Hippler, Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Adrian M. Glauser, ETH Zürich (Switzerland); Armin Huber, Max-Planck-Institut für Astronomie (Germany); Sarah Kendrew, Univ. of Oxford (United Kingdom); Ralf Klein, Werner Laun, Rainer Lenzen, Udo Neumann, Johana Panduro, José R. Ramos, Ralf-Rainer Rohloff, Neil Zimmerman, Max-Planck-Institut für Astronomie (Germany); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9148-99]

The multi-conjugate adaptive optics system of the New Solar telescope at Big Bear Solar Observatory, Dirk Schmidt, National Solar Observatory (USA); Nicolas Gorceix, Xianyu Zhang, Roy Coulter, Sergiy Shumko, Philip R. Goode, Big Bear Solar Observatory (USA); Thomas R. Rimmele, National Solar Observatory (USA); Thomas Berkefeld, Kiepenheuer-Institut für Sonnenphysik (Germany) . . [9148-100]

GALACSI integration and functional tests, Paolo La Penna, Stefan Stroebele, Emmanuel Aller-Carpentier, Javier Argomedo, Robin Arsenault, Ralf D. Conzelmann, Bernard-Alexis Delabre, Robert H. Donaldson, Michel Duchateau, Enrico Fedrigo, Fernando Gago Rodriguez, Norbert Hubin, Jutta Quentin, Paul D. Jolley, Mario Kiekebusch, Jean-Paul Kirchbauer, Barbara Klein, Johann Kolb, Harald Kuntschner, Miska Le Louarn, Jean-Louis Lizon, Pierre-Yves Madec, Antonio Manescau, Leander H. Mehrgan, Marcos Suarez Valles, Christian Soenke, Sebastien Tordo, European Southern Observatory (Germany) . . . . . [9148-101]

The first portable solar and stellar adaptive optics, Deqing Ren, California State Univ., Northridge (USA); Rong Li, Xi Zhang, Jiangpei Dou, Yiangtian Zhu, Gang Zhao, Nanjing Institute of Astronomical Optics & Technology (China) . . . [9148-102]

The HARMONI SCAO system: science cases, main trade-offs and preliminary design for a diffraction limited integral field spectroscopy at the E-ELT, Thierry Fusco, ONERA (France); Kjetil Dohlen, Lab. d'Astrophysique de Marseille (France); Jean-François Sauvage, ONERA (France); Matthias Tecza, Univ. of Oxford (United Kingdom); Christophe Vérinaud, Alexis Carlotti, Institut de Planétologie et d'Astrophysique de Grenoble (France); Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom); Fraser Clarke, Niranjan A. Thatte, Univ. of Oxford (United Kingdom); Ian Bryson, Oxford Univ. (United Kingdom) and UK Astronomy Technology Ctr. (United Kingdom) . . . . . [9148-105]

First light of the LINC-NIRVANA Pathfinder experiment, Maria Bergomi, Valentina Viotto, INAF - Osservatorio Astronomico di Padova (Italy); Carmelo Arcidiacono, INAF - Osservatorio Astrofisico di Arcetri (Italy); Harald Baumeister, Thomas Bertram, Jürgen Berwein, Florian Briegel, Albert R. Conrad, Max-Planck-Institut für Astronomie (Germany); Jacopo Farinato, INAF - Osservatorio Astronomico di Padova (Italy); Thomas M. Herbst, Ralph Hofferbert, Derek Kopon, Frank Kittmann, Max-Planck-Institut für Astronomie (Germany); Luca Marafatto, Roberto Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy) . [9148-106]

Swimming with ShARCS: comparison of on-sky sensitivity with model predictions for ShaneAO on the Lick Observatory 3-meter telescope, Srikar Srinath, Rosalie C. McGurk, Constance Rockosi, Univ. of California, Santa Cruz (USA); Renate Kupke, Donald Gavel, Elinor L. Gates, Michael Peck, Daren Dillon, Univ. of California Observatories (USA) . . . . . [9148-107]

CONFERENCE 9148 · LOCATION: ROOM 518A

The CHARA array adaptive optics I: common-path optical and mechanical design, and preliminary on-sky results, Xiao Che, Univ. of Michigan (USA); Laszlo Sturmann, CHARA (USA) and Mountain Wilson Observatory (USA); John D. Monnier, Univ. of Michigan (USA); Theo A. ten Brummelaar, Judit Sturmann, CHARA (USA) and Mountain Wilson Observatory (USA); Stephen T. Ridgway, National Optical Astronomy Observatory (USA); Michael Ireland, Macquaire Univ. (Australia); Nils H. Turner, CHARA (USA) and Mountain Wilson Observatory (USA); Harold A. McAlister, Georgia State Univ. (USA) . . . . . [9148-108]

Development of a new solar adaptive optics system at the Hida observatory, Noriaki Miura, Ayumu Oh-ishi, Shotaro Aoki, Hikaru Mogaki, Susumu Kuwamura, Kitami Institute of Technology (Japan); Naoshi Baba, Hokkaido Univ. (Japan); Yoichiro Hanaoka, National Astronomical Observatory of Japan (Japan); Masashi Yamaguchi, Kyoto Univ. (Japan); Satoru Ueno, Yoshikazu Nakatani, Kiyoshi Ichimoto, Kyoto Univ. Hida Observatory (Japan) . . . . . [9148-109]

The GRAVITY near-infrared adaptive optics test bench, design and integration, Pengqian Yang, Shanghai Institute of Optics and Fine Mechanics (China) and Max-Planck-Institut für Astronomie (Germany); Stefan Hippler, Wolfgang Brandner, Rainer Lenzen, Max-Planck-Institut für Astronomie (Germany); Sarah Kendrew, Univ. of Oxford (United Kingdom); Yann Clénet, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Casey P. Deen, Max-Planck-Institut für Astronomie (Germany); Éric Gendron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Armin Huber, Neil Zimmerman, Ralf Klein, Johana Panduro, Udo Neumann, José R. Ramos, Ralf-Rainer Rohloff, Max-Planck-Institut für Astronomie (Germany); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Jianqiang Zhu, Shanghai Institute of Optics and Fine Mechanics (China) . . . . . [9148-110]

Optical design of the relay optics for the MICADO SCAO system, Mathieu Cohen, Observatoire de Paris à Meudon (France); Fanny Chemla, Jean-Tristan M. Buey, Éric Gendron, Zoltan Hubert, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Michael Hartl, Max-Planck-Institut für extraterrestrische Physik (Germany); Yann Clénet, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Richard Davies, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9148-111]

ARGOS wavefront sensing: from detection to correction, Gilles Orban de Xivry, Lothar Barl, Max-Planck-Institut für extraterrestrische Physik (Germany); Marco Bonaglia, INAF - Osservatorio Astrofisico di Arcetri (Italy); José Luis Borelli, Max-Planck-Institut für Astronomie (Germany); Lorenzo Busoni, INAF - Osservatorio Astrofisico di Arcetri (Italy); Wolfgang Gaessler, Martin Kulas, Max-Planck-Institut für Astronomie (Germany); Tommaso Mazzoni, INAF - Osservatorio Astrofisico di Arcetri (Italy); Sebastian Rabien, Julian Ziegleder, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9148-112]

AO-308: the high order adaptive optics system at Big Bear Solar Observatory, Sergiy Shumko, Nicolas Gorceix, Seonghwan Choi, Aglaé Kellerer, Wenda Cao, Big Bear Solar Observatory (USA); Philip R. Goode, New Jersey Institute of Technology (USA); Volodymyr Abramenko, Big Bear Solar Observatory (USA); Kit Richards, Thomas R. Rimmele, Jose Marino, National Solar Observatory (USA). . . [9148-113]

Adaptive optics at The Large Binocular telescope, Julian C. Christou, Douglas L. Miller, Juan C. Guerra Ramon, Christian Veillet, Joar G. Brynnel, John M. Hill, David S. Ashby, R. Mark Wagner, John K. Little, Large Binocular Telescope Observatory (USA) . . . . . [9148-114]

Present opto-mechanical design status of NFIRAOS, Peter W. G. Byrnes, Jenny Atwood, NRC - Herzburg Institute of Astrophysics (Canada); Alexis Hill, National Research Council Canada (Canada); Glen Herriot, Kei Szeto, Ivan Wevers, NRC - Herzburg Institute of Astrophysics (Canada); Marc-André Boucher, INO (Canada) . . . . . [9148-115]

Altair performance and upgrades, Olivier Lai, Gemini Observatory (USA) and Subaru Telescope, National Astronomical Observatory of Japan (USA); Chadwick A. Trujillo, Gemini Observatory (USA); Jean-Pierre Véran, Glen Herriot, NRC - Herzburg Institute of Astrophysics (Canada). . . . . [9148-116]

KAPAO First Light: the design, construction and operation of a low-cost natural guide star adaptive optics system, Scott A. Severson, Sonoma State Univ. (USA); Philip I. Choi, Pomona College (USA); Katherine T. Badham, Sonoma State Univ. (USA); Dalton Z. Bolger, Daniel S. Contreras, Pomona College (USA); Blaine N. Gilbreth, Sonoma State Univ. (USA); Christian Guerrero, Erik Littleton, Harvey Mudd College (USA); Joseph D. Long, Lorcan P. McGonigle, William A. Morrison, Fernando Ortega, Alexander R. Rudy, Jonathan R. Wong, Pomona College (USA); Erik R. Spjut, Harvey Mudd College (USA); Christoph Baranec, Reed L. Riddle, California Institute of Technology (USA) . . . . . [9148-117]

Commissioning ShARCS: the Shane adaptive optics infrared camera-spectrograph for the Lick Observatory 3-m telescope, Rosalie C. McGurk, Srikar Srinath, Univ. of California, Santa Cruz (USA); Constance Rockosi, Univ. of California, Santa Cruz (USA) and Lick Observatory (USA); Renate Kupke, Donald Gavel, Gerald Cabak, David Cowley, Daren Dillon, Elinor L. Gates, Lick Observatory (USA); Andrew P. Norton, Univ. of California, Santa Cruz (USA); Michael Peck, Christopher T. Ratliff, Lick Observatory (USA); Marco R. Reinig, Univ. of California, Santa Cruz (USA). . . . . [9148-118]

Opto-mechanical design of ShaneAO: the adaptive optics system for the 3-meter Shane telescope, Christopher T. Ratliff, Renate Kupke, Donald Gavel, Gerald Cabak, Univ. of California Observatories (USA) . . . . . [9148-119]

Requirement versus performance for the ANU/EOS adaptive optics demonstrator, Francois Rigaut, Celine d'Orgeville, Francis Bennet, Ian Price, Nicolas Paulin, Kristina Uhlendorf, William R. Gardhouse, The Australian National Univ. (Australia); Craig H. Smith, Electro Optic Systems Pty. Ltd. (Australia); Yue Gao, Ian T. Ritchie, Yanjie Wang, EOS Space Systems Pty. Ltd. (Australia). . . . . [9148-120]

The NGS Pyramid wavefront sensor for ERIS, Armando Riccardi, Simone Esposito, Jacopo Antichi, Fernando Quirós-Pacheco, Alfio T. Puglisi, Luca Carbonaro, Valdemaro Biliotti, Guido Agapito, Runa Briguglio, Gianluca Di Rico, INAF - Osservatorio Astrofisico di Arcetri (Italy); Mauro Dolci, INAF - Osservatorio Astronomico di Teramo (Italy); Debora Ferruzzi, Enrico Pinna, Marco Xompero, INAF - Osservatorio Astrofisico di Arcetri (Italy); Enrico Marchetti, Enrico Fedrigo, Miska Le Louarn, Pierre-Yves Madec, Christian Soenke, Ralf D. Conzelmann, Bernard-Alexis Delabre, Paola Amico, Norbert Hubin, European Southern Observatory (Germany) . . . . . [9148-122]

Posters: Laser Guide Star Systems

A sodium laser guide star facility for the ANU/EOS space debris tracking adaptive optics demonstrator, Celine d'Orgeville, Francis Bennet, The Australian National Univ. (Australia); Mark Blundell, Amy L. Chan, Murray I. Dawson, Yue Gao, EOS Space Systems Pty. Ltd. (Australia); William R. Gardhouse, Nicolas Paulin, Ian Price, Francois Rigaut, The Australian National Univ. (Australia); Ian T. Ritchie, EOS Space Systems Pty. Ltd. (Australia); Matt J. Sellars, The Australian National Univ. (Australia); Craig H. Smith, Electro Optic Systems Pty. Ltd. (Australia); Kristina Uhlendorf, The Australian National Univ. (Australia); Yanjie Wang, EOS Space Systems Pty. Ltd. (Australia) . . . . . [9148-124]

The holographic calibration unit for ARGOS: concept and alignment, Diethard Peter, Max-Planck-Institut für Astronomie (Germany); Christian Schwab, Pennsylvania State Univ. (USA); Wolfgang Gaessler, Max-Planck-Institut für Astronomie (Germany). . . . . [9148-125]

PULSE: The Palomar ultraviolet laser for the study of exoplanets , Christoph Baranec, Univ. of Hawai'i (USA); Richard G. Dekany, California Institute of Technology (USA); Rick S. Burruss, Jet Propulsion Lab. (USA) . . . . . [9148-126]

Pulsed laser architecture for enhancing backscatter from sodium, Thomas J. Kane, Paul Hillman, Craig A. Denman, FASORtronics LLC (USA) . . . . . [9148-127]

ARGOS Laser system mechanical design, Matthias Deysenroth, Sebastian Rabien, Walfried Raab, Hans Gemperlein, Julian Ziegleder, Gilles Orban de Xivry, Lothar Barl, Mathias Honsberg, Max-Planck-Institut für extraterrestrische Physik (Germany); Wolfgang Gaessler, José Luis Borelli, Martin Kulas, Max-Planck-Institut für Astronomie (Germany) . . . . . [9148-128]

Laboratory validation of a laser shaping system before guide star projection, Sebastián G. Zúñiga, Univ. Técnica Federico Santa María (Chile); Clémentine Béchet, Pontificia Univ. Católica de Chile (Chile); Benoît Neichel, Lab. d'Astrophysique de Marseille (France); Vincent Fesquet, Vincent Garrel, Gemini Observatory (Chile); Pedro A. Escárate, Univ. Santa María (Chile); Christian Dani Guzmán, Andrés R. Guesalaga, Pontificia Univ. Católica de Chile (Chile) [9148-129]

Polarization control optimization of the Gemini south beam transfer optics, Constanza Araujo Hauck, Cristian Moreno, Gemini Observatory (Chile) . [9148-130]

The ARGOS laser system: green light for ground layer adaptive optics at the LBT, Walfried Raab, Sebastian Rabien, Max-Planck-Institut für extraterrestrische Physik (Germany); Wolfgang Gaessler, Max-Planck-Institut für Astronomie (Germany); Simone Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy); Lothar Barl, Max-Planck-Institut für extraterrestrische Physik (Germany); José Luis Borelli, Max-Planck-Institut für Astronomie (Germany); Matthias Daysenroth, Hans Gemperlein, Max-Planck-Institut für extraterrestrische Physik (Germany); Martin Kulas, Max-Planck-Institut für Astronomie (Germany); Julian Ziegleder, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9148-131]

Experimental demonstration of brighter sodium resonant scattering with 1.7 GHz sideband repumping for long pulse laser, Lihang Li, Shaopeng Zhang, Weihong Hua, Hongyan Wang, Xiaojun Xu, National Univ. of Defense Technology (China) . . . . . [9148-132]

Coupling efficiency measurements for long-pulsed solid sodium laser based on measured sodium profile data, Kai Jin, Kai Wei, Institute of Optics and Electronics (China); Shiyong Xie, Yong Bo, Junwei Zuo, Pengyuan Wang, Technical Institute of Physics and Chemistry (China); Lu Feng, National Astronomical Observatories (China); Xianghui Xue, Univ. of Science and Technology of China (China); Min Li, Institute of Optics and Electronics (China); Xuewu Cheng, Wuhan Institute of Physics and Mathematics (China); Chaolong Cui, Anhui Institute of Optics and Fine Mechanics (China); Yu Shen, Qi Bian, Ji Yao, Technical Institute of Physics and Chemistry (China); Angel C. Otarola, Thirty Meter Telescope Observatory Corp. (USA); Xiaolin Dai, Institute of Optics and Electronics (China); Tingdi Chen, Univ. of Science and Technology of China (China); Qinjun Peng, Technical Institute of Physics and Chemistry (China); Changhui Rao, Institute of Optics and Electronics (China); Zuyan Xu, Technical Institute of Physics and Chemistry (China); Yudong Zhang, Institute of Optics and Electronics (China) . . . . . [9148-133]

Proposal for a field test plan of elongated Sodium LGS wave-front sensing in the perspective of the E-ELT, Gérard Rousset, Damien Gratadour, Éric Gendron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Richard M. Myers, Timothy J. Morris, Gordon Talbot, Durham Univ. (United Kingdom); Domenico Bonaccini Calia, Thomas Pfrommer, European Southern Observatory (Germany); Alastair G. Basden, Durham Univ. (United Kingdom); Zoltan Hubert, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France) . . . . [9148-134]

Using a deformable mirror to generate custom laser guidestar asterisms: simulation and laboratory results, Andrew P. Norton, Srikar Srinath, Donald Gavel, Renate Kupke, Daren Dillon, Univ. of California, Santa Cruz (USA)[9148-135]

Assembly and test results of the AOF laser guide star units at ESO, Wolfgang K. Hackenberg, Domenico Bonaccini Calia, Bernard Buzzoni, Mauro Comin, Christophe Dupuy, Fernando Gago Rodriguez, Ivan M. Guidolin, Ronald Guzman, Ronald Holzlöhner, Lothar Kern, Jean-Paul Kirchbauer, Steffan A. Lewis, Jean-Louis Lizon, Stewart McLay, Thomas Pfrommer, Marco Quattri, Jutta Quentin, Robert Ridings, European Southern Observatory (Germany) . . . . . [9148-136]

Laser guide star pointing camera for LGSF facilities, Domenico Bonaccini Calia, European Southern Observatory (Germany); Fernando Pedichini, Mauro Centrone, INAF - Osservatorio Astronomico di Roma (Italy) . . . . . [9148-137]

Evaluating the compliance of Keck's LGSAO automated aircraft protection system with FAA adopted criteria, Paul J. Stomski Jr., Randall D. Campbell, W. M. Keck Observatory (USA) . . . . . [9148-138]

Laser tomography with the ARGOS Sodium upgrade: towards visible AO correction, Lorenzo Busoni, Tommaso Mazzoni, Marco Bonaglia, Enrico Pinna, Simone Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy); Gilles Orban de Xivry, Sebastian Rabien, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9148-139]

DARKNESS: An MKID based integral field spectrograph for high-contrast observations at Palomar, Seth R. Meeker, Benjamin A. Mazin, Univ. of California, Santa Barbara (USA); Rebecca M. Jensen-Clem, California Institute of Technology (USA); Julian C. van Eyken, Matthew Strader, Univ. of California, Santa Barbara (USA); Bruce Bumble, Jet Propulsion Lab. (USA); Richard G. Dekany, California Institute of Technology (USA); Ben R. Oppenheimer, American Museum of Natural History (USA); Eugene Serabyn, Jet Propulsion Lab. (USA) . . . . . [9148-271]

MONDAY 23 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . MON 8:50 TO 10:00

Session Chair: **Luc Simard,** National Research Council of Canada - Herzberg Institute of Astrophysics (Canada)

08:50: **Welcome**

9:00: **James Webb Space Telescope: the road to first science observations** *(Plenary)*, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) [9143-501]

9:30: **The Square Kilometre Array: a physics machine for the 21st Century** *(Plenary)*, Philip Diamond, SKA Organisation (United Kingdom) . . [9143-502]

Coffee Break . . . . . Mon 10:00 to 10:30

SESSION 5

LOCATION: ROOM 518A . . . . . MON 10:30 TO 12:20

Extreme AO I

Session Chair: **Simone Esposito,** INAF - Osservatorio Astrofisico di Arcetri (Italy)

10:30: **SPHERE: a planet finder instrument for the VLT** *(Invited Paper)*, Jean-Luc Beuzit, David Mouillet, Institut de Planétologie et d'Astrophysique de Grenoble (France); Kjetil Dohlen, Lab. d'Astrophysique de Marseille (France); Markus Feldt, Max-Planck-Institut für Astronomie (Germany); Pascal Puget, Institut de Planétologie et d'Astrophysique de Grenoble (France); François Wildi, Observatoire de Genève (Switzerland); Markus E. Kasper, European Southern Observatory (Germany) . . . . . [9148-17]

10:55: **The Gemini planet imager: first light and commissioning** *(Invited Paper)*, Bruce A. Macintosh, Stanford Univ. (USA); Jeffrey K. Chilcote, Univ. of California, Los Angeles (USA); Daren Dillon, Univ. of California, Santa Cruz (USA); Jennifer S. Dunn, NRC - Herzburg Institute of Astrophysics (Canada); Michael P. Fitzgerald, Univ. of California, Los Angeles (USA); Donald Gavel, Univ. of California, Santa Cruz (USA); James R. Graham, Univ. of California, Berkeley (USA); Alexandra Z. Greenbaum, Johns Hopkins Univ. (USA); Stephen J. Goodsell, Gemini Observatory (USA); Markus Hartung, Pascale Hibon, Gemini Observatory (Chile); Patrick J. Ingraham, Stanford Univ. (USA); Quinn M. Konopacky, Univ. of Toronto (Canada); James E. Larkin, Univ. of California, Los Angeles (USA); Jérôme Maire, Univ. of Toronto (Canada); Franck Marchis, SETI Institute (USA); Christian Marois, NRC-Dominion Astrophysical Observatory (Canada); Ben R. Oppenheimer, American Museum of Natural History (USA); David W. Palmer, Lawrence Livermore National Lab. (USA); Marshall D. Perrin, Space Telescope Science Institute (USA); Lisa A. Poyneer, Lawrence Livermore National Lab. (USA); Laurent A. Pueyo, Space Telescope Science Institute (USA); Fredrik T. Rantakyrö, Naru Sadakuni, Gemini Observatory (Chile); Dmitry Savransky, Cornell Univ. (USA); Rémi Soummer, Anand Sivaramakrishnan, Space Telescope Science Institute (USA); Sandrine J. Thomas, NASA Ames Research Ctr. (USA); James K. Wallace, Jet Propulsion Lab. (USA); Jason J. Wang, Univ. of California, Berkeley (USA); Sloane J. Wiktorowicz, Univ. of California, Santa Cruz (USA); Schuyler G. Wolff, Johns Hopkins Univ. (USA) . . . . . [9148-18]

11:20: **On-sky performance during verification and commissioning of the Gemini planet imager's adaptive optics system**, Lisa A. Poyneer, Bruce A. Macintosh, David W. Palmer, Lawrence Livermore National Lab. (USA) . . [9148-19]

11:40: **High contrast imaging at the LBT: the LEECH exoplanet imaging survey**, Andrew J. Skemer, Daniel Apai, Vanessa P. Bailey, The Univ. of Arizona (USA); Beth A. Biller, Mickaël Bonnefoy, Wolfgang Brandner, Esther Buenzli, Max-Planck-Institut für Astronomie (Germany); Laird M. Close, The Univ. of Arizona (USA); Justin Crepp, Univ. Notre Dame (USA); Denis Defrère, The Univ. of Arizona (USA); Silvano Desidera, INAF - Osservatorio Astronomico di Padova (Italy); Joshua Eisner, The Univ. of Arizona (USA); Simone Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy); Jonathan Fortney, Univ. of California, Santa Cruz (USA); Thomas F. E. Henning, Max-Planck-Institut für Astronomie (Germany); Philip M. Hinz, The Univ. of Arizona (USA); Karl-Heinz Hofmann, Max-Planck-Institut für Radioastronomie (Germany); Jarron M. Leisenring, Jared R. Males, The Univ. of Arizona (USA); Rafael Millan-Gabet, California Institute of Technology (USA); Katie M. Morzinski, Ilaria Pascucci, The Univ. of Arizona (USA); Jennifer Patience, Arizona State Univ. (USA); George H. Rieke, The Univ. of Arizona (USA); Dieter Schertl, Max-Planck-Institut für Radioastronomie (Germany); Joshua E. Schlieder, Max-Planck-Institut für Astronomie (Germany); Michael F. Skrutskie, Univ. of Virginia (USA); Kate Y. L. Su, The Univ. of Arizona (USA); Gerd P. Weigelt, Max-Planck-Institut für Radioastronomie (Germany); Charles E. Woodward, Univ. of Minnesota, Twin Cities (USA); Neil Zimmerman, Max-Planck-Institut für Astronomie (Germany) . . [9148-20]

12:00: **The VORTEX project: first results and perspectives**, Olivier Absil, Univ. de Liège (Belgium); Dimitri Mawet, European Southern Observatory (Chile); Christian Delacroix, Univ. de Liège (Belgium); Pontus Forsberg, Mikael Karlsson, Uppsala Univ. (Sweden); Serge Habraken, Jean Surdej, Univ. de Liège (Belgium); Pierre-Antoine Absil, Univ. Catholique de Louvain (Belgium); Brunella Carlomagno, Univ. de Liège (Belgium); Valentin Christiaens, Univ. de Chile (Chile) and Univ. de Liège (Belgium); Denis Defrère, The Univ. of Arizona (USA); Carlos A. Gomez Gonzalez, Aïssa Jolivet, Lindsay Marion, Univ. de Liège (Belgium); Julien Milli, European Southern Observatory (Chile); Pierre Piron, Univ. de Liège (Belgium); Ernesto Vargas Catalan, Uppsala Univ. (Sweden); Marc Van Droogenbroeck, Univ. de Liège (Belgium) . . . . . [9148-21]

Lunch Break . . . . . Mon 12:20 to 13:50

SESSION 6

LOCATION: ROOM 518A . . . . . MON 13:50 TO 15:30

Advances in AO Control I

Session Chair: **Caroline Kulcsar,** Institut d'Optique Graduate School (France)

13:50: **On-sky vibration environment for the Gemini planet imager and mitigation effort**, Markus Hartung, Gemini Observatory (Chile); Leslie Saddlemyer, NRC - Herzburg Institute of Astrophysics (Canada); Thomas L. Hayward, Gemini Observatory (Chile); Bruce A. Macintosh, Lisa A. Poyneer, Lawrence Livermore National Lab. (USA); Andrés R. Guesalaga, Pontificia Univ. Católica de Chile (Chile); Dmitry Savransky, Lawrence Livermore National Lab. (USA); Naru Sadakuni, Gemini Observatory (Chile); Daren Dillon, Univ. of California, Santa Cruz (USA); James K. Wallace, Jet Propulsion Lab. (USA); Ramon Galvez, Gaston Gausachs, Paul Collins, Andrew Cardwell, Andrew Serio, Fredrik T. Rantakyrö, Gemini Observatory (Chile); Stephen J. Goodsell, Gemini Observatory (USA) . . . . . [9148-175]

14:10: **SPHERE eXtreme AO control scheme: final performance assessment and on sky validation of the first auto-tuned LQG based operational system**, Cyril Petit, Jean-François Sauvage, Serge C. Meimon, Thierry Fusco, ONERA (France); Marcos Suarez Valles, European Southern Observatory (Germany); Anne Costille, Lab. d'Astrophysique de Marseille (France); Andrea Barrufolo, INAF - Osservatorio Astronomico di Padova (Italy); Markus E. Kasper, Enrico Fedrigo, European Southern Observatory (Germany); David Mouillet, INAF - Osservatorio Astronomico di Padova (France); Kjetil Dohlen, Lab. d'Astrophysique de Marseille (France); Arnaud Sevin, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Jean-Luc Beuzit, INAF - Osservatorio Astronomico di Padova (Italy) . . . . . [9148-23]

14:30: **Fast algorithm for wavefront reconstruction in XAO/SCAO with pyramid wavefront sensor**, Iuliia Shatokhina, Johannes Kepler Univ. Linz (Austria); Andreas Obereder, MathConsult GmbH (Austria); Ronny Ramlau, Johannes Kepler Univ. Linz (Austria) . . . . . [9148-24]

14:50: **Iterative reconstruction methods in atmospheric tomography**, Ronny Ramlau, Johannes Kepler Univ. Linz (Austria); Mykhaylo Yudytskiy, Johann Radon Institute for Computational and Applied Mathematics (Austria); Daniela Saxenhuber, Johannes Kepler Univ. Linz (Austria). . . . . [9148-25]

15:10: **Fast iterative optimal estimation of turbulence wavefronts with recursive block Toeplitz covariance matrix**, Rodolphe Conan, The Australian National Univ. (Australia) . . . . . [9148-26]

Coffee Break . . . . . Mon 15:30 to 16:00

SESSION 7

LOCATION: ROOM 518A . . . . . MON 16:00 TO 17:20

Post-Processing AO Data I

Session Chair: **Francois Rigaut,** Research School of Astronomy & Astrophysics (Australia)

16:00: **Status of point spread function determination for Keck adaptive optics**, Sam Ragland, W. M. Keck Observatory (USA); Laurent Jolissaint, Haute Ecole d'Ingénierie et de Gestion du Canton de Vaud (Switzerland); Christopher R. Neyman, Peter L. Wizinowich, W. M. Keck Observatory (USA) . . . . . [9148-27]

16:20: **Efficient PSF reconstruction process for partially-corrected wide field images: description, simulation results and on-sky validation using GEMs data**, Thierry Fusco, Remy Villecroze, ONERA (France); Benoît Neichel, Lab. d'Astrophysique de Marseille (France); Pierre-Yves Madec, European Southern Observatory (Germany); Roland M. Bacon, Observatoire de Lyon (France); Miska Le Louarn, European Southern Observatory (Germany) . . . . . [9148-28]

16:40: **GPI PSF subtraction with TLOCI: the next evolution in exoplanet/disk high-contrast imaging**, Christian Marois, NRC-Dominion Astrophysical Observatory (Canada); Jean-Pierre Véran, NRC - Herzberg Institute of Astrophysics (Canada); Carlos M. Correia, Univ. do Porto (Portugal) . . . . . [9148-29]

17:00: **NACO, a(n on-going) history: astrometric calibration through the years**, Julien H. V. Girard, Koraljka Muzic, Jared O'Neal, European Southern Observatory (Chile). . . . . [9148-30]

POSTER SESSION–MONDAY

LOCATION: ROOM 516 . . . . . MON 17:30 TO 19:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Monday. The interactive poster session with authors in attendance will be Monday evening from 17:30 to 19:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Posters: Astronomy with AO

First demo science with MOAO: observations of distant merging galaxies with CANARY, Damien Gratadour, Éric Gendron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Olivier Martin, Observatoire de Paris à Meudon (France); Gérard Rousset, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Alastair G. Basden, Timothy J. Morris, Richard M. Myers, James Osborn, Durham Univ. (United Kingdom) . . . . . [9148-141]

GEMS: a new vision of galactic globular clusters, Giuliana Fiorentino, INAF - Osservatorio Astronomico di Bologna (Italy); Alan McConnachie, Peter B. Stetson, Paolo Turri, NRC - Herzburg Institute of Astrophysics (Canada); Giuseppe Bono, Univ. degli Studi di Roma "Tor Vergata" (Italy); Jean-Pierre Véran, NRC - Herzburg Institute of Astrophysics (Canada) . . . . . [9148-142]

The photometric and astrometric performance of LGS MCAO with science-based metrics: first results from Gemini/GeMS observations of galactic globular clusters, Paolo Turri, Univ. of Victoria (Canada); Alan McConnachie, Peter B. Stetson, David R. Andersen, NRC - Herzburg Institute of Astrophysics (Canada); Giuseppe Bono, Univ. degli Studi di Roma "Tor Vergata" (Italy); Giuliana Fiorentino, INAF - Osservatorio Astronomico di Bologna (Italy); Jean-Pierre Véran, NRC - Herzburg Institute of Astrophysics (Canada). . . . . [9148-143]

New frontiers in circumstellar science with MagAO's visible light simultaneous differential imaging mode, Katherine B. Follette, Laird M. Close, Jared R. Males, Katie M. Morzinski, The Univ. of Arizona (USA) . . . . . [9148-144]

L'-band AGPM vector vortex coronagraph's first light on LBTI/LMIRCAM, Denis Defrère, The Univ. of Arizona (USA); Olivier Absil, Univ. de Liège (Belgium); Phillip M. Hinz, The Univ. of Arizona (USA); Dimitri Mawet, European Southern Observatory (Chile); Jonas G. Kühn, Bertrand Mennesson, Jet Propulsion Lab. (USA); Andrew J. Skemer, The Univ. of Arizona (USA); James K. Wallace, Jet Propulsion Lab. (USA); Christian Delacroix, Univ. de Liège (Belgium); Matthew A. Kenworthy, Leiden Observatory (Netherlands); Olivier Durney, Manny Montoya, The Univ. of Arizona (USA). . . . . [9148-145]

Posters: Wavefront Correction

Double drive modes unimorph deformable mirror with high actuator count for astronomical application, Ying Liu, Univ. of Science and Technology of China (China); Jianqiang Ma, Ningbo Univ. (China); Junjie Chen, Baoqing Li, Jiaru Chu, Univ. of Science and Technology of China (China). . . . . [9148-146]

Payload characterization for CubeSat demonstration of MEMS deformable mirrors, Anne D. Marinan, Kerri L. Cahoy, Matthew Webber, Caitlin Kerr, Faith Huynh, Massachusetts Institute of Technology (USA) . . . . . [9148-147]

Analysis of the static deformation matching between numerical and experimental data on the voice-coil actuated deformable mirrors, Ciro Del Vecchio, Runa Briguglio, Armando Riccardi, INAF - Osservatorio Astrofisico di Arcetri (Italy). . . . . [9148-148]

The preliminary design of the large adaptive mirror for the Chinese future telescope, Heng Zuo, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9148-149]

A compact adaptive optics system with 3mm narrow-interval DM, Min Li, Lixia Xue, Hao Xian, Institute of Optics and Electronics (China); Xuejun Rao, Institute of Optics and Electronics, Chinese Academy of Science (China) and The Key Laboratory on Adaptive Optics, Chinese Academy of Science (China); Xiaojun Zhang, Kai Wei, Shanqiu Chen, Ang Zhang, Donghong Chen, Changhui Rao, Yudong Zhang, Institute of Optics and Electronics (China) . . . . . [9148-150]

Optimization of actuator configuration for bimorph mirrors, Marie Laslandes, Sergio Pellegrino, John Steeves, Keith Patterson, California Institute of Technology (USA) . . . . . [9148-151]

The 384-channel prototype of DM Electronics for ELT AO systems, Kris Caputa, Jenny Atwood, Glen Herriot, Jean-Pierre Véran, NRC - Herzberg Institute of Astrophysics (Canada); Adam Zielinski, Univ. of Victoria (Canada) . . . . . [9148-152]

The deformable secondary mirror of VLT: final electro-mechanical and optical acceptance test results, Runa Briguglio, Marco Xompero, Armando Riccardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Mario Andrighettoni, Dietrich Pescoller, Roberto Biasi, Microgate S.r.l. (Italy); Daniele Gallieni, A.D.S. International S.r.l. (Italy); Elise Vernet, Johann Kolb, Robin Arsenault, Pierre-Yves Madec, European Southern Observatory (Germany) . . . . . [9148-153]

Deformable mirror interferometric analysis for the direct imagery of exoplanets, Johan Mazoyer, Observatoire de Paris à Meudon (France); Pierre Baudoz, Raphaël Galicher, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Patrick Lanzoni, Frédéric Zamkotsian, Lab. d'Astrophysique de Marseille (France); Gérard Rousset, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France) . . . . . [9148-154]

Posters: Extreme AO

Wave-front sensor strategies for SPHERE: first on-sky results and future improvements, Jean-François Sauvage, Thierry Fusco, Cyril Petit, ONERA (France); David Mouillet, Institut de Planétologie et d'Astrophysique de Grenoble (France); Kjetil Dohlen, Anne Costille, Lab. d'Astrophysique de Marseille (France); Jean-Luc Beuzit, Institut de Planétologie et d'Astrophysique de Grenoble (France); Andrea Baruffolo, INAF - Osservatorio Astronomico di Padova (Italy); Markus E. Kasper, Marcos Suarez Valles, European Southern Observatory (Germany); Laurent Mugnier, ONERA (France); Pierre Baudoz, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France) . . . . . [9148-155]

Lyot based pointing control system: implementation on Subaru coronagraphic extreme adaptive optics system and its laboratory performance, Garima Singh, Olivier Guyon, Subaru Telescope, National Astronomical Observatory of Japan (USA); Pierre Baudoz, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Frantz Martinache, Observatoire de la Côte d'Azur (France); Nemanja Jovanovic, Subaru Telescope, National Astronomical Observatory of Japan (USA). . . . . [9148-157]

CHARIS science: performance simulations for the Subaru Telescope's third-generation of exoplanet imaging instrumentation, Timothy D. Brandt, Institute for Advanced Study (USA); Michael W. McElwain, NASA Goddard Space Flight Ctr. (USA); Markus Janson, Queen's Univ. Belfast (United Kingdom); Gillian Knapp, Princeton Univ. (USA); Kyle Mede, The Univ. of Tokyo (Japan); Masayuki Kuzuhara, Tokyo Institute of Technology (Japan); Satoko Sorahana, Nagoya Univ. (Japan) and Institute of Space and Astronautical Science (Japan); Tyler D. Groff, Adam Burrows, Princeton Univ. (USA); Olivier Guyon, Subaru Telescope, National Astronomical Observatory of Japan (USA) and The Univ. of Arizona (USA); Jun Hashimoto, The Univ. of Oklahoma (USA); Masahiko Hayashi, Nemanja Jovanovic, Subaru Telescope, National Astronomical Observatory of Japan (USA); N. Jeremy Kasdin, Mary Anne Peters-Limbach, Princeton Univ. (USA); Frantz Martinache, Univ. de Nice Sophia Antipolis (France); David Spiegel, Institute for Advanced Study (USA); Naruhisa Takato, Subaru Telescope, National Astronomical Observatory of Japan (USA); Motohide Tamura, The Univ. of Tokyo (Japan); Edwin L. Turner, Princeton Univ. (USA) and The Univ. of Tokyo (Japan); Robert J. Vanderbei, Princeton Univ. (USA); John P. Wisniewski, Univ. of Oklahoma (USA) . . . . . [9148-158]

Posters: Advances in AO Control

A software based de-rotation algorithm concept for the new adaptive optics module (NAOMI) for the auxiliary telescopes of the VLTI, Emmanuel Aller-Carpentier, Enrico Marchetti, Reinhold J. Dorn, Jérome Paufique, Enrico Fedrigo, Miska Le Louarn, Norbert Hubin, Julien Woillez, Françoise Delplancke-Stroebele, European Southern Observatory (Germany) . . . . . [9148-159]

Evaluation of the Xeon phi processor as a technology for the acceleration of real-time control in high order adaptive optics systems, David T. Barr, UK Astronomy Technology Ctr. (United Kingdom) and Heriot-Watt Univ. (United Kingdom); Alastair G. Basden, Nigel A. Dipper, Durham Univ. (United Kingdom); Noah Schwartz, Andrew J. A. Vick, Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom); Robert R. Thomson, Heriot-Watt Univ. (United Kingdom) . . . . . [9148-160]

Preliminary evaluation and comparison of atmospheric turbulence rejection performance for infinite and receding horizon control in adaptive optics systems, Mikhail V. Konnik, Jose De Dona, The Univ. of Newcastle (Australia) . . . . . [9148-161]

A new type RTC with multi-stars structure for ExAO system, Luchun Zhou, Mei Li, Zhui Wang, Changhui Rao, Kai Wei, Hao Xian, Yudong Zhang, Institute of Optics and Electronics (China) . . . . . [9148-163]

Multi-input multi-output identification for control of adaptive optics systems, Riccardo Muradore, Univ. degli Studi di Verona (Italy); Johann Kolb, Lorenzo Pettazzi, Enrico Marchetti, European Southern Observatory (Germany) . [9148-165]

Real-time control for the high order, wide field DRAGON AO test bench, Alastair G. Basden, Timothy J. Morris, Andrew P. Reeves, Nigel A. Dipper, Richard M. Myers, Eddy J. Younger, Nazim A. Bharmal, Urban Bitenc, Durham Univ. (United Kingdom) . . . . . [9148-168]

VLT DSM, the control system of the largest deformable secondary mirror ever manufactured, Marco Morandini, Paolo Mantegazza, Politecnico di Milano (Italy); Mauro Manetti, Roberto Biasi, Mario Andrighettoni, Microgate S.r.l. (Italy); Daniele Gallieni, A.D.S. International S.r.l. (Italy) . . . . . [9148-169]

Artificial immunological algorithm applied in the problem of Shack-Hartmann centroid detection, Denis F. Andrade, Bruno C. Quint, Javier Ramirez-Fernandez, Univ. de São Paulo (Brazil) . . . . . [9148-170]

Demonstration of the suitability of GPUs for AO real-time control at ELT scales, Urban Bitenc, Alastair G. Basden, Nigel A. Dipper, Richard M. Myers, Durham Univ. (United Kingdom) . . . . . [9148-171]

Modern anti-windup control of tip-tilt mirror, Jean-Pierre Folcher, Univ. de Nice Sophia Antipolis (France) . . . . . [9148-172]

Local ensemble transform Kalman filter: first simulation results of an optimal and non-stationary control law for adaptive optics systems on Extremely Large telescopes, Morgan Gray, Lab. d'Astrophysique de Marseille (France); Cyril Petit, ONERA (France); Sergey Rodionov, Lab. d'Astrophysique de Marseille (France); Laurent Bertino, Univ. of Bergen (Norway); Marc Bocquet, Univ. Paris-EST (France) and Electricité de France (France) and Institut National de Recherche en Informatique et en Automatique (France) . . . . . [9148-173]

Woofer-tweeter deformable mirror control for closed-loop adaptive optics: theory and practice, Donald Gavel, Andrew P. Norton, Univ. of California, Santa Cruz (USA) . . . . . [9148-174]

Benchmarking hardware architecture candidates for the NFIRAOS real-time controller, Malcolm Smith, Jean-Pierre Véran, Glen Herriot, Daniel A. Kerley, NRC - Herzberg Institute of Astrophysics (Canada) . . . . . [9148-176]

Kalman filter design for tip/tilt, tip/tilt anisoplanatism and vibration rejection on Extremely Large telescopes, Luc Gilles, Thirty Meter Telescope Observatory Corp. (USA); Henri-François G. Raynaud, Institut d'Optique Graduate School (France); Carlos M. Correia, Univ. do Porto (Portugal); Caroline Kulcsar, Institut d'Optique Graduate School (France); Lianqi Wang, Brent L. Ellerbroek, Corinne Boyer, Thirty Meter Telescope Observatory Corp. (USA) . . . . . [9148-177]

First on-sky results of a neural network based tomographic reconstructor: Carmen on Canary, James Osborn, Durham Univ. (United Kingdom); Christian Dani Guzman Carmine, Pontificia Univ. Católica de Chile (Chile); Francisco J. De Cos Juez, Univ. de Oviedo (Spain); Timothy J. Morris, Alastair G. Basden, Richard M. Myers, Durham Univ. (United Kingdom); Éric Gendron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Timothy Butterley, Durham Univ. (United Kingdom); Andrés R. Guesalaga, Pontificia Univ. Católica de Chile (Chile) . . . . . [9148-178]

Robustness of tomographic reconstructors versus real atmospheric profiles in the ELT perspective, Éric Gendron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Olivier Martin, Observatoire de Paris à Meudon (France); Damien Gratadour, Fabrice Vidal, Gérard Rousset, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France) . . . . . [9148-179]

Posters: Post-Processing AO Data

On-sky PSF reconstruction with APETy, Rodrigo A. Olguin, ALMA (Chile) and Pontificia Univ. Católica de Chile (Chile); Markus Hartung, Thomas L. Hayward, Gemini Observatory (Chile); Damien Gratadour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Andrés R. Guesalaga, Pontificia Univ. Católica de Chile (Chile) . . . . . [9148-188]

Morphology of distant galaxies with MCAO, Benoît Neichel, Lab. d'Astrophysique de Marseille (France); Marc Huertas-Company, Observatoire de Paris à Meudon (France); Benoit Epinat, Lab. d'Astrophysique de Marseille (France); Damien Gratadour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France) . . . . . [9148-180]

Maximum likelihood approach of the adaptive optics point spread function estimation, Jonathan Exposito, Damien Gratadour, Gérard Rousset, Yann Clénet, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Laurent Mugnier, ONERA (France); Éric Gendron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France) . . . . . [9148-181]

CHARA array adaptive optics II: non-common-path correction and downstream optics, Theo A. ten Brummelaar, CHARA (USA); Xiao Che, Univ. of Michigan (USA); Harold A. McAlister, CHARA (USA); Michael Ireland, Maquarie Univ. (Australia); John D. Monnier, Univ. of Michigan (USA); Denis Mourard, Observatoire de la Côte d'Azur (France); Stephen T. Ridgway, National Optical Astronomy Observatory (USA); Judit Sturmann, Laszlo Sturmann, Nils H. Turner, CHARA (USA); Peter G. Tuthill, The Univ. of Sydney (Australia) . . . . . [9148-183]

ABISM: an interactive image quality assessment tool for adaptive optics instruments, Julien H. V. Girard, European Southern Observatory (Chile); Martin Tourneboeuf, Pontificia Univ. Católica de Chile (Chile) and École Polytechnique (France) and European Southern Observatory (Chile); Antoine Mérand, Dimitri Mawet, European Southern Observatory (Chile) . . . . . [9148-184]

Point spread function reconstruction for the W. M. Keck observatory laser guide star adaptive optics system: preliminary on-sky results, Laurent Jolissaint, Haute Ecole d'Ingénierie et de Gestion du Canton de Vaud (Switzerland) . . . . . [9148-185]

Real-time Strehl and image quality performance estimator at Paranal observatory, Dimitri Mawet, Alain Smette, European Southern Observatory (Chile); Marc S. Sarazin, European Southern Observatory (Germany); Julien H. V. Girard, European Southern Observatory (Chile); Harald Kuntschner, European Southern Observatory (Germany) . . . . . [9148-186]

Strehl-constrained reconstruction of post-adaptive optics data by means of the Software Package AIRY, version 6.1, Marcel Carbillet, Univ. de Nice Sophia Antipolis (France); Andrea La Camera, Univ. degli Studi di Genova (Italy); Jérémy Deguignet, Univ. de Nice Sophia Antipolis (France); Marco Prato, Univ. degli Studi di Modena e Reggio Emilia (Italy); Eric Aristidi, Univ. de Nice Sophia Antipolis (France); Mario Bertero, Patrizia Boccacci, Univ. degli Studi di Genova (Italy) . . . . . [9148-187]

CONFERENCE 9148 · LOCATION: ROOM 518A

TUESDAY 24 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . TUE 8:50 TO 10:00

Session Chair: **Gillian S. Wright,** UK Astronomy Technology Ctr. (United Kingdom)

8:50: **SPIE Fellows Awards** presented by H. Philip Stahl, President of SPIE. The following individuals will be recognized for their contributions to SPIE and the scientific community: **Mark Clampin,** NASA Goddard Space Flight Ctr. (United States); **Gary Matthews,** Exelis Inc. (United States); **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (United States)

9:00: **Gaia: scientific in-orbit performance** *(Plenary),* Timo Prusti, European Space Agency (Netherlands) . . . . . [9143-503]

9:30: **ALMA Update** *(Plenary)*, Pierre Cox, Joint ALMA Observatory (Chile); Stuartt A. Corder, National Radio Astronomy Observatory (Chile) [9143-504]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 8

LOCATION: ROOM 518A . . . . . TUE 10:30 TO 12:20

AO for ELTs

Session Chair: **Richard M. Myers,** Durham Univ. (United Kingdom)

10:30: **The Giant Magellan telescope adaptive optics program** *(Invited Paper)*, Antonin H. Bouchez, Giant Magellan Telescope Project (USA) . . . . . [9148-31]

10:55: **Adaptive optics program at TMT** *(Invited Paper)*, Corinne Boyer, Thirty Meter Telescope Observatory Corp. (USA). . . . . [9148-32]

11:20: **Preparing for the phase-B of the E-ELT MCAO module project**, Emiliano Diolaiti, INAF - Osservatorio Astronomico di Bologna (Italy). . . . . [9148-33]

11:40: **Overview of the MICADO SCAO system**, Yann Clénet, Jean-Tristan M. Buey, Gérard Rousset, Éric Gendron, Zoltan Hubert, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Mathieu Cohen, Observatoire de Paris à Meudon (France); Fanny Chemla, Damien Gratadour, Pierre Baudoz, Sylvestre Lacour, Anthony Boccaletti, Arnaud Sevin, Fabrice Vidal, Denis Perret, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Bertrand Le Ruyet, Observatoire de Paris à Meudon (France); Frédéric Chapron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Richard Davies, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9148-34]

12:00: **NFIRAOS: first facility AO system for the Thirty Meter telescope**, Glen Herriot, Jean-Pierre Véran, Peter W. G. Byrnes, Jenny Atwood, Kris Caputa, David R. Andersen, NRC - Herzburg Institute of Astrophysics (Canada); Alexis Hill, National Research Council Canada (Canada); John Pazder, NRC - Herzburg Institute of Astrophysics (Canada); Zoran Ljusic, National Research Council Canada (Canada); Malcolm Smith, Paolo Spanò, Matthias Rosensteiner, Ivan Wevers, Robert Wooff, Kei Szeto, NRC - Herzburg Institute of Astrophysics (Canada) . . . . . [9148-35]

Lunch Break . . . . . Tue 12:20 to 13:40

SESSION 9

LOCATION: ROOM 518A . . . . . TUE 13:40 TO 15:25

New Proposed AO Systems and Concepts for Large Telescopes and ELTs

Session Chair: **Simone Esposito,** INAF - Osservatorio Astrofisico di Arcetri (Italy)

13:40: **Pushing the limits of NGSs solely AO: GMCAO and beyond** *(Invited Paper)*, Roberto Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy) . . . . . [9148-36]

14:05: **Second generation Robo-AO instruments and systems**, Christoph Baranec, Univ. of Hawai'i (USA); Reed L. Riddle, California Institute of Technology (USA) and Caltech Optical Observatories (USA); Nicholas M. Law, The Univ. of North Carolina at Chapel Hill (USA). . . . . [9148-37]

14:25: **Wide field adaptive optics correction for the GMT using natural guide stars**, Marcos A. van Dam, Flat Wavefronts (New Zealand); Antonin H. Bouchez, Giant Magellan Telescope Project (USA); Brian McLeod, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9148-38]

14:45: **TMT-AGE: wide field of regard multi-object adaptive optics for TMT**, Masayuki Akiyama, Tohoku Univ. (Japan); Shin Oya, Subaru Telescope, National Astronomical Observatory of Japan (USA); Yoshito Ono, Tohoku Univ. (Japan); Hideki Takami, Shinobu Ozaki, National Astronomical Observatory of Japan (Japan); Yutaka Hayano, Ikuru Iwata, Subaru Telescope, National Astronomical Observatory of Japan (USA); Kazuhiro Hane, Tong Wu, Tohoku Univ. (Japan). . . . . [9148-39]

15:05: **Performance analysis of a multi-segmented extreme AO concept for the Colossus telescope**, Maud P. Langlois, Ctr. de Recherche Astronomique de Lyon (France); Gilberto Moretto, Institut de Physique Nucléaire de Lyon (France); Jeffrey R. Kuhn, Univ. of Hawai'i (USA); Svetlana Berdyugina, Kiepenheuer-Institut für Sonnenphysik (Germany); David Halliday, Dynamic Structures Ltd. (Canada); Caisey Harlingten, Innovative Optics Ltd. (Canada) . . . . . [9148-40]

Coffee Break . . . . . Tue 15:25 to 15:55

SESSION 10

LOCATION: ROOM 518A . . . . . TUE 15:55 TO 17:45

Wavefront Sensing I

Session Chair: **Brent L. Ellerbroek,** Thirty Meter Telescope Observatory Corp. (USA)

15:55: **Review of the latest developments in fast low noise detectors for wave-front sensing in the visible** *(Invited Paper)*, Sean M. Adkins, W. M. Keck Observatory (USA). . . . . [9148-41]

16:20: **SAPHIRA detector for infrared wavefront sensing** *(Invited Paper)*, Gert Finger, European Southern Observatory (Germany); Ian M. Baker, SELEX Galileo Infrared Ltd. (United Kingdom); Domingo Alvarez, Derek J. Ives, Leander H. Mehrgan, Manfred Meyer, Joerg Stegmeier, European Southern Observatory (Germany) . . . . . [9148-42]

16:45: **Revolutionary visible and infrared sensor detectors for the most advanced astronomical AO systems**, Philippe Feautrier, Institut de Planétologie et d'Astrophysique de Grenoble (France) and First Light Imaging (France); Jean-Luc Gach, Lab. d'Astrophysique de Marseille (France) and First Light Imaging (France); Sylvain Guieu, Institut de Planétologie et d'Astrophysique de Grenoble (France); Mark Downing, European Southern Observatory (Germany); Paul R. Jorden, e2v technologies plc (United Kingdom); Johan Rothman, Eric D. de Borniol, MINATEC (France); Philippe Balard, Lab. d'Astrophysique de Marseille (France) and First Light Imaging (France); Eric Stadler, Institut de Planétologie et d'Astrophysique de Grenoble (France) and First Light Imaging (France); Christian Guillaume, Observatoire de Haute-Provence (France); David Boutolleau, First Light Imaging (France); Jérome Coussement, SOFRADIR (France); Johann Kolb, Norbert Hubin, European Southern Observatory (Germany); Sophie Derelle, Clélia Robert, ONERA (France); Julien Tanchon, Thierry Trollier, Alain Ravex, Absolut System SAS (France); Gérard Zins, Pierre Kern, Thibaut Moulin, Sylvain Rochat, Alain Delpoulbé, Jean-Baptiste Lebouqun, Institut de Planétologie et d'Astrophysique de Grenoble (France) . . . . . [9148-43]

17:05: **OCAM2S: an integral shutter ultrafast and low noise wavefront sensor camera for laser guide stars adaptive optics systems**, Jean-Luc Gach, Lab. d'Astrophysique de Marseille (France) and First Light Imaging (France); Philippe Feautrier, Institut de Planétologie et d'Astrophysique de Grenoble (France) and First Light Imaging (France); Philippe Balard, Lab. d'Astrophysique de Marseille (France) and First Light Imaging (France); Christian Guillaume, Observatoire de Haute-Provence (France) and First Light Imaging (France); Eric Stadler, Institut de Planétologie et d'Astrophysique de Grenoble (France) and First Light Imaging (France) . . . . . [9148-44]

17:25: **Very low noise Shack-Hartmann wavefront sensor for adaptive optics in the near-IR**, Silvere Gousset, Clélia Robert, Thierry Fusco, Vincent Michau, Sophie Derelle, Joel Deschamps, ONERA (France); Philippe Feautrier, Eric Stadler, Institut de Planétologie et d'Astrophysique de Grenoble (France); Eric D. de Borniol, Johan Rothman, MINATEC (France); Jérome Coussement, SOFRADIR (France). [9148-45]

WEDNESDAY 25 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . WED 9:00 TO 10:00

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

9:00: **Highlights from the Multi Unit Spectroscopic Explorer (MUSE): a 2nd generation VLT instrument for the VLT** *(Plenary)*, Roland M. Bacon, Observatoire de Lyon (France) . . . . . [9147-506]

9:30: **Canadian Space Astronomy: past, present and future** *(Plenary)*, John B. Hutchings, NRC - Herzberg Institute of Astrophysics (Canada) [9143-505]

Coffee Break . . . . . Wed 10:00 to 10:30

SESSION 11

LOCATION: ROOM 518A . . . . . WED 10:30 TO 11:35

Laser Guide Star Systems II

Session Chair: **Peter L. Wizinowich,** W. M. Keck Observatory (USA)

10:30: **Status of the ARGOS project** *(Invited Paper)*, Sebastian Rabien, Lothar Barl, Max-Planck-Institut für extraterrestrische Physik (Germany); Udo Beckmann, Max-Planck-Institut für Radioastronomie (Germany); Marco Bonaglia, INAF - Osservatorio Astrofisico di Arcetri (Italy); José Luis Borelli, Max-Planck-Institut für Astronomie (Germany); Joar G. Brynnel, Large Binocular Telescope Observatory (USA); Peter Buschkamp, Max-Planck-Institut für extraterrestrische Physik (Germany); Lorenzo Busoni, INAF - Osservatorio Astrofisico di Arcetri (Italy); Julian C. Christou, Large Binocular Telescope Observatory (USA); Claus Connot, Max-Planck-Institut für Radioastronomie (Germany); Richard Davies, Matthias Deysenroth, Max-Planck-Institut für extraterrestrische Physik (Germany); Simone Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy); Hans Gemperlein, Max-Planck-Institut für extraterrestrische Physik (Germany); Wolfgang Gaessler, Max-Planck-Institut für Astronomie (Germany); Michael Hart, The Univ. of Arizona (USA); Martin Kulas, Max-Planck-Institut für Astronomie (Germany); Michael J. Lefebvre, Large Binocular Telescope Observatory (USA); Tommaso Mazzoni, INAF - Osservatorio Astrofisico di Arcetri (Italy); Edmund Nußbaum, Max-Planck-Institut für Radioastronomie (Germany); Gilles Orban de Xivry, Max-Planck-Institut für extraterrestrische Physik (Germany); Diethard Peter, Max-Planck-Institut für Astronomie (Germany); Andreas Quirrenbach, Landessternwarte Heidelberg (Germany); Gustavo Rahmer, Large Binocular Telescope Observatory (USA); Walfried Raab, Max-Planck-Institut für extraterrestrische Physik (Germany); Jesper Storm, Leibniz-Institut für Astrophysik Potsdam (Germany); Julian Ziegleder, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9148-46]

10:55: **Laser guidestar uplink correction using a MEMS deformable mirror: on-sky test results and implications for future AO systems**, Andrew P. Norton, Donald Gavel, Univ. of California, Santa Cruz (USA); Michael A. Helmbrecht, Carl J. Kempf, Iris AO, Inc. (USA); Elinor L. Gates, Konstantinos Chloros, Donnie Redel, Lick Observatory (USA); Daren Dillon, Univ. of California, Santa Cruz (USA) . . . . . [9148-47]

11:15: **Calibration and operation of the sodium guidestar adaptive optics system on the Starfire Optical Range 3.5 meter telescope**, Robert L. Johnson, Michael D. Oliker, Dennis A. Montera, Air Force Research Lab. (USA) . . . [9148-48]

SESSION 12

LOCATION: ROOM 518A . . . . . WED 11:35 TO 12:25

Pathfinders to Enable AO on ELTs and New AO Concepts I

Session Chair: **Glen Herriot,** NRC - Herzburg Institute of Astrophysics (Canada)

11:35: **AO application for space debris tracking** *(Invited Paper)*, Francis Bennet, Celine d'Orgeville, The Australian National Univ. (Australia); Yue Gao, EOS Space Systems Pty. Ltd. (Australia); William R. Gardhouse, Nicolas Paulin, Ian Price, Francois Rigaut, The Australian National Univ. (Australia); Ian T. Ritchie, EOS Space Systems Pty. Ltd. (Australia); Craig H. Smith, Electro Optic Systems Pty. Ltd. (Australia); Kristina Uhlendorf, The Australian National Univ. (Australia); Yanjie Wang, EOS Space Systems Pty. Ltd. (Australia). . . . . [9148-51]

12:00: **MOAO results with RAVEN** *(Invited Paper)*, Olivier Lardière, Univ. of Victoria (Canada); David R. Andersen, NRC - Herzberg Institute of Astrophysics (Canada); Colin Bradley, Kate J. Jackson, Reston Nash, Darryl Gamroth, Célia Blain, Przemek Lach, Univ. of Victoria (Canada); Laurie Pham, Univ of Victoria (Canada); Jean-Pierre Véran, NRC - Herzberg Institute of Astrophysics (Canada); Shin Oya, Subaru Telescope, National Astronomical Observatory of Japan (USA); Carlos M. Correia, Univ. do Porto (Portugal) . . . . . [9148-50]

Lunch/Exhibition Break . . . . . Wed 12:25 to 13:45

SESSION 13

LOCATION: ROOM 518A . . . . . WED 13:45 TO 15:10

Pathfinders to Enable AO on ELTs and New AO Concepts II

Session Chair: **Glen Herriot,** NRC - Herzburg Institute of Astrophysics (Canada)

13:45: **Adaptive optics activities at ESO** *(Invited Paper)*, Norbert Hubin, European Southern Observatory (Germany) . . . . . [9148-49]

14:10: **CANARY phase B: on-sky open-loop tomographic LGS AO results**, Timothy J. Morris, Durham Univ. (United Kingdom); Éric Gendron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Alastair G. Basden, Durham Univ. (United Kingdom); Olivier Martin, Observatoire de Paris à Meudon (France); James Osborn, Durham Univ. (United Kingdom); David Henry, UK Astronomy Technology Ctr. (United Kingdom); Zoltan Hubert, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Gaetano Sivo, Institut d'Optique Graduate School (France) and ONERA (France); Damien Gratadour, Fanny Chemla, Arnaud Sevin, Matthieu Cohen, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Eddy J. Younger, Durham Univ. (United Kingdom); Fabrice Vidal, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Richard W. Wilson, Timothy Butterley, Urban Bitenc, Andrew P. Reeves, Nazim A. Bharmal, Durham Univ. (United Kingdom); Henri-François G. Raynaud, Caroline Kulcsar, Institut d'Optique Graduate School (France); Jean-Marc Conan, ONERA (France); Jean-Michel Huet, Observatoire de Paris à Meudon (France); Denis Perret, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Colin Dickson, David C. Atkinson, Tom Bailie, Andy Longmore, Stephen Todd, UK Astronomy Technology Ctr. (United Kingdom); Gordon Talbot, Simon L. Morris, Durham Univ. (United Kingdom); Gérard Rousset, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Richard M. Myers, Durham Univ. (United Kingdom) . . . . . [9148-52]

14:30: **Tests of high-precision, calibrated astrometry with GeMS and ShaneAO**, S. Mark Ammons, Lawrence Livermore National Lab. (USA); Eduardo A. Bendek, NASA Ames Research Ctr. (USA); Olivier Guyon, The Univ. of Arizona (USA); Benoît Neichel, Gemini Observatory (Chile); Donald Gavel, Srikar Srinath, Alexander R. Rudy, Renate Kupke, Daren Dillon, Constance Rockosi, Univ. of California, Santa Cruz (USA); Christian Marois, NRC-Dominion Astrophysical Observatory (Canada); Bruce A. Macintosh, Lawrence Livermore National Lab. (USA); Dmitry Savransky, Cornell Univ. (USA); Raphaël Galicher, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France). . . . . [9148-53]

14:50: **`imaka: a path-finder ground-layer adaptive optics system for the University of Hawaii 2.2-meter telescope on Mauna Kea**, Mark R. Chun, Univ. of Hawai'i (USA); Olivier Lai, Gemini Observatory (USA) and Subaru Telescope, National Astronomical Observatory of Japan (USA); Douglas Toomey, Mauna Kea Infrared LLC (USA); Jessica R. Lu, Univ. of Hawai'i (USA); Simon Thibault, Denis Brousseau, Univ. Laval (Canada); Christoph Baranec, Univ. of Hawai'i (USA); Hu Zhang, ImmerVision (Canada) . . . . . [9148-54]

Coffee Break . . . . . Wed 15:10 to 15:40

SESSION 14

LOCATION: ROOM 518A . . . . . WED 15:40 TO 17:45

Astronomy with AO II

Session Chair: **Anne-Marie Lagrange,** Institut de Planétologie et d'Astrophysique de Grenoble (France)

15:40: **Circumstellar disk and planet imaging with AO** *(Invited Paper)*, Markus Janson, Queen's Univ. Belfast (United Kingdom) . . . . . [9148-55]

16:05: **Into the blue: AO science in the visible** *(Invited Paper)*, Laird M. Close, The Univ. of Arizona (USA) and MagAO Team (USA); Jared R. Males, Katie M. Morzinski, Katherine B. Follette, The Univ. of Arizona (USA) . . . . . [9148-56]

16:30: **Studying extrasolar planet atmospheric properties using AO-assisted spectroscopy** *(Invited Paper)*, Quinn M. Konopacky, Univ. of Toronto (Canada); Travis S. Barman, The Univ. of Arizona (USA); Bruce A. Macintosh, Stanford Univ. (USA); Christian Marois, NRC-Dominion Astrophysical Observatory (Canada); Dmitry Savransky, Cornell Univ. (USA) . . . . . [9148-57]

16:55: **Science results from the Gemini/NICI planet-finding campaign** *(Invited Paper)*, Beth A. Biller, The Univ. of Edinburgh (United Kingdom); Michael C. Liu, Univ. of Hawai'i (USA); Zahed Wahhaj, European Southern Observatory (Chile); Eric L. Nielsen, Univ. of Hawai'i (USA); Thomas L. Hayward, Gemini Observatory (Chile); Mark R. Chun, Univ. of Hawai'i (USA); Laird M. Close, The Univ. of Arizona (USA); Christ Ftaclas, Univ. of Hawai'i (USA); Markus Hartung, Gemini Observatory (Chile); Jared R. Males, The Univ. of Arizona (USA); I. Neill Reid, Space Telescope Science Institute (USA); Evgenya Shkolnik, Lowell Observatory (USA); Andrew J. Skemer, The Univ. of Arizona (USA); Matthias Tecza, Niranjan A. Thatte, Univ. of Oxford (United Kingdom); Adam Burrows, Princeton Univ. (USA); Fraser Clarke, Univ. of Oxford (United Kingdom); Douglas Toomey, Mauna Kea Infrared LLC (USA) . . . . . [9148-58]

17:20: **Extragalactic science with laser guide star AO** *(Invited Paper)*, Claire E. Max, Univ. of California, Santa Cruz (USA) . . . . . [9148-59]

POSTER SESSION–WEDNESDAY

LOCATION: ROOM 516 . . . . . WED 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Wednesday. The interactive poster session with authors in attendance will be Wednesday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Posters: New Proposed AO Systems

Meaningful options for a dichroic unit within the natural & laser guide star AO systems at the Giant Magellan telescope, Jacopo Antichi, Enrico Pinna, Simone Esposito, Marco Bonaglia, Lorenzo Busoni, INAF - Osservatorio Astrofisico di Arcetri (Italy); Fernando G. Santoro, Antonin H. Bouchez, Giant Magellan Telescope Project (USA) . . . . . [9148-189]

NGS2: the natural guide star next generation sensor for GeMS, Francois Rigaut, Peter McGregor, Ian Price, Kristina Uhlendorf, Nicolas Paulin, William R. Gardhouse, The Australian National Univ. (Australia); Benoît Neichel, Lab d'Astrophysique de Marseille (France); Vincent Garrel, Chadwick A. Trujillo, Gemini Observatory (Chile). . . . . [9148-191]

Design of adaptive optics calibration source for the Giant Magellan telescope, Ping Zhou, James H. Burge, Chunyu Zhao, Scott D. Benjamin, College of Optical Sciences, The Univ. of Arizona (USA); Brian Cuerden, The Univ. of Arizona (USA); Antonin H. Bouchez, Giant Magellan Telescope Project (USA) . . . . . [9148-192]

Optical design of Big Bear Solar Observatory's multi-conjugate adaptive optics system, Xianyu Zhang, Nicolas Gorceix, Big Bear Solar Observatory (USA); Dirk Schmidt, National Solar Observatory (USA); Philip R. Goode, Wenda Cao, Big Bear Solar Observatory (USA); Thomas R. Rimmele, National Solar Observatory (USA); Roy Coulter, Big Bear Solar Observatory (USA) . . . . . [9148-193]

1500Hz adaptive optics system using commercially available components, Armin Schimpf, Mickael Micallef, Vincent Hardy, Julien Charton, ALPAO S.A.S. (France) . . . . . [9148-194]

Latest results on artificial neural networks-based tomographic reconstruction with BEAGLE: a multi-object AO bench for MOAO experimentation, Christian Dani Guzmán, Nicole David, Nicolas S. Dubost Alligier, Norman Saez, Amokrane Berdja, Andrés R. Guesalaga, Pontificia Univ. Católica de Chile (Chile); Timothy J. Morris, James Osborn, Stephen Rolt, Durham Univ. (United Kingdom); Francisco J. De Cos Juez, Univ. de Oviedo (Spain); Timothy Butterley, Alastair G. Basden, Richard M. Myers, Durham Univ. (United Kingdom) . . . . . [9148-195]

Testing the analytical model of the pyramid wavefront sensor with high-order aberrations on the optical bench, Matthias Rosensteiner, Jean-Pierre Véran, NRC - Herzburg Institute of Astrophysics (Canada). . . . . [9148-196]

Precision astrometry calibration of MCAO systems using a diffractive mask, Eduardo A. Bendek, NASA Ames Research Ctr. (USA); S. Mark Ammons, Lawrence Livermore National Lab. (USA); Dmitry Svaransky, Cornell Univ. (USA); Bruce A. Macintosh, Lawrence Livermore National Lab. (USA); Olivier Guyon, The Univ. of Arizona (USA) . . . . . [9148-197]

Posters: Wavefront Sensing

A composite tracking sensor with high accuracy and large dynamic range, Xiaoyu Ma, Changhui Rao, Kai Wei, Wenjia Zheng, Institute of Optics and Electronics (China) . . . . . [9148-199]

Theoretical analysis for the relationship between the performance of quadrant photodetector and the size of incident light spot, Zhaoying Zheng, Changwei Li, Sijiong Zhang, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9148-201]

Non-common path aberration corrections for the MOAO system RAVEN, Masen P. Lamb, National Research Council Canada (Canada); David R. Andersen, Jean-Pierre Véran, NRC - Herzberg Institute of Astrophysics (Canada); Carlos M. Correia, Univ. do Porto (Portugal); Colin Bradley, Olivier Lardiere, Univ. of Victoria (Canada) . . . . . [9148-202]

Cross-scale inference and wavefront reconstruction, Suman K. Maji, Inria Bordeaux - Sud-Ouest (France); Thierry Fusco, ONERA (France); Hussein Yahia, Inria Bordeaux - Sud-Ouest (France) . . . . . [9148-203]

Wavefront sensing from the image domain with the Oxford-SWIFT integral field spectrograph, Benjamin J. Pope, Niranjan A. Thatte, Univ. of Oxford (United Kingdom); Rick S. Burruss, Jet Propulsion Lab. (USA). . . . . [9148-204]

Static aberrations in an open-loop tomographic system: the CANARY case, Éric Gendron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Timothy J. Morris, Durham Univ. (United Kingdom); Olivier Martin, Observatoire de Paris à Meudon (France); Alaister G. Basden, Durham Univ. (United Kingdom); Gérard Rousset, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Richard M. Myers, Durham Univ. (United Kingdom); Zoltan Hubert, Fabrice Vidal, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France) . . . . . [9148-206]

Near-infrared aberration tracking using a correlation algorithm on the Galactic Center, Narsireddy Anugu, Paulo J. V. Garcia, Univ. do Porto (Portugal); Antonio Amorim, Paulo R. S. Gordo, Univ. de Lisboa (Portugal); Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Guy S. Perrin, Observatoire de Paris à Meudon (France); Wolfgang Brandner, Max-Planck-Institut für Astronomie (Germany); Christian Straubmeier, Univ. zu Köln (Germany); Karine Rousselet-Perraut, Institut de Planétologie et d'Astrophysique de Grenoble (France) . . . . . [9148-207]

High speed and High precision pyramid wavefront sensor: n labs validation and preparation to on sky demonstration, Kacem El Hadi, Lab. d'Astrophysique de Marseille (France); Thierry Fusco, ONERA (France) and Lab. d'Astrophysique de Marseille (France) . . . . . [9148-208]

Focal-plane wavefront sensing with high-order adaptive optics systems, Visa A. Korkiakoski, Christoph U. Keller, Leiden Observatory (Netherlands); Niek J. Doelman, TNO (Netherlands) and Leiden Observatory (Netherlands); Matthew A. Kenworthy, Gilles Otten, Leiden Observatory (Netherlands); Raluca Marinica, Michel Verhaegen, Technische Univ. Delft (Netherlands). . . . . [9148-209]

A novel means of measuring non-common path errors in an adaptive optics system, Eric E. Bloemhof, National Science Foundation (USA). . . . . [9148-210]

The focal plane adaptive optics test box of the 'Observatoire du Mont-Mégantic', Denis Brousseau, William Deschênes, Simon Thibault, Univ. Laval (Canada); Jean-Pierre Véran, NRC - Herzburg Institute of Astrophysics (Canada) . . . . . [9148-211]

Pre-shipment test of the ARGOS LGS wavefront sensor, Marco Bonaglia, Lorenzo Busoni, Tommaso Mazzoni, Jacopo Antichi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Gilles Orban de Xivry, Max-Planck-Institut für extraterrestrische Physik (Germany); Simone Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy); Sebastian Rabien, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9148-212]

Design optimization and lab demonstration of ZELDA, a Zernike sensor for near-coronagraph quasi-static measurements, Mamadou N'Diaye, Space Telescope Science Institute (USA); Kjetil Dohlen, Fabrice Madec, Lab. d'Astrophysique de Marseille (France); Baptiste Paul, ONERA (France) and Lab. d'Astrophysique de Marseille (France); Aïssa Jolivet, Lab. d'Astrophysique de Marseille (Belgium); Thierry Fusco, Jean-François Sauvage, ONERA (France) and Lab. d'Astrophysique de Marseille (France); Laurent Mugnier, ONERA (France); James K. Wallace, Jet Propulsion Lab. (USA); Rémi Soummer, Space Telescope Science Institute (USA) . . . . . [9148-213]

Understanding and correcting low order residual static aberrations in adaptive optics corrected images, Rachel Rampy, Sam Ragland, Peter L. Wizinowich, Randall D. Campbell, W. M. Keck Observatory (USA) . . . . . [9148-214]

Applications of variable focus liquid lenses for curvature WFSs in astronomy, Jorge Fuentes Fernandez, Salvador Cuevas, Luis C. Alvarez Nuñez, Alan M. Watson, Univ. Nacional Autónoma de México (Mexico). . . . . [9148-215]

Comparing the performance of open loop centroiding techniques in the Raven MOAO system, David R. Andersen, NRC - Herzburg Institute of Astrophysics (Canada); Olivier Lardière, Univ. of Victoria (Canada); Jean-Pierre Véran, NRC - Herzburg Institute of Astrophysics (Canada); Colin Bradley, National Research Council Canada (Canada) and Univ. of Victoria (Canada); Daniel A. Kerley, NRC - Herzburg Institute of Astrophysics (Canada). . . . . [9148-216]

Effects of differential wavefront sensor bias drifts on high contrast imaging, Naru Sadakuni, Gemini Observatory (USA); Bruce A. Macintosh, Stanford Univ. (USA); Lisa A. Poyneer, David W. Palmer, Dmitry Savransky, Lawrence Livermore National Lab. (USA); Sandrine J. Thomas, NASA Ames Research Ctr. (USA) . . . . . [9148-217]

Wavefront sensing in a partially illuminated, rotating pupil, Thomas Bertram, Max-Planck-Institut für Astronomie (Germany); Carmelo Arcidiacono, INAF - Osservatorio Astronomico di Bologna (Italy); Jürgen Berwein, Max-Planck-Institut für Astronomie (Germany); Roberto Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy); Thomas M. Herbst, Max-Planck-Institut für Astronomie (Germany) . . . . . [9148-218]

A new phase retrieval algorithm based on multi-layered intensity distribution, Shaojun Du, Bohong Shu, Xuanzhe Zhang, Wenda Cui, National Univ. of Defense Technology (China) . . . . . [9148-220]

New CCD imagers for adaptive optics wavefront sensors, Robert L. Johnson, Air Force Research Lab. (USA); Barry E. Burke, Daniel R. Schuette, Ilya Prigozhin, MIT Lincoln Lab. (USA) . . . . . [9148-221]

Discretized aperture mapping with a micro-lenses array for interferometric direct imaging, Fabien Patru, European Southern Observatory (Chile) and Osservatorio Astrofisico di Arcetri (Italy); Jacopo Antichi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Patrick Rabou, Institut de Planétologie et d'Astrophysique de Grenoble (France); Enrico Giro, INAF - Osservatorio Astronomico di Padova (Italy); Dimitri Mawet, European Southern Observatory (Chile); Julien Milli, European Southern Observatory (Germany); Julien H. V. Girard, European Southern Observatory (Chile); Marcel Carbillet, Denis Mourard, Observatoire de la Côte d'Azur (France) . . . . . [9148-222]

On-sky low order non-common path correction of the GPI calibration unit, Markus Hartung, Gemini Observatory (Chile); Bruce A. Macintosh, Lawrence Livermore National Lab. (USA); Donald Gavel, Univ. of California, Santa Cruz (USA); Lisa A. Poyneer, Dmitry Savransky, Lawrence Livermore National Lab. (USA); Sandrine J. Thomas, NASA Ames Research Ctr. (USA); Naru Sadakuni, Gemini Observatory (Chile); Daren Dillon, Univ. of California, Santa Cruz (USA); Jennifer S. Dunn, NRC - Herzburg Institute of Astrophysics (Canada); James K. Wallace, Jet Propulsion Lab. (USA); Fredrik T. Rantakyrö, Gemini Observatory (Chile) [9148-224]

Point spread function reconstruction on the MCAO Canopus bench, Luc Gilles, Thirty Meter Telescope Observatory Corp. (USA); Benoît Neichel, Lab. d'Astrophysique de Marseille (France); Jean-Pierre Véran, NRC - Herzberg Institute of Astrophysics (Canada); Lianqi Wang, Thirty Meter Telescope Observatory Corp. (USA); Carlos M. Correia, Univ. do Porto (Portugal); Brent L. Ellerbroek, Corinne Boyer, Thirty Meter Telescope Observatory Corp. (USA) . . . . . [9148-225]

Posters: Pathfinders to Enable AO on ELTs and New AO Concepts

HALOS: fast, autonomous, holographic adaptive optics, Geoff P. Andersen, U.S. Air Force Academy (USA) . . . . . [9148-226]

A laser tomography test bed for Extremely Large Telescopes, Rodolphe Conan, Francois Rigaut, Kristina Uhlendorf, William R. Gardhouse, The Australian National Univ. (Australia) . . . . . [9148-227]

DRAGON, the Durham real-time, tomography adaptive optics test bench: progress and results, Andrew P. Reeves, Richard M. Myers, Timothy J. Morris, Alastair G. Basden, Nazim A. Bharmal, Nigel A. Dipper, Eddy J. Younger, Durham Univ. (United Kingdom) . . . . . [9148-228]

CHOUGH, the Canary hosted-upgrade for high-order AO, Nazim A. Bharmal, Richard M. Myers, Alastair G. Basden, Timothy J. Morris, Daniel Hölck, Durham Univ. (United Kingdom) . . . . . [9148-229]

CRAO: a compact and refractive adaptive-optics, Naofumi Fujishiro, Eiji Kitao, Tomo Shimizu, Takuya Matsui, Kyoto Sangyo Univ. (Japan); Shin Oya, Subaru Telescope, National Astronomical Observatory of Japan (USA); Yuji Ikeda, Photocoding (Japan); Hideyo Kawakita, Kyoto Sangyo Univ. (Japan) . . . [9148-230]

Pyramidal wavefront sensor demonstrator at INO, Olivier Martin, Geneviève Anctil, Pascal Bourqui, François Châteauneuf, Jonny Gauvin, Philippe Goyette, Maxime Savard, Simon Turbide, Min Wang, INO (Canada); Jean-Pierre Véran, NRC - Herzburg Institute of Astrophysics (Canada) . . . . . [9148-231]

An MCAO test bench for NFIRAOS, Paolo Turri, Univ. of Victoria (Canada); David R. Andersen, Jean-Pierre Véran, Paolo Spanò, NRC - Herzburg Institute of Astrophysics (Canada); Masen P. Lamb, Univ. of Victoria (Canada); Eric A. McVeigh, National Research Council Canada (Canada) . . . . . [9148-232]

Spot-tracking LGS-AO: experimental evaluation with Pyramid WFS, Domenico Bonaccini Calia, European Southern Observatory (Germany); Richard M. Myers, Durham Univ. (United Kingdom); Simone Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy). . . . . [9148-272]

THURSDAY 26 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . THU 9:00 TO 10:00

Session Chair: **Masanori Iye,** National Astronomical Observatory of Japan (Japan)

9:00: **Hyper Suprime-Cam for Weak Gravitational Lensing Survey** *(Plenary)*, Satoshi Miyazaki, National Astronomical Observatory of Japan (Japan). . . . . [9143-507]

9:30: **Transiting Exoplanet Survey Satellite (TESS)** *(Plenary)*, George R. Ricker Jr., Massachusetts Institute of Technology (USA) . . . . . [9143-508]

Coffee Break . . . . . Thu 10:00 to 10:30

SESSION 15

LOCATION: ROOM 518A . . . . . THU 10:30 TO 12:20

Status of Current AO Instrument Projects II

Session Chair: **Emiliano Diolaiti,** INAF - Osservatorio Astronomico di Bologna (Italy)

10:30: **Adaptive optics at the Subaru telescope** *(Invited Paper)*, Olivier Guyon, Yutaka Hayano, Subaru Telescope, National Astronomical Observatory of Japan (USA); Motohide Tamura, National Astronomical Observatory of Japan (Japan); Tomoyuki Kudo, Shin Oya, Yosuke Minowa, Olivier Lai, Nemanja Jovanovic, Subaru Telescope, National Astronomical Observatory of Japan (USA); N. Jeremy Kasdin, Tyler D. Groff, Princeton Univ. (USA); Masahiko Hayashi, Nobuo Arimoto, Subaru Telescope, National Astronomical Observatory of Japan (USA); Hideki Takami, National Astronomical Observatory of Japan (Japan); Colin Bradley, Univ. of Victoria (Canada); Hajime Sugai, Kyoto Univ. (Japan); Guy S. Perrin, Observatoire de Paris à Meudon (France); Peter G. Tuthill, The Univ. of Sydney (Australia) . . . . . [9148-60]

10:55: **Solar adaptive optics for ATST: status report**, Luke C. Johnson, B. Scott Gregory, Erik Johansson, Jose Marino, Kit Richards, Thomas R. Rimmele, Friedrich Wöger, National Solar Observatory (USA). . . . . [9148-61]

11:15: **GREGOR MCAO looking at the Sun: results with a triple conjugate adaptive optics system**, Dirk Schmidt, National Solar Observatory (USA); Thomas Berkefeld, Frank Heidecke, Andreas Fischer, Dirk Soltau, Oskar von der Lühe, Kiepenheuer-Institut für Sonnenphysik (Germany) . . . . . [9148-62]

11:35: **Final performance and lesson-learned of SAXO, the VLT-SPHERE eXtreme AO: from early design to on-sky results**, Thierry Fusco, Jean-François Sauvage, Cyril Petit, ONERA (France); Anne Costille, Lab. d'Astrophysique de Marseille (France); David Mouillet, Institut de Planétologie et d'Astrophysique de Grenoble (France); Markus E. Kasper, European Southern Observatory (Germany); Kjetil Dohlen, Lab. d'Astrophysique de Marseille (France); Marcos Suarez Valles, European Southern Observatory (Germany); Pierre Baudoz, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Andrea Barrufolo, INAF - Osservatorio Astronomico di Padova (Italy); Jean-Luc Beuzit, Institut de Planétologie et d'Astrophysique de Grenoble (France). . . . . [9148-63]

11:55: **Gender equity issues in astronomy: facts, fiction, and what the adaptive optics community can do to close the gap** *(Invited Paper)*, Celine d'Orgeville, Research School of Astronomy & Astrophysics (Australia). . . . . [9148-64]

Lunch/Exhibition Break . . . . . Thu 12:20 to 13:40

SESSION 16

LOCATION: ROOM 518A . . . . . THU 13:40 TO 15:05

Characterization, Measurement and Modeling of the Distrurbances Faced by AO

Session Chair: **Michael Hart,** Hart Scientific Consulting International L.L.C. (USA)

13:40: **Review on atmospheric turbulence monitoring** *(Invited Paper)*, Gianluca Lombardi, Julio Navarrete, European Southern Observatory (Chile); Marc S. Sarazin, European Southern Observatory (Germany) . . . . . [9148-65]

14:05: **Comparison of two turbulence profilers applied to ESO's adaptive optics facility**, Javier Valenzuela, European Southern Observatory (Germany) and Pontificia Univ. Católica de Chile (Chile); Andrés R. Guesalaga, Pontificia Univ. Católica de Chile (Chile); Frédéric Y. J. Gonté, European Southern Observatory (Germany); Clémentine Béchet, Pontificia Univ. Católica de Chile (Chile); Johann Kolb, Aurea Garcia Rissmann, Miska Le Louarn, European Southern Observatory (Germany); Benoît Neichel, Lab. d'Astrophysique de Marseille (France); Pierre-Yves Madec, European Southern Observatory (Germany) . . . . . [9148-66]

14:25: **Dynamics of mesospheric sodium in the horizontal plane**, Thomas Pfrommer, Ronald Holzlöhner, European Southern Observatory (Germany); Paul Hickson, Daniel Clouston, The Univ. of British Columbia (Canada) . . . . . [9148-67]

14:45: **Wind layer identification with predictive Fourier control on the ShaneAO 3-meter AO system**, Alexander R. Rudy, Srikar Srinath, Univ. of California, Santa Cruz (USA); Lisa A. Poyneer, S. Mark Ammons, Lawrence Livermore National Lab. (USA); Donald Gavel, Renate Kupke, Daren Dillon, Univ. of California, Santa Cruz (USA); Constance Rockosi, Lick Observatory (USA); Benoît Neichel, Gemini Observatory (Chile); Andrés R. Guesalaga, Pontificia Univ. Católica de Chile (Chile); Angela Cortes, Pontificia Univ Católica de Chile (Chile) . . . . . [9148-68]

Coffee Break . . . . . Thu 15:05 to 15:35

CONFERENCE 9148 · LOCATION: ROOM 518A

SESSION 17

LOCATION: ROOM 518A . . . . . THU 15:35 TO 16:40

Extreme AO II

Session Chair: **Bruce A. Macintosh,** Lawrence Livermore National Lab. (USA)

15:35: **Direct imaging of exoplanets in the habitable zone with adaptive optics** *(Invited Paper)*, Jared R. Males, Olivier Guyon, Laird M. Close, The Univ. of Arizona (USA) . . . . . [9148-69]

16:00: **On-sky speckle nulling with the Subaru coronagraphic extreme AO (SCExAO) instrument**, Frantz Martinache, Lab. J.L. Lagrange (France); Olivier Guyon, Nemanja Jovanovic, Christophe S. Clergeon, Garima Singh, Subaru Telescope, National Astronomical Observatory of Japan (USA). . . . . [9148-70]

16:20: **Realtime speckle sensing and suppression with Palomar's Project 1640 and its impact on exoplanet detection**, Gautam Vasisht, Eric Cady, Jet Propulsion Lab. (USA); Ben R. Oppenheimer, American Museum of Natural History (USA); Chengxing Zhai, Jet Propulsion Lab. (USA). . . . . [9148-71]

SESSION 18

LOCATION: ROOM 518A . . . . . THU 16:40 TO 17:40

Wavefront Correction II

Session Chair: **Norbert Hubin,** European Southern Observatory (Germany)

16:40: **Deformable mirror designs for extreme AO (XAO)**, Allan Wirth, AOA Xinetics (USA); Jeffrey Cavaco, Northrop Grumman Xinetics (USA). . . . . [9148-72]

17:00: **On the way to build the M4 Unit for the E-ELT**, Elise Vernet, Marc Cayrel, Norbert Hubin, European Southern Observatory (Germany); Roberto Biasi, Microgate S.r.l. (Italy); Daniele Gallieni, A.D.S. International S.r.l. (Italy) . . . [9148-73]

17:20: **Recent improvements of high density magnetic deformable mirrors: faster, larger and stronger**, Julien Charton, Jean-Francois Curis, Sebastien Camet, Romain Di Chiaro, Rozenn Bougeard, ALPAO S.A.S. (France); Alain Badoche, MCM Optique (France) . . . . . [9148-74]

POSTER SESSION–THURSDAY

LOCATION: ROOM 516 . . . . . THU 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Thursday. The interactive poster session with authors in attendance will be Thursday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Posters: Characterization, Measurement and Modeling of the Distrurbances Faced by AO

Isoplanatic patch considerations for solar telescope multi-conjugate adaptive optics, Jacques M. Beckers, College of Optical Sciences, The Univ. of Arizona (USA) and Kiepenheuer-Institut für Sonnenphysik (Germany) . . . . . [9148-233]

Atmospheric parameter estimation for AO wavefront sensing data: application of the FADE method for NACO, Elisabeth Brunner, Technische Univ. Delft (Netherlands); Julien H. V. Girard, European Southern Observatory (Chile); Andrei Tokovinin, Cerro Tololo Inter-American Observatory (Chile). . . . . [9148-234]

Simulation of the imaging quality of ground-based telescopes affected by atmospheric disturbances, Yubin Ren, Songfeng Kou, Cong Yang, Nanjing Institute of Astronomical Optics & Technology (China). . . . . [9148-235]

Towards a reliability assessment of the Cn2 and wind speed vertical profiles retrieved from GeMS, Benoît Neichel, Lab. d'Astrophysique de Marseille (France); Elena Masciadri, INAF - Osservatorio Astrofisico di Arcetri (Italy); Andrés R. Guesalaga, Pontificia Univ. Católica de Chile (Chile); Franck Lascaux, INAF - Osservatorio Astrofisico di Arcetri (Italy); Clémentine Béchet, Pontificia Univ. Católica de Chile (Chile) . . . . . [9148-236]

Validation tests of the AOF Cn2 profiler, Aurea Garcia Rissmann, European Southern Observatory (Germany); Andrés R. Guesalaga, Pontificia Univ. Católica de Chile (Chile); Johann Kolb, Miska Le Louarn, Pierre-Yves Madec, Robin Arsenault, European Southern Observatory (Germany) . . . . . [9148-237]

Verification of Meso-nh forecasts of the atmospheric surface layer parameters at Cerro Paranal and Cerro Armazones using contingency tables, Franck Lascaux, Elena Masciadri, Luca Fini, INAF - Osservatorio Astrofisico di Arcetri (Italy) . . . . . [9148-238]

Statistics of atmospheric turbulence at Cerro Pachon using the GeMS profiler, Ignacio Rodriguez Aedo, Pontificia Univ. Católica de Chile (Chile); Benoît Neichel, Lab. d'Astrophysique de Marseille (France); Clémentine Béchet, Angela Cortes, Christian Dani Guzmán, Andrés R. Guesalaga, Pontificia Univ. Católica de Chile (Chile). . . . . [9148-240]

Extremely high-resolution ground-layer optical turbulence profile at Mauna Kea, Mark R. Chun, Univ. of Hawai'i (USA); Olivier Lai, Gemini Observatory (USA) and Subaru Telescope, National Astronomical Observatory of Japan (USA); Timothy Butterley, Durham Univ. (United Kingdom); Sean Goebel, Univ of Hawai'i (USA); Douglas Toomey, Mauna Kea Infrared LLC (USA) . . . . . [9148-241]

Aero-thermal simulations of the TMT laser guide star facility, Konstantinos Vogiatzis, Corinne Boyer, Thirty Meter Telescope Observatory Corp. (USA); Kai Wei, Jin-long Tang, Institute of Optics and Electronics (China); Brent L. Ellerbroek, Thirty Meter Telescope Observatory Corp. (USA). . . . . [9148-243]

Usage of LBT pupils to estimate the local outer scale parameter, Juan C. Guerra Ramon, Large Binocular Telescope Observatory (USA); Angel C. Otarola, Thirty Meter Telescope Observatory Corp. (USA); Guido Brusa Zappellini, Large Binocular Telescope Observatory (USA); Philip M. Hinz, Vanessa P. Bailey, The Univ. of Arizona (USA); Julian C. Christou, Large Binocular Telescope Observatory (USA); Enrico Pinna, INAF - Osservatorio Astrofisico di Arcetri (Italy). . . . [9148-244]

Implementation of SLODAR atmospheric turbulence profiling to the ARGOS system, Tommaso Mazzoni, Lorenzo Busoni, Simone Esposito, INAF - Osservatorio Astrofisico di Arcetri (Italy) . . . . . [9148-245]

Long-term stability testing of a 241-actuator ALPAO DM, Urban Bitenc, Nazim A. Bharmal, Durham Univ. (United Kingdom); Vincent Hardy, ALPAO S.A.S. (France); Timothy J. Morris, Richard M. Myers, Durham Univ. (United Kingdom) . . . . . [9148-246]

Posters: AO Modeling, Analysis and Simulations

Integrated modeling of the GMT laser tomography adaptive optics system, Piotr K. Piatrou, Rodolphe Conan, The Australian National Univ. (Australia). . . . . [9148-247]

Object-oriented Matlab adaptive optics, Rodolphe Conan, The Australian National Univ. (Australia); Carlos M. Correia, Univ. do Porto (Portugal) . . [9148-248]

Modelling the effect of high altitude turbulence in wide-field correlating wavefront sensing and its impact on the performance of solar AO systems, Iciar Montilla Garcia, Instituto de Astrofísica de Canarias (Spain); Michel Tallon, Observatoire de Lyon (France); Maud P. Langlois, Ctr. de Recherche Astronomique de Lyon (France); Clémentine Béchet, Pontificia Univ. Católica de Chile (Chile); Manuel Collados Vera, Instituto de Astrofísica de Canarias (Spain) . . . . . [9148-249]

Simulations of layer-oriented adaptive optics for solar telescopes, Gang Zhao, Nanjing Institute of Astronomical Optics & Technology; Aglaé Kellerer, Durham Univ.; Deqing Ren, California State Univ., Northridge; Alastair G. Basden, Durham Univ.; Jiangpei Dou, Xi Zhang, Nanjing Institute of Astronomical Optics & Technology . . . . . [9148-250]

End to end numerical simulations of the MAORY multiconjugate adaptive optics system, Carmelo Arcidiacono, Laura Schreiber, Emiliano Diolaiti, Italo Foppiani, INAF - Osservatorio Astronomico di Bologna (Italy); Giuseppe Cosentino, Univ. degli Studi di Bologna (Italy); Matteo Lombini, INAF - Osservatorio Astronomico di Bologna (Italy); Chris R. Butler, INAF - Istituto di Astrofisica Spaziale e di Fisica Cosmica (Italy); Giovanni Bregoli, Paolo Ciliegi, INAF - Osservatorio Astronomico di Bologna (Italy) . . . . . [9148-251]

ULTIMATE-SUBARU: simulation update, Shin Oya, Yutaka Hayano, Olivier Lai, Ikuru Iwata, Subaru Telescope, National Astronomical Observatory of Japan (USA); Tadayuki Kodama, National Astronomical Observatory of Japan (Japan); Nobuo Arimoto, Yosuke Minowa, Subaru Telescope, National Astronomical Observatory of Japan (USA); Masayuki Akiyama, Yoshito Ono, Tohoku Univ. (Japan); Hiroshi Terada, Subaru Telescope, National Astronomical Observatory of Japan (USA); Tomonori Usuda, Hideki Takami, National Astronomical Observatory of Japan (Japan); Tetsuo Nishimura, Naruhisa Takato, Daigo Tomono, Subaru Telescope, National Astronomical Observatory of Japan (USA) . . . . . [9148-252]

Analysis of turbulent atmospheric anisoplanatism influence on adaptive optics system over horizontal path, Quan Sun, Yu Ning, Wuming Wu, Baihong Shu, Shaojun Du, National Univ. of Defense Technology (China) . . . . . [9148-253]

Modelling global multi-conjugated adaptive optics, Valentina Viotto, Roberto Ragazzoni, Demetrio Magrin, Jacopo Farinato, Maria Bergomi, Marco Dima, INAF - Osservatorio Astronomico di Padova (Italy); Luca Marafatto, Davide Greggio, INAF - Osservatorio Astronomico di Padova (Italy) and Univ. degli Studi di Padova (Italy) . . . . . [9148-270]

Adaptive optics simulations for the MICADO SCAO system, Fabrice Vidal, Éric Gendron, Yann Clénet, Damien Gratadour, Gérard Rousset, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Richard Davies, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . . . [9148-254]

AO modelling for wide-field E-ELT instrumentation using Monte-Carlo simulation, Alastair G. Basden, Simon L. Morris, Timothy J. Morris, Richard M. Myers, Durham Univ. (United Kingdom) . . . . . [9148-255]

Optical design trade offs of the multi conjugate adaptive optics relay for the European Extremely Large telescope, Matteo Lombini, Emiliano Diolaiti, INAF - Osservatorio Astronomico di Bologna (Italy); Adriano De Rosa, Reginald C. Butler, INAF - IASF Bologna (Italy); Italo Foppiani, INAF - Osservatorio Astronomico di Bologna (Italy) . . . . . [9148-256]

A novel fast and accurate pseudo-analytical simulation approach for MOAO, Éric Gendron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Ahmad Abdelfattah, King Abdullah Univ. of Science and Technology (Saudi Arabia); Damien Gratadour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Hatem Ltaief, King Abdullah Univ. of Science and Technology (Saudi Arabia); Fabrice Vidal, Arnaud Sevin, Gérard Rousset, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France) . . . . [9148-257]

TMT-AGE: numerical simulation of a new tomographic reconstruction method for wide FoR MOAO, Yoshito Ono, Masayuki Akiyama, Tohoku Univ. (Japan); Shin Oya, Subaru Telescope, National Astronomical Observatory of Japan (USA) . . . . . [9148-258]

A numerical exploration of phase-retrieval error-metric surfaces, Alden S. Jurling, James R. Fienup, Univ. of Rochester (USA). . . . . [9148-259]

COMPASS: a highly optimized numerical platform for the development of extremely large telescopes AO systems, Damien Gratadour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Mathieu Puech, Observatoire de Paris à Meudon (France); Christophe Vérinaud, Institut de Planétologie et d'Astrophysique de Grenoble (France); Pierre Kestener, Maison de la Simulation (France); Morgan Gray, Lab. d'Astrophysique de Marseille (France); Julien Brulé, Yann Clénet, Éric Gendron, Maxime Lainé, Arnaud Sevin, Gérard Rousset, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); François Hammer, Isabelle Jégouzo, Sylvestre Taburet, Yanbin Yang, Observatoire de Paris à Meudon (France); Jean-Luc Beuzit, Alexis Carlotti, Mathieu Westphal, Institut de Planétologie et d'Astrophysique de Grenoble (France); Benoit Epinat, Jean Charles Lambert, Benoît Neichel, Sergey Rodionov, Lab. d'Astrophysique de Marseille (France); Cyril Petit, ONERA (France). . . . . [9148-260]

The effects of AO systems on polarised light, Marco Stangalini, INAF - Osservatorio Astronomico di Roma (Italy); Dario Del Moro, Francesco Berrilli, Luca Giovannelli, Roberto Piazzesi, Univ. degli Studi di Roma "Tor Vergata" (Italy) . . . . . [9148-261]

Impact of sodium layer variations on the performance of the E-ELT MCAO module, Laura Schreiber, INAF - Osservatorio Astronomico di Bologna (Italy); Thomas Pfrommer, European Southern Observatory (Germany); Emiliano Diolaiti, INAF - Osservatorio Astronomico di Bologna (Italy); Roland Holzlöhner, European Southern Observatory (Germany); Carmelo Arcidiacono, Italo Foppiani, INAF - Osservatorio Astronomico di Bologna (Italy); Paul Hickson, The Univ. of British Columbia (Canada); Matteo Lombini, INAF - Osservatorio Astronomico di Bologna (Italy) . . . . . [9148-262]

Modelization of a pyramid wavefront sensor for the E-ELT in the context of the COMPASS project, Alexis Carlotti, Christophe Vérinaud, Institut de Planétologie et d'Astrophysique de Grenoble (France); Damien Gratadour, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Mathieu Westphal, Jean-Luc Beuzit, Institut de Planétologie et d'Astrophysique de Grenoble (France) [9148-263]

ULTIMATE-Subaru: sensitivities and simulations of the observations of high-redshift galaxies, Yosuke Minowa, Ikuru Iwata, Yutaka Hayano, Shin Oya, Subaru Telescope, National Astronomical Observatory of Japan (USA); Masayuki Akiyama, Tohoku Univ. (Japan); Tadayuki Kodama, National Astronomical Observatory of Japan (Japan); Takashi Hattori, Olivier Lai, Ichi Tanaka, Yoko Tanaka, Koki Takiura, Subaru Telescope, National Astronomical Observatory of Japan (USA); Yoshito Ono, Tohoku Univ. (Japan); Nobuo Arimoto, Subaru Telescope, National Astronomical Observatory of Japan (USA) . . . . . [9148-264]

Modeling instrumental field-dependent aberrations in the NIRC2 instrument on the Keck II telescope, Breann N. Sitarski, Michael P. Fitzgerald, Gunther Witzel, Leo Meyer, Andrea M. Ghez, Univ. of California, Los Angeles (USA); Randall D. Campbell, W. M. Keck Observatory (USA); Jessica R. Lu, Univ. of Hawai'i (USA); Keith Y. Matthews, California Institute of Technology (USA) . . . . . [9148-265]

Modeling anisoplanatism for the laser guide star adaptive optics systems at the Keck Observatory, Gunther Witzel, Andrea M. Ghez, Leo Meyer, Univ. of California, Los Angeles (USA); Matthew Britton, the Optical Sciences Company (tOSC) (USA); Michael P. Fitzgerald, Univ. of California, Los Angeles (USA); Jessica R. Lu, Univ. of Hawai'i (USA); Breann N. Sitarski, Univ. of California, Los Angeles (USA); Randall D. Campbell, W. M. Keck Observatory (USA); Keith Y. Matthews, California Institute of Technology (USA) . . . . . [9148-266]

Quasi-realtime solar adaptive optics simulation, Jose Marino, Dirk Schmidt, National Solar Observatory (USA) . . . . . [9148-267]

Modeling and quantifying the benefits of real-time Fourier-based wind layer identification, prediction and correction on the Shane 3-meter telescope at Lick Observatory, Srikar Srinath, Univ. of California, Santa Cruz (USA); S. Mark Ammons, Lawrence Livermore National Lab. (USA); Alexander R. Rudy, Univ. of California, Santa Cruz (USA); Lisa A. Poyneer, Lawrence Livermore National Lab. (USA); Claire E. Max, Univ. of California, Santa Cruz (USA); Donald Gavel, Univ. of California Observatories (USA) . . . . . [9148-268]

FRIDAY 27 JUNE

SESSION 19

LOCATION: ROOM 518A . . . . . FRI 8:30 TO 9:50

Status of Current AO Instrument Projects III

Session Chair: **Yutaka Hayano,** Subaru Telescope, National Astronomical Observatory of Japan (USA)

8:30: **The ERIS adaptive optics system**, Enrico Marchetti, Enrico Fedrigo, Miska Le Louarn, Pierre-Yves Madec, Christian Soenke, Roland Brast, Ralf D. Conzelmann, Bernard-Alexis Delabre, Michel Duchateau, Christoph Frank, Barbara Klein, Paola Amico, Norbert Hubin, European Southern Observatory (Germany); Simone Esposito, Jacopo Antichi, Luca Carbonaro, Alfio T. Puglisi, Fernando Quirós-Pacheco, Armando Riccardi, Marco Xompero, INAF - Osservatorio Astrofisico di Arcetri (Italy). . . . . [9148-75]

8:50: **Status of the PALM-3000 high order adaptive optics instrument**, Rick S. Burruss, Jennifer E. Roberts, Jean C. Shelton, Jonathan A. Tesch, James K. Wallace, Jet Propulsion Lab. (USA); Richard G. Dekany, California Institute of Technology (USA) and Caltech Optical Observatories (USA); Dean Palmer, Jet Propulsion Lab. (USA); David Hale, California Institute of Technology (USA); Kevin Rykoski, Carolyn M. Heffner, California Institute of Technology (USA) and Palomar Observatory (USA); Jamey E. Eriksen, Palomar Observatory (USA); Jean E. Mueller, Kajsa Peffer, California Institute of Technology (USA) and Palomar Observatory (USA); Fred Vescelus, Jet Propulsion Lab. (USA) . . . . . [9148-4]

9:10: **Pathfinder first light: alignment, calibration, and commissioning of the LINC-NIRVANA ground-layer adaptive optics subsystem**, Derek A. Kopon, Albert R. Conrad, Thomas Bertram, Thomas M. Herbst, Jürgen Berwein, Max-Planck-Institut für Astronomie (Germany); Roberto Ragazzoni, Jacopo Farinato, Valentina Viotto, Maria Bergomi, Luca Marafatto, INAF - Osservatorio Astronomico di Padova (Italy); Frank Kittmann, Ralf-Rainer Rohloff, Harald Baumeister, Fulvio De Bonis, Ralph Hofferbert, Max-Planck-Institut für Astronomie (Germany); Carmelo Arcidiacono, Alfio T. Puglisi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Alessandro Brunelli, INAF - Osservatorio Astronomico di Padova (Italy); Jörg-Uwe Pott, Peter Bizenberger, Florian Briegel, Martin Kürster, Daniel Mechke, Lars Mohr, Max-Planck-Institut für Astronomie (Germany); Xianyu Zhang, Big Bear Solar Observatory (USA). . . . . [9148-77]

9:30: **Life with quintuplets: transitioning GeMS into regular operations**, Vincent Garrel, Marcos A. van Dam, Gemini Observatory (Chile); Benoît Neichel, Lab. d'Astrophysique de Marseille (France); Fabrice Vidal, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Eduardo Marin, Andrew Serio, Gustavo Arriagada, Gemini Observatory (Chile); Chadwick A. Trujillo, Gemini Observatory (USA); William N. Rambold, Pedro Gigoux, Cristian Urrutia, Ramon Galvez, Cristian Moreno, Constanza Araujo Hauck, Tomislav Vucina Parga, Gemini Observatory (Chile); Jeff Donahue, Gemini Observatory (USA); Claudio Marchant, Gaston Gausachs, Fabian Collao, Eleazar R. Carrasco Damele, Peter Pessev, Ariel Lopez, Gemini Observatory (Chile) . . . . . [9148-78]

CONFERENCE 9148 · LOCATION: ROOM 518A

SESSION 20

LOCATION: ROOM 518A . . . . . FRI 9:50 TO 12:05

Wavefront Sensing II

Session Chair: **Donald Gavel,** Univ. of California, Santa Cruz (USA)

9:50: **Strategies to cope with sodium layer profile variations in laser guide star AO systems** *(Invited Paper)*, Brent L. Ellerbroek, Thirty Meter Telescope Observatory Corp. (USA). . . . . [9148-79]

Coffee Break . . . . . Fri 10:15 to 10:45

10:45: **A near-infrared tip-tilt sensor for the Keck I laser guide star adaptive optics system**, Peter L. Wizinowich, W. M. Keck Observatory (USA); Roger M. Smith, California Institute of Technology (USA); Roberto Biasi, Microgate S.r.l. (Italy); Sylvain Cetre, W. M. Keck Observatory (USA); Richard G. Dekany, California Institute of Technology (USA); Bruno Femenia-Castella, W. M. Keck Observatory (USA); Jason R. Fucik, David Hale, California Institute of Technology (USA); Christopher R. Neyman, W. M. Keck Observatory (USA); Dietrich Pescoller, Microgate S.r.l. (Italy); Sam Ragland, Paul J. Stomski Jr., W. M. Keck Observatory (USA); Mario Andrighettoni, Microgate S.r.l. (Italy); Randy Bartos, Khanh Bui, California Institute of Technology (USA); Andrew Cooper, W. M. Keck Observatory (USA); John L. Cromer, California Institute of Technology (USA); Michael J. Hess, Ean James, W. M. Keck Observatory (USA); James E. Lyke, Microgate S.r.l. (Italy) and W. M. Keck Observatory (USA); Hector Rodriguez, California Institute of Technology (USA); Thomas E. Stalcup Jr., W. M. Keck Observatory (USA)[9148-80]

11:05: **The AOLI low-order non-linear curvature wavefront sensor: laboratory and on-sky results**, Jonathan Crass, David M. P. King, Craig D. MacKay, Univ. of Cambridge (United Kingdom) . . . . . [9148-81]

11:25: **LIFT: analysis of closed loop performance in a laser assisted adaptive optics**, Cedric Plantet, Serge C. Meimon, Jean-Marc Conan, ONERA (France); Benoît Neichel, Lab. d'Astrophysique de Marseille (France); Thierry Fusco, ONERA (France) and Lab. d'Astrophysique de Marseille (France). . . . . [9148-82]

11:45: **A miniature curvature sensor with coherent fiber image bundle**, Jessica R. Zheng, Australian Astronomical Observatory (Australia); Samuel N. Richards, The Univ. of Sydney (Australia); Michael Goodwin, Jon S. Lawrence, Australian Astronomical Observatory (Australia); Sergio G. Leon-Saval, Alexander Argyros, The Univ. of Sydney (Australia) . . . . . [9148-83]

Lunch Break . . . . . Fri 12:05 to 13:35

SESSION 21

LOCATION: ROOM 518A . . . . . FRI 13:35 TO 15:00

Advances in AO Control II

Session Chair: **Mitchell Troy,** Jet Propulsion Lab. (USA)

13:35: **Results of the NFIRAOS real time controller architecture trade study** *(Invited Paper)*, Jean-Pierre Véran, NRC - Herzberg Institute of Astrophysics (Canada); Corinne Boyer, Brent L. Ellerbroek, Luc Gilles, Thirty Meter Telescope Observatory Corp. (USA); Daniel A. Kerley, Glen Herriot, NRC - Herzberg Institute of Astrophysics (Canada); Zoran Ljusic, Eric A. McVeigh, National Research Council Canada (Canada); Robert Prior, Univ. of Victoria (Canada); Malcolm Smith, NRC - Herzberg Institute of Astrophysics (Canada); Lianqi Wang, Thirty Meter Telescope Observatory Corp. (USA). . . . . [9148-84]

14:00: **Enabling technologies for GPU driven adaptive optics real-time control**, Arnaud Sevin, Denis Perret, Damien Gratadour, Julien Brulé, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Bertrand Le Ruyet, Observatoire de Paris à Meudon (France); Maxime Lainé, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France) . . . . . [9148-85]

14:20: **Distributed wavefront reconstruction with SABRE for real-time large scale adaptive optics control**, Elisabeth Brunner, Cornelis C. de Visser, Michel Verhaegen, Technische Univ. Delft (Netherlands). . . . . [9148-86]

14:40: **Some investigations on turbulence modeling with wind direction for wide-field adaptive optics control and its impact on performance**, Caroline Kulcsar, Henri-François G. Raynaud, Gaetano Sivo, Institut d'Optique Graduate School (France); James Osborn, Durham Univ. (United Kingdom); Jean-Marc Conan, ONERA (France); Éric Gendron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Alastair G. Basden, Durham Univ. (United Kingdom); Olivier Martin, Observatoire de Paris à Meudon (France); Gérard Rousset, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Timothy J. Morris, Richard M. Myers, Durham Univ. (United Kingdom) . . . [9148-87]

SESSION 22

LOCATION: ROOM 518A . . . . . FRI 15:00 TO 16:50

AO Modeling, Analysis and Simulations

Session Chair: **Thierry Fusco,** ONERA (France)

15:00: **Physical optics modeling of Sky coverage for TMT NFIRAOS with advanced LQG controller**, Lianqi Wang, Luc Gilles, Brent L. Ellerbroek, Thirty Meter Telescope Observatory Corp. (USA); Carlos M. Correia, Univ. do Porto (Portugal) . . . . . [9148-88]

Coffee Break . . . . . Fri 15:20 to 15:50

15:50: **Tomography and calibration for Raven: from simulations to laboratory results**, Kate J. Jackson, Univ. of Victoria (Canada); Carlos M. Correia, Univ. do Porto (Portugal); Olivier Lardiere, Univ. of Victoria (Canada); David R. Andersen, NRC - Herzburg Institute of Astrophysics (Canada); Colin Bradley, Laurie Pham, Célia Blain, Reston Nash, Darryl Gamroth, Przemek Lach, Univ. of Victoria (Canada); Jean-Pierre Véran, NRC - Herzburg Institute of Astrophysics (Canada) . . . . . [9148-89]

16:10: **Thirty Meter telescope astrometry error budget**, Matthias Schoeck, Thirty Meter Telescope Observatory Corp. (USA); Tuan Do, Univ. of Toronto (Canada); Brent L. Ellerbroek, Luc Gilles, Thirty Meter Telescope Observatory Corp. (USA); Glen Herriot, NRC - Herzburg Institute of Astrophysics (Canada); Leo Meyer, Univ. of California, Los Angeles (USA); Ryuji Suzuki, National Astronomical Observatory of Japan (Japan); Lianqi Wang, Thirty Meter Telescope Observatory Corp. (USA); Sylvana Yelda, Univ. of California, Los Angeles (USA) . . . . . [9148-90]

16:30: **Design, prototyping and numerical simulations of the GMT Natural Guide star WFS**, Simone Esposito, Enrico Pinna, Fernando Quirós-Pacheco, Alfio T. Puglisi, Luca Carbonaro, Marco Bonaglia, Valdemaro Biliotti, Jacopo Antichi, Runa Briguglio, Guido Agapito, INAF - Osservatorio Astrofisico di Arcetri (Italy); Carmelo Arcidiacono, INAF - Osservatorio Astrofisico di Arcetri (Italy) and INAF - Osservatorio Astronomico di Bologna (Italy); Armando Riccardi, Luca Fini, INAF - Osservatorio Astrofisico di Arcetri (Italy) . . . . . [9148-91]

SESSION 23

LOCATION: ROOM 518A . . . . . FRI 16:50 TO 17:50

Post-Processing AO Data II

Session Chair: **Jean-Pierre Véran,** NRC - Herzburg Institute of Astrophysics (Canada)

16:50: **Detailed analysis of on-sky tomography with Laser Guide Stars by the MOAO demonstrator Canary**, Olivier Martin, Observatoire de Paris à Meudon (France); Éric Gendron, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Timothy J. Morris, Alastair G. Basden, Durham Univ. (United Kingdom); Damien Gratadour, Fabrice Vidal, Zoltan Hubert, Gérard Rousset, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Richard M. Myers, Durham Univ. (United Kingdom) . . . . . [9148-92]

17:10: **Image restoration with spatially variable PSF**, Paolo Ciliegi, INAF - Osservatorio Astronomico di Bologna (Italy); Andrea La Camera, Univ. degli Studi di Genova (Italy); Laura Schreiber, Michele Bellazzini, INAF - Osservatorio Astronomico di Bologna (Italy); Margherita Talia, Univ. degli Studi di Bologna (Italy); Emiliano Diolaiti, INAF - Osservatorio Astronomico di Bologna (Italy); Mario Bertero, Patrizia Boccacci, Univ. degli Studi di Genova (Italy); Italo Foppiani, Matteo Lombini, INAF - Osservatorio Astronomico di Bologna (Italy); Davide Massari, Univ. degli Studi di Bologna (Italy); Paolo Montegriffo, INAF - Osservatorio Astronomico di Bologna (Italy) . . . . . [9148-182]

17:30: **Perspectives on phase rertrieval and phase diversity in astronomy**, Robert A. Gonsalves, Tufts Univ. (USA) . . . . . [9148-94]

CONFERENCE 9149 · LOCATION: ROOM 523

Wednesday–Friday 25–27 June 2014 • Proceedings of SPIE Vol. 9149

Observatory Operations: Strategies, Processes, and Systems V


(Peck)


(Benn)


(Seaman)

Conference Chairs: **Alison B. Peck,** National Radio Astronomy Observatory (USA); **Chris R. Benn,** Isaac Newton Group of Telescopes (Spain); **Robert L. Seaman,** National Optical Astronomy Observatory (USA)

Program Committee: **David S. Adler,** Space Telescope Science Institute (USA); **Lori E. Allen,** National Optical Astronomy Observatory (USA); **Todd A. Boroson,** Las Cumbres Observatory Global Telescope Network (USA); **Dennis R. Crabtree,** National Research Council Canada (Canada); **Suzanne R. Dodd,** Jet Propulsion Lab. (USA); **Andreas Kaufer,** European Southern Observatory (Chile); **Nicole M. Radziwill,** James Madison Univ. (USA); **Arnold H. Rots,** Smithsonian Astrophysical Observatory (USA); **Christian Veillet,** Large Binocular Telescope Observatory (USA)

WEDNESDAY 25 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . WED 9:00 TO 10:00

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

9:00: **Highlights from the Multi Unit Spectroscopic Explorer (MUSE): a 2nd generation VLT instrument for the VLT** *(Plenary)*, Roland M. Bacon, Observatoire de Lyon (France) . . . . . [9147-506]

9:30: **Canadian Space Astronomy: past, present and future** *(Plenary)*, John B. Hutchings, NRC - Herzberg Institute of Astrophysics (Canada) [9143-505]

Coffee Break . . . . . Wed 10:00 to 10:30

SESSION 1

LOCATION: ROOM 523 . . . . . WED 10:30 TO 11:50

Archive Operations and Data Flow

Session Chair: **Alison B. Peck,** National Radio Astronomy Observatory (USA)

10:30: **The ALMA archive and its place in the astronomy of the future**, Felix Stoehr, European Southern Observatory (Germany); Mark D. Lacy, National Radio Astronomy Observatory (USA); Stephane Leon, Joint ALMA Observatory (Chile); Erik Muller, National Astronomical Observatory of Japan (Japan); Alisdair Manning, Christophe Moins, European Southern Observatory (Germany); Dustin Jenkins, NRC - Herzberg Institute of Astrophysics (Canada) . . . . . [9149-1]

10:50: **Data products in the ESO science archive facility**, Joerg Retzlaff, Magda Arnaboldi, Martino Romaniello, Pascal Ballester, Nausicaa A. R. Delmotte, Vincenzo Forchi, Wolfram Freudling, Armin Gabasch, Cesar Enrique Garcia-Dabo, Reinhard Hanuschik, Maurice S. Klein Gebbinck, John Lockhart, Alberto Micol, Andrea Modigliani, Isabelle Percheron, European Southern Observatory (Germany); Artur Szostak, Informate International SA/NV (Belgium); Ignacio Vera Sequeiros, European Southern Observatory (Germany); Paul Carson, Terma GmbH (Germany) . . . . . [9149-2]

11:10: **JWST science data products**, Daryl A. Swade, Space Telescope Science Institute (USA) . . . . . [9149-3]

11:30: **Telluric-line subtraction in high-accuracy velocimetry: a PCA-based approach**, Étienne Artigau, Univ. de Montréal (Canada); François Bouchy, Institut d'Astrophysique de Paris (France); Xavier Delfosse, Institut de Planétologie et d'Astrophysique de Grenoble (France); Jean-François Donati, Institut de Recherche en Astrophysique et Planétologie (France); René Doyon, Univ. de Montréal (Canada); Nicola Astudillo, Institut de Planétologie et d'Astrophysique de Grenoble (France); Claire Moutou, Canada-France-Hawaii Telescope (USA) . . . . . [9149-4]

SESSION 2

LOCATION: ROOM 523 . . . . . WED 11:50 TO 12:30

Time Domain Follow-up I

Session Chair: **Alison B. Peck,** National Radio Astronomy Observatory (USA)

11:50: **Reengineering observatory operations for the time domain astronomy**, Robert Seaman, National Optical Astronomy Observatory (USA); W. Thomas Vestrand, Los Alamos National Lab. (USA); Frederic V. Hessman, Georg-August-Univ. Göttingen (Germany) . . . . . [9149-5]

12:10: **Prospects and challenges of electromagnetic follow-up of LIGO-Virgo gravitational wave detections**, Salvatore Vitale, Massachusetts Institute of Technology (USA) . . . . . [9149-6]

Lunch/Exhibition Break . . . . . Wed 12:30 to 13:40

SESSION 3

LOCATION: ROOM 523 . . . . . WED 13:40 TO 14:00

Time Domain Follow-up II

Session Chair: **David S. Adler,** Space Telescope Science Institute (USA)

13:40: **ANTARES: a prototype transient broker system**, Abhijit Saha, Thomas Matheson, National Optical Astronomy Observatory (USA); Richard Snodgrass, John Kececioglu, The Univ. of Arizona (USA) . . . . . [9149-7]

SESSION 4

LOCATION: ROOM 523 . . . . . WED 14:00 TO 15:00

Operations Benchmarking and Metrics

Session Chair: **David S. Adler,** Space Telescope Science Institute (USA)

14:00: **Tracking progress: monitoring observing statistics and telescope usage at the Southern African Large telescope**, Steven M. Crawford, South African Astronomical Observatory (South Africa) . . . . . [9149-8]

14:20: **A bibliometric analysis of observatory publications**, Dennis R. Crabtree, National Research Council Canada (Canada) . . . . . [9149-10]

14:40: **The LSST metrics analysis framework**, Stephen T. Ridgway, Srinivasan Chandrasekharan, National Optical Astronomy Observatory (USA); Andrew P. Connolly, Univ. of Washington (USA); Kem H. Cook, Eureka Scientific, Inc. (USA); ?eljko Ivezic, R. Lynne Jones, K. Simon Krughoff, Univ. of Washington (USA); Catherine Petry, The Univ. of Arizona (USA); Peter Yoachim, Univ. of Washington (USA) . . . . . [9149-11]

Coffee Break . . . . . Wed 15:00 to 15:30

SESSION 5

LOCATION: ROOM 523 . . . . . .WED 15:30 TO 17:30

Program and Observation Scheduling

Session Chair: **Dennis R. Crabtree,** NRC - Herzberg Institute of Astrophysics (Canada)

15:30: **Optimizing the Large Synoptic Survey telescope (LSST) dithering pattern and cadence for dark energy studies**, Christopher M. Carroll, Dartmouth College (USA) and Rutgers, The State Univ. of New Jersey (USA); Eric Gawiser, Peter L. Kurczynski, Rachel A. Bailey, Rutgers, The State Univ. of New Jersey (USA); Rahul Biswas, Argonne National Lab. (USA); David Cinabro, Wayne State Univ. (USA); Saurabh W. Jha, Rutgers, The State Univ. of New Jersey (USA); R. Lynne Jones, K. Simon Krughoff, Univ. of Washington (USA); Aneesa Sonawalla, The Univ. of Chicago (USA); W. Michael Wood-Vasey, Univ. of Pittsburgh (USA) . . . . . [9149-12]

15:50: **Planning and scheduling at STScI: from Hubble to the James Webb Space telescope**, David S. Adler, Wayne M. Kinzel, Ian J. Jordan, Computer Sciences Corp. (USA) and Space Telescope Science Institute (USA) . . . . [9149-13]

16:10: **Novel scheduling approaches in the era of multi-telescope networks**, Eric S. Saunders, Las Cumbres Observatory Global Telescope Network (USA); Sotiria Lampoudi, Liquid Robotics, Inc. (USA); Timothy A. Lister, Martin A. Norbury, Zachary A. Walker, Las Cumbres Observatory Global Telescope Network (USA) . . . . . [9149-14]

16:30: **Seeing and ground meteorology forecast for site quality and observatory operations**, Christophe Giordano, Jean Vernin, Univ. de Nice Sophia Antipolis (France). . . . . [9149-15]

16:50: **The LSST OCS scheduler design**, Francisco Delgado, German Schumacher, Cerro Tololo Inter-American Observatory (Chile) . . . . . [9149-16]

17:10: **Artificial intelligence for the CTA Observatory scheduler**, Josep Colomé, ICE - Institut de Ciències de l'Espai (Spain); Pau Colomer Criach, GTD Ingeniería de Sistemas y de Software S.A. (Spain); Jordi Campreciós, ICE - Institute of Space Sciences (Spain); Thierry Coiffard, GTD Ingeniería de Sistemas y de Software S.A. (Spain); Emma D. Oña, Giovanna Pedaletti, Diego F. Torres, ICE - Institut de Ciències de l'Espai (Spain) . . . . . [9149-17]

THURSDAY 26 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . .THU 9:00 TO 10:00

Session Chair: **Masanori Iye,** National Astronomical Observatory of Japan (Japan)

9:00: **Hyper Suprime-Cam for Weak Gravitational Lensing Survey** *(Plenary)*, Satoshi Miyazaki, National Astronomical Observatory of Japan (Japan) . . . . . [9143-507]

9:30: **Transiting Exoplanet Survey Satellite (TESS)** *(Plenary)*, George R. Ricker Jr., Massachusetts Institute of Technology (USA) . . . . . [9143-508]

Coffee Break . . . . . Thu 10:00 to 10:30

SESSION 6

LOCATION: ROOM 523 . . . . . THU 10:30 TO 12:10

Science Operations I

Session Chair: **Robert Seaman,** National Optical Astronomy Observatory (USA)

10:30: **Remote access and operation of telescopes by the scientific users**, Philip G. Edwards, Shaun Amy, David Brodrick, Ettore Carretti, Simon Hoyle, Balthasar T. Indermuehle, David McConnell, Peter Mirtschin, Brett Preisig, Malcolm R. Smith, Jamie Stevens, Robin Wark, Mark Wieringa, Xinyu Wu, CSIRO Astronomy and Space Science (Australia). . . . . [9149-18]

10:50: **ALMA observations during its first early science cycles**, Lars-Åke Nyman, Pierre Cox, Joint ALMA Observatory (Chile) and European Southern Observatory (Chile); Stuartt A. Corder, National Radio Astronomy Observatory (Chile) and Joint ALMA Observatory (Chile); Masao Saito, National Astronomical Observatory of Japan (Japan) and Joint ALMA Observatory (Chile); Andreas Lundgren, Baltasar Vila-Vilaro, European Southern Observatory (Chile) and Joint ALMA Observatory (Chile); Daniel Espada, Joint ALMA Observatory (Chile) and National Astronomical Observatory of Japan (Japan); Eric Villard, Joint ALMA Observatory (Chile) and European Southern Observatory (Chile); Paola M. Andreani, European Southern Observatory (Germany); John E. Hibbard, National Radio Astronomy Observatory (USA); Ken'ichi Tatematsu, National Astronomical Observatory of Japan (Japan) . . . . . [9149-19]

11:10: **Remote proposal review panels: insights from Spitzer warm operations**, Lisa J. Storrie-Lombardi, Nancy Silbermann, Luisa M. Rebull, Seppo Laine, Lee Armus, California Institute of Technology (USA) . . . . . [9149-20]

11:30: **Flux-calibration of medium-resolution spectra from 300 nm to 2500 nm**, Sabine Moehler, Andrea Modigliani, Wolfram Freudling, European Southern Observatory (Germany); Noemi Giammichele, Univ. de Montréal (Canada); Alex Gianninas, The Univ. of Oklahoma (USA); Anais Gonneau, Univ. de Strasbourg (France); Wolfgang Kausch, Univ. of Innsbruck (Austria); Ariane Lancon, Univ. de Strasbourg (France); Stefan Noll, Univ. of Innsbruck (Austria); Thomas Rauch, Eberhard Karls Univ. Tübingen (Germany); Jakob Vinther, European Southern Observatory (Germany) . . . . . [9149-21]

11:50: **Quantifying photometric observing conditions on Paranal using an IR camera**, Florian Kerber, European Southern Observatory (Germany); Richard R. Querel, National Institute for Water and Atmospheric Research (New Zealand). . . . . [9149-22]

Lunch/Exhibition Break . . . . . Thu 12:10 to 13:40

SESSION 7

LOCATION: ROOM 523 . . . . . THU 13:40 TO 15:20

Science Operations II

Session Chair: **Alison B. Peck,** National Radio Astronomy Observatory (USA)

13:40: **The ALMA observing tool: proposal preparation, implementation and scheduling**, Harvey S. Liszt, National Radio Astronomy Observatory (USA) . . . . . [9149-23]

14:00: **Solar wind electron Alphas and Protons Science Operations Center initial design and implementation**, Kelly Korreck, Smithsonian Astrophysical Observatory (USA); Justin C. Kasper, Univ. of Michigan (USA) and Smithsonian Astrophysical Observatory (USA); Anthony W. Case, Peter Daigneau, Jay A. Bookbinder, Smithsonian Astrophysical Observatory (USA); Davin Larson, Jasper S. Halekas, Univ. of California, Berkeley (USA); Michael Stevens, Smithsonian Astrophysical Observatory (USA); Micheal Ludlam, Will Marchant, Univ. of California, Berkeley (USA) . . . . . [9149-24]

14:20: **GBOT: ground based optical tracking of the Gaia satellite**, Martin Altmann, Univ. Heidelberg (Germany) and Observatoire de Paris (France); Sebastien Bouquillon, Observatoire de Paris à Meudon (France); Francois Taris, Observatoire de Paris (France); Iain A. Steele, Liverpool John Moores Univ. (United Kingdom); Richard Smart, INAF - Osservatorio Astronomico di Torino (Italy); Alexandre H. Andrei, Observatorio Nacional (Brazil) and Observatorio de Valongo (Brazil) and INAF - Osservatorio Astronomico di Torino (Italy); Christophe Barache, Teddy Carlucci, Observatoire de Paris (France); Sebastian G. Els, European Space Astronomy Ctr. (Spain) . . . . . [9149-25]

14:40: **ESA Gaia payload uplink commanding system**, Alcione Mora, European Space Astronomy Ctr. (Spain) and Aurora Technology BV (Netherlands); Asier Abreu Aramburu, European Space Astronomy Ctr. (Spain) and Elecnor Deimos (Spain); Neil Cheek, European Space Astronomy Ctr. (Spain) and Serco Gestion de Negocios (Spain); Cian M. Crowley, Emmanuel Joliet, European Space Astronomy Ctr. (Spain) and HE Space BV (Netherlands); Juan Manuel Martin-Fleitas, Ralf Kohley, European Space Astronomy Ctr. (Spain); Jose Osinde, European Space Astronomy Ctr. (Spain) and Ingeniería de Sistemas para la Defensa de España (Spain); Hassan Siddiqui, European Space Astronomy Ctr. (Spain) and Telespazio Vega (United Kingdom) . . . . . [9149-26]

15:00: **NuSTAR observatory science operations: on-orbit acclimation**, Karl Forster, Fiona A. Harrison, California Institute of Technology (USA); Suzanne R. Dodd, Daniel K. Stern, Jet Propulsion Lab. (USA); Hiromasa Miyasaka, Kristin K. Madsen, Brian W. Grefenstette, California Institute of Technology (USA); Craig B. Markwardt, NASA Goddard Space Flight Ctr. (USA); William W. Craig, Space Sciences Lab. (USA); Francis E. Marshall, NASA Goddard Space Flight Ctr. (USA) . . . . . [9149-27]

Coffee Break . . . . . Thu 15:20 to 15:50

SESSION 8

LOCATION: ROOM 523 . . . . . THU 15:50 TO 17:30

Operations and Data Quality Control

Session Chair: **Suzanne R. Dodd,** Jet Propulsion Lab. (USA)

15:50: **Focus and alignment of the Space Surveillance telescope: procedures and year 2 performance results**, Deborah F. Woods, Richard L. Lambour, Eric C. Pearce, Walter Faccenda, MIT Lincoln Lab. (USA) . . . . . [9149-28]

16:10: **Highly automated on-orbit operations of the NuSTAR telescope**, Bryce A. Roberts, Manfred G. Bester, Renee Dumlao, Marty Eckert, Samuel Johnson, Mark Lewis, John S McDonald, Deron O. Pease, Greg Picard, Jeremy Thorsness, Univ. of California, Berkeley (USA) . . . . . [9149-29]

16:30: **The Radiometric All-Sky Infrared camera (RASICAM)**, Kevin A. Reil, SLAC National Accelerator Lab. (USA); Peter Lewis, Univ. of Hawai'i at Manoa (USA); Rafe H. Schindler, SLAC National Accelerator Lab. (USA) . . . . . [9149-30]

16:50: **The Dark Energy survey and operations**, H. Thomas Diehl, Fermi National Accelerator Lab. (USA) . . . . . [9149-31]

17:10: **SALSA: a tool to estimate the stray light contamination for low-Earth orbit observatories**, Thibault Kuntzer, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Andrea Fortier, Willy Benz, Univ. Bern (Switzerland) . . . . . [9149-77]

SESSION 9

LOCATION: ROOM 523 . . . . . THU 17:30 TO 17:50

Virtual Observatory

Session Chair: **Suzanne R. Dodd,** Jet Propulsion Lab. (USA)

17:30: **EPN-TAP: a data discovery protocol for Solar system resources**, Stéphane Erard, Baptiste Cecconi, Pierre Le Sidaner, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Nicolas André, Vincent Génot, Natacha Bourrel, Institut de Recherche en Astrophysique et Planétologie (France); Cyril Chauvin, Lab. d'Etudes Spatiales et d'Instrumentation en Astrophysique (France); Christian Jacquey, Institut de Recherche en Astrophysique et Planétologie (France) . . . . . [9149-33]

POSTER SESSION–THURSDAY

LOCATION: ROOM 516 . . . . . THU 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Thursday. The interactive poster session with authors in attendance will be Thursday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Upgrading, monitoring and operation of a dome drive system, Steven E. Bauman, Grant Matsushige, Tom A. Vermeulen, Canada-France-Hawaii Telescope (USA) . . . . . [9149-55]

Dome venting: the path to thermal balance and superior image quality, Steven E. Bauman, Derrick Salmon, Grant Matsushige, Tom A. Vermeulen, Canada-France-Hawaii Telescope (USA) . . . . . [9149-56]

Strategies for personnel sustainable lifecycle at astronomical observatories and local industry development, Eduardo A. Bendek, NASA Ames Research Ctr. (USA) . . . . . [9149-57]

Telescope pointing calibration for the Cherenkov Telescope Array (CTA), David Berge, Univ. van Amsterdam (Netherlands); Remko Stuik, ASTRON (Netherlands) . . . . . [9149-58]

Measure the fiber positioning error from spectrum data for LAMOST, Jian-Jun Chen, Zhongrui Bai, Yong-Heng Zhao, National Astronomical Observatories (China) . . . . . [9149-59]

Acquiring multiple stars with the LINC-NIRVANA Pathfinder: What is the most efficient method?, Albert R. Conrad, Max-Planck-Institut für Astronomie (Germany); Carmelo Arcidiacono, National Institute for Astrophysics (Italy); Harald Baumeister, Max-Planck-Institut für Astronomie (Germany); Maria Bergomi, National Institute for Astrophysics (Italy); Thomas Bertram, Jürgen Berwein, Florian Briegel, Max-Planck-Institut für Astronomie (Germany); Jacopo Farinato, National Institute for Astrophysics (Italy); Thomas M. Herbst, Ralph Hofferbert, Martin Kürster, Frank Kittmann, Derek Kopon, Max-Planck-Institut für Astronomie (Germany); Luca Marafatto, National Institute for Astrophysics (Italy); Mark Norris, Max-Planck-Institut für Astronomie (Germany); Roberto Ragazzoni, Valentina Viotto, National Institute for Astrophysics (Italy). . . . . [9149-60]

New Archiving Distributed InfrastructuRe (NADIR), Marco De Marco, Cristina Knapic, Riccardo Smareglia, INAF - Osservatorio Astronomico di Trieste (Italy) . . . . . [9149-61]

ESPRESSO data flow: from design to development, Paolo Di Marcantonio, INAF - Osservatorio Astronomico di Trieste (Italy); Danuta Sosnowska, Christophe Lovis, Observatoire de Genève (Switzerland); Valentina D'Odorico, Guido Cupani, INAF - Osservatorio Astronomico di Trieste (Italy); Sergio Sousa, Univ. do Porto (Portugal); Jonai Isai González Hernández, Instituto de Astrofísica de Canarias (Spain); Roberto Cirami, INAF - Osservatorio Astronomico di Trieste (Italy); Gaspare Lo Curto, Andrea Modigliani, European Southern Observatory (Germany); Denis Mégevand, Observatoire de Genève (Switzerland); Stefano Cristiani, INAF - Osservatorio Astronomico di Trieste (Italy). . . . . [9149-62]

Operational support and service concepts for observatories, Peter Emde, MT Mechatronics GmbH (Germany) . . . . . [9149-63]

Status of ALMA offline software in the transition from construction to full operations, Daniel Espada, Masao Saito, Lars-Åke Nyman, Itziar de Gregorio, ALMA (Chile); Andrew Biggs, Felix Stoehr, European Southern Observatory (Germany); Juan R. Cortes, ALMA (Chile) and National Radio Astronomy Observatory (Chile); Thomas Wiklind, Gautier Mathys, ALMA (Chile); Liz Humphreys, European Southern Observatory (Germany); Stephane Leon, Emilio Barrios, ALMA (Chile); Crystal Brogan, Carol Lonsdale, National Radio Astronomy Observatory (USA); Ruediger Kneissl, Baltasar Vila-Vilaro, Andreas Lundgren, ALMA (Chile); Paola M. Andreani, European Southern Observatory (Germany); Ken'ichi Tatematsu, National Astronomical Observatory of Japan (Japan); John E. Hibbard, National Radio Astronomy Observatory (USA); Eric Villard, Anthony J. Remijan, ALMA (Chile). . . . . [9149-64]

The NOAO data laboratory: a conceptual overview, Michael J. Fitzpatrick, Frossie Economou, Elizabeth B. Stobie, Brian Thomas, Knut Olsen, Timothy C. Beers, Mark Dickinson, National Optical Astronomy Observatory (USA) . . [9149-65]

Artificial intelligence for the EChO long-term mission planning tool, Álvaro García Piquer, Ignasi Ribas, Josep Colomé, ICE - Institut de Ciències de l'Espai (Spain) . . . . . [9149-66]

Phoenix: automatic science processing of ESO-VLT data, Reinhard Hanuschik, European Southern Observatory (Germany) . . . . . [9149-67]

The ALMA CONOPS project: the impact of funding decisions on observatory performance, Jorge F. Ibsen, Joint ALMA Observatory (Chile); John E. Hibbard, National Radio Astronomy Observatory (Chile); Giorgio Filippi, European Southern Observatory (Germany) . . . . . [9149-69]

Characterisation of atmospheric Cherenkov transparency with all-sky camera measurements, Felix Jankowsky, Stefan J. Wagner, Landessternwarte Heidelberg (Germany) . . . . . [9149-70]

Full automation of the automated telescope for optical monitoring, Felix Jankowsky, Stefan J. Wagner, Landessternwarte Heidelberg (Germany) . [9149-71]

Algorithms for optimal observation planning with the JWST NIRSpec multi-object spectroscopy mode, Diane Karakla, Klaus Pontoppidan, Alexander Shyrokov, Tracy Beck, James Muzerolle, Jeff A. Valenti, Karoline Gilbert, Space Telescope Science Institute (USA) . . . . . [9149-72]

Web-based hyper suprime-cam data providing system, Michitaro Koike, Hisanori Furusawa, Yuki Okura, Tadafumi Takata, Yoshihiko Yamada, Hitomi Yamanoi, National Astronomical Observatory of Japan (Japan); Naoki Yasuda, Steve Bickerton, Katayama Nobu, Soge Mineo, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Robert H. Lupton, Jim Bosch, Craig Loomis, Paul A. Price, Princeton Univ. (USA) . . . . . [9149-74]

Turning a remote controllable observatory into fully autonomouse system, Scott Swindell, Chris Johnson, Steward Observatory, The Univ. of Arizona (USA); Paul Gabor, Steward Observatory, The Univ. of Arizona (USA) and Vatican Observatory (USA); Petr Kubánek, Michael Prouza, Institute of Physics of the ASCR, v.v.i. (Czech Republic) . . . . . [9149-75]

Big and small: observations statistics, Petr Kubánek, Michael Prouza, Institute of Physics of the ASCR, v.v.i. (Czech Republic); Emilio E. Falco, Smithsonian Astrophysical Observatory (USA) and Fred Lawrence Whipple Observatory (USA) . . . . . [9149-76]

Study on fault diagnose system for large astronomy telescope based on fault tree and distributed log service, Jia-jing Liu, Ming-Cheng Luo, Peng-yi Tang, Wen-qing Wu, Guang-yu Zhang, Hong-fei Zhang, Jian Wang, Univ. of Science and Technology of China (China) . . . . . [9149-78]

AO Operations at Gemini South, Eduardo Marin, Andrew Cardwell, Peter Pessev, Gemini Observatory (Chile) . . . . . [9149-79]

Scheduling and calibration strategy for continuous radio monitoring of 1700 sources every three days, Walter Max-Moerbeck, National Radio Astronomy Observatory (USA) and California Institute of Technology (USA) . . . . . [9149-80]

Two years of ALMA bibliography: lessons learned, Silvia Meankins, Uta Grothkopf, European Southern Observatory (Germany); Marsha J. Bishop, National Radio Astronomy Observatory (USA); Felix Stoehr, European Southern Observatory (Germany); Ken'ichi Tatematsu, National Astronomical Observatory of Japan (Japan). . . . . [9149-81]

LaNotte: the TNG metric system after two years of data, Emilio Molinari, Nauzet Hernandez, Telescopio Nazionale Galileo (Spain). . . . . [9149-82]

Safety management of an underground-based gravitational wave telescope: KAGRA, Naoko Ohishi, National Astronomical Observatory of Japan (Japan); Shinji Miyoki, Takashi Uchiyama, Osamu Miyakawa, Masatake Ohashi, The Univ. of Tokyo (Japan). . . . . [9149-84]

Automating engineering verification in ALMA subsystems, José L. Ortiz, Jorge S. Castillo, ALMA (Chile) . . . . . [9149-85]

Early laser operations at the Large Binocular Telescope Observatory, Gustavo Rahmer, Michael J. Lefebvre, Julian C. Christou, Large Binocular Telescope Observatory (USA); Walfried Raab, Sebastian Rabien, Max-Planck-Institut für extraterrestrische Physik (Germany); Wolfgang Gaessler, Max-Planck-Institut für Astronomie (Germany). . . . . [9149-86]

Gemini planet imager integration to the Gemini South telescope environment, Fredrik T. Rantakyrö, Pascale Hibon, Andrew Cardwell, Andrew Serio, Carlos Quiroz, Stephen J. Goodsell, Markus Hartung, Gaston Gausachs, Ramon Galvez, Javier Luhrs, Claudia Winge, Kayla Hardie, Gemini Observatory (Chile) . . [9149-87]

A typical day of Dark Energy survey operations, Kevin A. Reil, SLAC National Accelerator Lab. (USA); H. Thomas Diehl, Fermi National Accelerator Lab. (USA); Gary M. Bernstein, Univ. of Pennsylvania (USA); Klaus Honscheid, The Ohio State Univ. (USA); Stephen Kent, Fermi National Accelerator Lab. (USA); Richard G. Kron, The Univ. of Chicago (USA); Niall MacCrann, Univ. College London (United Kingdom); Alejandro Plazas Malagón, Univ. of Pennsylvania (USA); Maayane Soumagnac, Univ. College London (United Kingdom); James Annis, Douglas L. Tucker, Brian Nord, Fermi National Accelerator Lab. (USA); Marisa C. March, Univ. of Pennsylvania (USA); Marcelle Soares-Santos, Fermi National Accelerator Lab. (USA); Lyndsay Old, The Univ. of Nottingham (United Kingdom); Philip Rooney, Univ. of Sussex (United Kingdom); David Gerdes, Univ. of Michigan (USA); Claudio Bruderer, Swiss Federal Institute of Technology (Switzerland). . . . . [9149-88]

Exploring remote operation for ALMA Observatory, Tzu-Chiang Shen, Ruben Soto, Nicolas Ovando, Soledad Fuica, Andres Robles, Anton Schemrl, Gastón Vélez, Jorge F. Ibsen, Girgio Filippi, ALMA (Chile); Emmanuel Pietriga, INRIA Chile (Chile). . . . . [9149-90]

Gaia downlink processing pipeline, Hassan Siddiqui, European Space Astronomy Ctr. (Spain); Sebastian G. Els, Gaia DPAC (Spain); Rocio Guerra, Neil Cheek, Alcione Mora, William O'Mullane, European Space Astronomy Ctr. (Spain)[9149-91]

Future-oriented maintenance strategy based on automated processes is finding its way into large astronomical facilities at remote observing sites, Armin Silber, European Southern Observatory (Chile) . . . . . [9149-92]

Implementing extended observing at the JCMT, Craig A. Walther, Ian Campbell, Jessica T. Dempsey, Joint Astronomy Ctr. (USA). . . . . [9149-93]

Problems with twilight/supersky flat-field for wide-field robotic telescopes and the solution, Peng Wei, Bin Ma, National Astronomical Observatories (China); Cheng Zhao, Tsinghua Univ. (China); Zhaohui Shang, Tianjin Normal Univ. (China) and National Astronomical Observatories (China); Yi Hu, Qiang Liu, National Astronomical Observatories (China) . . . . . [9149-94]

Development of database system for data obtained by hyper suprime-cam on Subaru telescope, Yoshihiko Yamada, Tadafumi Takata, Hisanori Furusawa, Yuki Okura, Michitaro Koike, Hitomi Yamanoi, National Astronomical Observatory of Japan (Japan); Naoki Yasuda, Steve Bickerton, Nobuhiko Katayama, Sogo Mineo, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Robert H. Lupton, Jim Bosch, Craig Loomis, Hironao Miyatake, Paul A. Price, Kendrick Smith, Princeton Univ. (USA); Dustin Lang, Carnegie Mellon Univ. (USA). . . . . [9149-95]

Multi-object spectroscopy data reduction: the AF2+WYFFOS pipeline, Lilian Dominquez, Cecilia Fariña, Isaac Newton Group of Telescopes (Spain); Alireza Molaeinezhad, Institute for Research in Fundamental Sciences (Iran, Islamic Republic of); Marc Balcells, Chris R. Benn, Isaac Newton Group of Telescopes (Spain); Richard Jackson, Keele Univ. (United Kingdom) . . . . . [9149-96]

FRIDAY 27 JUNE

SESSION 10

LOCATION: ROOM 523 . . . . . .FRI 8:30 TO 9:30

User Support

Session Chair: **Chris R. Benn,** Isaac Newton Group of Telescopes (Spain)

8:30: **The European ALMA Regional Centre: a model of users' support**, Paola M. Andreani, Felix Stoehr, Martin A. Zwaan, Evanthia Hatziminaoglou , Andrew Biggs, Maria Diaz Tribo, Elizabeth Humphreys, Dirk Petry, Suzanna Randall, Thomas Stanke, Eelco van Kampen, European Southern Observatory (Germany) . . . . . [9149-34]

8:50: **The Human Pipeline: distributed data reduction for ALMA**, Scott L. Schnee, National Radio Astronomy Observatory (USA) . . . . . [9149-35]

9:10: **Gemini Observatory's fast turnaround program**, Rachel E. Mason, Markus Kissler-Patig, Andrew J. Adamson, Gemini Observatory (USA); Nancy A. Levenson, Gemini Observatory (Chile); Dennis R. Crabtree, NRC - Herzberg Institute of Astrophysics (Canada); Stephanie Cote, NRC - Herzburg Institute of Astrophysics (Canada) . . . . . [9149-36]

SESSION 11

LOCATION: ROOM 523 . . . . . .FRI 9:30 TO 12:00

Site and Facility Operations I

Session Chair: **Andreas Kaufer,** European Southern Observatory (Chile)

9:30: **The Chandra calibration database: toward a universally applicable multi-mission calibration database**, Dale E. Graessle, Arnold H. Rots, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9149-37]

9:50: **LCOGT network observatory operations**, Andrew J. Pickles, Annie Hjelstrom, Todd Boroson, Benjamin Burleson, Las Cumbres Observatory Global Telescope Network (USA); Patrick Conway, Las Cumbres Observatory Global Telescope Network (United Kingdom); John De Vera, Mark Elphick, Brian Haworth, Wayne E. Rosing, Eric S. Saunders, Doug Thomas, Gary White, Las Cumbres Observatory Global Telescope Network (USA); Mark Willis, Las Cumbres Observatory Global Telescope Network (Australia); Zachary A. Walker, Las Cumbres Observatory Global Telescope Network (USA) . . . . . [9149-38]

Coffee Break . . . . . Fri 10:10 to 10:40

10:40: **The instrumentation on Paranal Observatory: how to keep its reliability and performances over its lifetime?**, Frédéric Y. J. Gonté, Alain Smette, European Southern Observatory (Chile) . . . . . [9149-39]

11:00: **A comparison of operation models and management strategies for the Spitzer Space telescope and the Nuclear Spectroscopic telescope array**, Suzanne R. Dodd, Jet Propulsion Lab. (USA). . . . . [9149-40]

11:20: **Maintaining a suite of binocular facility instruments at the Large Binocular telescope**, Robert O. Reynolds, Large Binocular Telescope Observatory (USA) . . . . . [9149-41]

11:40: **LBTO's long march to full operation: step 1**, Christian Veillet, Joar G. Brynnel, John M. Hill, R. Mark Wagner, David S. Ashby, Julian C. Christou, John K. Little, Douglas M. Summers, Large Binocular Telescope Observatory (USA) . . . . . [9149-42]

Lunch Break . . . . . Fri 12:00 to 13:30

SESSION 12

LOCATION: ROOM 523 . . . . . FRI 13:30 TO 15:10

Site and Facility Operations II

Session Chair: **Todd Boroson,** Las Cumbres Observatory Global Telescope Network (USA)

13:30: **Commissioning and operation of the new Karl G. Jansky Very Large Array**, Claire J. Chandler, Bryan J. Butler, National Radio Astronomy Observatory (USA) . . . . . [9149-43]

13:50: **Auxiliary instruments for the absolute calibration of the ASTRI SST-2M telescope prototype for the Cherenkov Telescope Array**, Maria C. Maccarone, Alberto Segreto, Osvaldo Catalano, Giovanni La Rosa, Francesco Russo, Giuseppe Sottile, Carmelo Gargano, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy) . . . . . [9149-44]

14:10: **Calibration strategies for the Cherenkov Telescope Array**, Michael Daniel, Univ. of Liverpool (United Kingdom); Michele Doro, Univ. degli Studi di Padova (Italy); Andreas Förster, Max-Planck-Institut für Kernphysik (Germany); Markus Gaug, Univ. Autònoma de Barcelona (Spain); Maria C. Maccarone, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Dan Parsons, Raquel de los Reyes, Werner Hofmann, Max-Planck-Institut für Kernphysik (Germany) . . . . . [9149-45]

14:30: **Operating observatories: the need for new paradigm**, Ifan Payne, Magdalena Ridge Observatory (USA); Christian Veillet, Large Binocular Telescope Observatory (USA). . . . . [9149-46]

14:50: **The Isaac Newton Group of Telescopes on La Palma**, Chris R. Benn, Isaac Newton Group of Telescopes (Spain) . . . . . [9149-47]

Coffee Break . . . . . Fri 15:10 to 15:40

SESSION 13

LOCATION: ROOM 523 . . . . . FRI 15:40 TO 18:00

Site and Facility Operations III

Session Chair: **Christian Veillet,** Large Binocular Telescope Observatory (USA)

15:40: **Tiers of the maintenance concepts at ALMA in operations**, David Rabanus, European Southern Observatory (Chile) . . . . . [9149-48]

16:00: **Creation of an instrument maintenance program at W. M. Keck Observatory**, Grant M. Hill, W. M. Keck Observatory (USA) . . . . . [9149-49]

16:20: **Science operations for LCOGT: a global telescope network**, Todd Boroson, Timothy M. Brown, Annie Hjelstrom, D. A. Howell, Timothy A. Lister, Andrew J. Pickles, Wayne E. Rosing, Rachel Street, Zachary A. Walker, Las Cumbres Observatory Global Telescope Network (USA) . . . . . [9149-50]

16:40: **Setting the standard: 25 years of operating the JCMT**, Jessica T. Dempsey, Joint Astronomy Ctr. (USA); Timothy Jenness, Cornell Univ. (USA); Frossie Economou, National Optical Astronomy Observatory (USA); Remo P. J. Tilanus, Netherlands Organisation for Scientific Research (Netherlands); Antonio C. Chrysostomou, Univ. of Hertfordshire (United Kingdom); Gary R. Davis, Holly S. Thomas, Craig A. Walther, Iain M. Coulson, Doug Johnstone, Per Friberg, Graham S. Bell, Joint Astronomy Ctr. (USA). . . . . [9149-51]

17:00: **SciOps2.0: an evolution of ESO/VLT's science operations model**, Christophe Dumas, Henri M. J. Boffin, Stéphane Brillant, Andres Pino, Cédric Ledoux, Antoine Mérand, Steffen Mieske, Alain Smette, Andrew Wright, European Southern Observatory (Chile) . . . . . [9149-52]

17:20: **SUMO: operation and maintenance management web tool for astronomical observatories**, Emma Mujica-Alvarez, Ana Perez-Calpena, María Luisa García-Vargas, FRACTAL S.L.N.E (Spain). . . . . [9149-53]

17:40: **The Observatorio Astrofísico de Javalambre: current status, developments, operations and strategies**, A. Javier Cenarro, David Cristóbal-Hornillos, Antonio Marín-Franch, Axel Yanes Díaz, Mariano Moles, Alessandro Ederoclite, Jesús Varela, Ctr. de Estudios de Física del Cosmos de Aragón (Spain) . . . . . [9149-54]

CONFERENCE 9150 · LOCATION: ROOM 523

Sunday–Tuesday 22–24 June 2014 • Proceedings of SPIE Vol. 9150

Modeling, Systems Engineering, and Project Management for Astronomy VI


(Angeli)


(Dierickx)

Conference Chairs: **George Z. Angeli,** LSST Corp. (USA); **Philippe Dierickx,** European Southern Observatory (Germany)

Program Committee: **Simon C. Craig,** National Solar Observatory (USA); **Sebastian G. Els,** European Space Astronomy Ctr. (Spain); **Gary E. Mosier,** NASA Goddard Space Flight Ctr. (USA); **Scott Roberts,** Thirty Meter Telescope Observatory Corp. (Canada); **Hermine Schnetler,** UK Astronomy Technology Ctr. (United Kingdom); **Michael Sheehan,** Giant Magellan Telescope Project (USA); **Mitchell Troy,** Jet Propulsion Lab. (USA)

SUNDAY 22 JUNE

SESSION 1

LOCATION: ROOM 523 . . . . . .SUN 9:00 TO 10:20

Project Management I

Session Chair: **George Angeli,** LSST Corp. (USA)

9:00: **Success in large high-technology projects: what really works**, Philip Crosby, Commonwealth Scientific and Industrial Research Organization (Australia). . . . . [9150-1]

9:20: **Governance of large astronomy projects**, Mattheus W. M. de Graauw, European Southern Observatory (Chile) and Astro Space Ctr. (Russian Federation) . . . . . [9150-2]

9:40: **Generic documentation tree for science ground segments**, Fernando Perez-Lopez, Timothy F. Lock, European Space Astronomy Ctr. (Spain) . . [9150-3]

10:00: **Tackling 5 main problem areas found in science (ground segment) project developments**, Timothy F. Lock, European Space Astronomy Ctr. (Spain) . . . . . [9150-4]

Coffee Break . . . . . Sun 10:20 to 10:50

SESSION 2

LOCATION: ROOM 523 . . . . . SUN 10:50 TO 12:10

Project Management II

Session Chair: **Sebastian G. Els,** European Space Astronomy Ctr. (Spain)

10:50: **The tail wags the dog: managing large telescope construction projects with lagging requirements and creeping scope**, Mark Warner, National Solar Observatory (USA). . . . . [9150-5]

11:10: **Advanced Technology Solar telescope system safety**, Robert P. Hubbard, Scott E. Bulau, Steve Shimko, Timothy R. Williams, National Solar Observatory (USA). . . . . [9150-6]

11:30: **Integrated logistics support approach: concept for the new big projects E-ELT, SKA, CTA**, Gianpietro Marchiori, Francesco Rampini, Federico Formentin, European Industrial Engineering s.r.l. (Italy) . . . . . [9150-7]

11:50: **De-mystifying earned value management for ground based astronomy projects, large and small**, Timothy J. Norton, Patricia Brennan, Mark A. Mueller, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9150-8]

Lunch Break . . . . . Sun 12:10 to 13:30

SESSION 3

LOCATION: ROOM 523 . . . . . SUN 13:30 TO 15:30

System Integration, Verification, and Validation

Session Chair: **Scott Roberts,** Thirty Meter Telescope Observatory Corp. (USA)

13:30: **The commissioning of Gaia** *(Invited Paper)*, Sebastian G. Els, Timothy F. Lock, Gabriele Comoretto, Gonzalo A. Gracia, William O'Mullane, European Space Astronomy Ctr. (Spain) . . . . . [9150-9]

14:00: **The ALMA assembly, integration, verification, and commissioning project: a retrospective analysis** *(Invited Paper)*, Bernhard Lopez, ALMA (Chile). . . . . [9150-10]

14:30: **Advanced Technology Solar telescope: testing and commissioning planning**, Simon C. Craig, Eric Hansen, Kerry L. Gonzales, Chen Liang, William R. McBride, Scott E. Bulau, Timothy R. Williams, Robert P. Hubbard, Ruth A. Kneale, Predrag Sekulic, Erik Johansson, Bret Goodrich, National Solar Observatory (USA) . . . . . [9150-11]

14:50: **MUSE dream conclusion: the sky verdict**, Patrick Caillier, Observatoire de Lyon (France); Matteo Accardo, European Southern Observatory (Germany); Louisa Adjali, Observatoire de Lyon (France); Heiko Anwand, Univ. Göttingen (Germany); Roland M. Bacon, Didier Boudon, Lionel Capoani, Eric Daguisé, Observatoire de Lyon (France); Michel Dupieux, Institut de Recherche en Astrophysique et Planétologie (France); Christophe Dupuy, European Southern Observatory (Germany); Mylène François, Observatoire de Lyon (France); Andreas Glindemann, Domingo Gojak, European Southern Observatory (Germany); Frédéric Y. J. Gonté, Nicolas F. Haddad, European Southern Observatory (Chile); Ghaouti Hansali, Observatoire de Lyon (France); Thomas Hahn, Leibniz-Institut für Astrophysik Potsdam (Germany); Aurélien Jarno, Observatoire de Lyon (France); Andreas Kelz, Leibniz-Institut für Astrophysik Potsdam (Germany); Christof Köhler, Georg-August-Univ. Göttingen (Germany); Johan Kosmalski, Florence Laurent, Observatoire de Lyon (France); Marie Larrieu, Institut de Recherche en Astrophysique et Planétologie (France); Jean-Louis Lizon, European Southern Observatory (Germany); Magali Loupias, Observatoire de Lyon (France); Antonio Manescau, European Southern Observatory (Germany); Jean-Emmanuel Migniau, Observatoire de Lyon (France); Christian Monstein, Eidgenössische Technische Hochschule (Switzerland); Harald Nicklas, Georg-August-Univ. Göttingen (Germany); Laurent P. Parès, Institut de Recherche en Astrophysique et Planétologie (France); Arlette Pécontal-Rousset, Laure Piquéras, Observatoire de Lyon (France); Roland Reiss, European Southern Observatory (Germany); Alban Remillieux, Edgard Renault, Johan Richard, Observatoire de Lyon (France); Gero Rupprecht, European Southern Observatory (Germany); Ole Streicher, Leibniz-Institut für Astrophysik Potsdam (Germany); Remko Stuik, Leiden Observatory (Netherlands); Hervé Valentin, Institut de Recherche en Astrophysique et Planétologie (France); Joel R. D. Vernet, European Southern Observatory (Germany); Peter Weilbacher, Leibniz-Institut für Astrophysik Potsdam (Germany); Gérard Zins, Institut de Planétologie et d'Astrophysique de Grenoble (France) . . . . . [9150-12]

15:10: **Planning and reality of the final verification and on-site assembly of KMOS for the VLT**, Philip Rees II, Michele Cirasuolo, Alasdair E. Fairley, George H. Davidson, UK Astronomy Technology Ctr. (United Kingdom) . . . . . [9150-13]

Coffee Break . . . . . Sun 15:30 to 16:00

SESSION 4

LOCATION: ROOM 523 . . . . . .SUN 16:00 TO 18:00

System Designs and Architectures

Session Chair: **Hermine Schnetler,** UK Astronomy Technology Ctr. (United Kingdom)

16:00: **Feed array metrology and correction layer for large antenna systems**, Rosario F. Cimmino, Antonio Saitto, Consorzio Nazionale Interuniversitario per i Transporti e la Logistica (Italy); Francesco Romano, Rheinmetall Italia S.p.A. (Italy); Alessandro Trifiletti, Univ. degli Studi di Roma La Sapienza (Italy). . . . . [9150-14]

16:20: **Overview of the LSST active optics system**, Douglas Neill, National Optical Astronomy Observatory (USA); George Z. Angeli, National Optical Astronomy Observatory (USA) and Large Synoptic Survey Telescope Corp. (USA); Charles F. Claver, National Optical Astronomy Observatory (USA) and LSST Corp. (USA); Edward A. Hileman, Joseph DeVries, Jacques Sebag, Bo Xin, National Optical Astronomy Observatory (USA) . . . . . [9150-15]

16:40: **Real time wavefront control system for the Large Synoptic Survey telescope (LSST)**, George Z. Angeli, Charles F. Claver, Bo Xin, LSST Corp. (USA); Douglas G. MacMartin, California Institute of Technology (USA); Douglas Neill, LSST Corp. (USA); Matthew C. Britton, the Optical Sciences Company (tOSC) (USA); Jacques Sebag, Srinivasan Chandrasekharan, LSST Corp. (USA) . [9150-16]

17:00: **NEAT breadboard system analysis and performance models**, François B. Hénault, Antoine Crouzier, Fabien Malbet, Institut de Planétologie et d'Astrophysique de Grenoble (France) . . . . . [9150-17]

17:20: **Relative performance of dispersive and non-dispersive spectrometers operating in the FIR**, Bruce Sibthorpe, Willem Jellema, SRON Netherlands Institute for Space Research (Netherlands) . . . . . [9150-18]

17:40: **Running AIM: initial data treatment and micro-arcsec level calibration procedures for Gaia within the astrometric verification unit**, Deborah Busonero, INAF - Osservatorio Astronomico di Torino (Italy); Mario Gai, INAF - Osservatorio Astrofisico di Torino (Italy); Enrico Licata, euriX (Italy); Mario G. Lattanzi, INAF - Osservatorio Astrofisico di Torino (Italy) . . . . . [9150-19]

MONDAY 23 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . MON 8:50 TO 10:00

Session Chair: **Luc Simard,** National Research Council of Canada - Herzberg Institute of Astrophysics (Canada)

08:50: **Welcome**

9:00: **James Webb Space Telescope: the road to first science observations** *(Plenary)*, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) [9143-501]

9:30: **The Square Kilometre Array: a physics machine for the 21st Century** *(Plenary)*, Philip Diamond, SKA Organisation (United Kingdom) . . [9143-502]

Coffee Break . . . . . Mon 10:00 to 10:30

SESSION 5

LOCATION: ROOM 523 . . . . . MON 10:30 TO 12:10

Model Based Systems Engineering

Session Chair: **Sebastian G. Els,** European Space Astronomy Ctr. (Spain)

10:30: **Model based systems engineering for astronomical projects** *(Invited Paper)*, Robert Karban, European Southern Observatory (Germany); Frank G. Dekens, Jet Propulsion Lab. (USA); Luigi Andolfato, Paul Bristow, Gianluca Chiozzi, Michael Esselborn, Marcus Schilling, Mario Kiekebusch, Christian Schmid, Heiko Sommer, Gianluca Verzichelli, European Southern Observatory (Germany)[9150-20]

11:00: **Systems engineering in the Large Synoptic Survey project: an application of model based systems engineering** *(Invited Paper)*, Charles F. Claver, Brian M. Selvy, George Z. Angeli, LSST Corp. (USA); Francisco Delgado, National Optical Astronomy Observatory (USA); Gregory P. Dubois-Felsmann, Patrick Hascall, Stuart Marshall, SLAC National Accelerator Lab. (USA); German Schumacher, National Optical Astronomy Observatory (USA); Jacques Sebag, LSST Corp. (USA) . . . . . [9150-21]

11:30: **Using SysML for verification and validation planning on the Large Synoptic Survey telescope (LSST)**, Brian M. Selvy, Charles F. Claver, George Z. Angeli, LSST Corp. (USA) . . . . . [9150-22]

11:50: **An illustrative example using model based systems engineering to design and plan the construction of the next generation multi-object optical and near-infrared spectrograph (MOONS) for the European Southern Observatory (ESO)**, Hermine Schnetler, Michele Cirasuolo, David W. Lunney, Philip Rees II, UK Astronomy Technology Ctr. (United Kingdom); Ernesto Oliva, INAF - Osservatorio Astrofisico di Arcetri (Italy); Stephen Todd, David M. Montgomery, UK Astronomy Technology Ctr. (United Kingdom); Alexandre Cabral Pereira, Univ. de Lisboa (Portugal); Isabelle Guinouard, Observatoire de Paris à Meudon (France); David Lee, Steven M. Beard, William D. Taylor, UK Astronomy Technology Ctr. (United Kingdom). . . . . [9150-23]

Lunch Break . . . . . Mon 12:10 to 13:40

SESSION 6

LOCATION: ROOM 523 . . . . . MON 13:40 TO 15:20

System Modeling I

Session Chair: **George Z. Angeli,** LSST Corp. (USA)

13:40: **Transient aero-thermal simulations for TMT**, Konstantinos Vogiatzis, Thirty Meter Telescope Observatory Corp. (USA). . . . . [9150-24]

14:00: **Unsteady wind loads for TMT: replacing parametric models with CFD**, Douglas G. MacMartin, California Institute of Technology (USA); Konstantinos Vogiatzis, Thirty Meter Telescope Observatory Corp. (USA) . . . . . [9150-25]

14:20: **Estimating dome seeing for LSST**, Jacques Sebag, National Optical Astronomy Observatory (USA); Konstantinos Vogiatzis, Thirty Meter Telescope Observatory Corp. (USA); Douglas Neill, National Optical Astronomy Observatory (USA) . . . . . [9150-26]

14:40: **Wavefront sensing and control performance modeling of the Thirty Meter telescope for systematic trade analyses**, Carl R. Nissly, Jet Propulsion Lab. (USA); Byoung-Joon Seo, Jet Propulsion Lab. (USA) and California Institute of Technology (USA); Mitchell Troy, Jet Propulsion Lab. (USA); Gary Chanan, Univ. of California, Irvine (USA); Scott Roberts, John Rogers, Thirty Meter Telescope Observatory Corp. (USA). . . . . [9150-27]

15:00: **TOAD: a numerical model for the 4MOST instrument**, Roland Winkler, Dionne M. Haynes, Olga Bellido-Tirado, Leibniz-Institut für Astrophysik Potsdam (Germany); Wenli Xu, Landessternwarte Heidelberg (Germany); Roger Haynes, Leibniz-Institut für Astrophysik Potsdam (Germany). . . . . [9150-28]

Coffee Break . . . . . Mon 15:20 to 15:50

SESSION 7

LOCATION: ROOM 523 . . . . . MON 15:50 TO 17:30

Systems Engineering I

Session Chair: **Simon Craig,** National Solar Observatory (USA)

15:50: **Systems engineering plan for the construction phase of the E-ELT**, Juan C. Gonzalez, European Southern Observatory (Germany) . . . . . [9150-29]

16:10: **Systems engineering of the Thirty Meter telescope for the construction phase**, Scott Roberts, Thirty Meter Telescope Observatory Corp. (Canada); John Rogers, Hugh A. Thompson, Konstantinos Vogiatzis, Thirty Meter Telescope Observatory Corp. (USA); Douglas G. MacMartin, Thirty Meter Telescope Observatory Corp. (USA) and California Institute of Technology (USA); Eric Wilde, Thirty Meter Telescope Observatory Corp. (USA); Mitchell Troy, Byoung-Joon Seo, Carl R. Nissly, Jet Propulsion Lab. (USA) and California Institute of Technology (USA) . . . . . [9150-30]

16:30: **The Paving Stones: initial feed-back on an attempt to apply the Agile principles for the development of a CubeSat space mission to Mars**, Boris Segret, Alain Semery, Observatoire de Paris (France); Jordan Vannitsen, National Cheng Kung Univ. (Taiwan); Benoit Mosser, LESIA, Observatoire de Paris (France); Jiun-Jih Miau, Jyh-Ching Juang, National Cheng Kung Univ. (Taiwan); Florent Deleflie, IMCCE, Observatoire de Paris (France) and Ctr. National de la Recherche Scientifique (France) . . . . . [9150-31]

16:50: **Automatic performance budget: towards a risk reduction**, Philippe Laporte, Cameron Rulten, Observatoire de Paris à Meudon (France); Jurgen Schmoll, Simon Blake, Durham Univ. (United Kingdom); Denis Savoie, Institut d'Optique Graduate School (France) . . . . . [9150-32]

17:10: **Project management for complex ground-based instruments: MEGARA plan**, María Luisa García-Vargas, Ana Perez-Calpena, FRACTAL S.L.N.E (Spain); Armando Gil de Paz, Univ. Complutense de Madrid (Spain); Esperanza Carrasco, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Jesús Gallego, Univ. Complutense de Madrid (Spain); Jorge Iglesias-Páramo, Instituto de Astrofísica de Andalucía (Spain); Francisco Manuel Sánchez-Moreno, Univ. Politécnica de Madrid (Spain) . . . . . [9150-51]

CONFERENCE 9150 · LOCATION: ROOM 523

POSTER SESSION–MONDAY

LOCATION: ROOM 516 . . . . . MON 17:30 TO 19:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Monday. The interactive poster session with authors in attendance will be Monday evening from 17:30 to 19:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Novel technique for tracking manpower and work packages: a useful tool for the team and management, Ranpal Gill, Rhea System S.A. (Belgium); Gonzalo Abril Gracia, European Space Astronomy Ctr. (Spain); Robert H. Lupton, Princeton Univ. (USA); William O'Mullane, European Space Agency (Spain) . . . . . [9150-48]

Designing for operation: keeping the eyes on the life cost since the design phase, Antonio Saitto, Consorzio Nazionale Interuniversitario per i Transporti e la Logistica (Italy); Francesco Romano, Rheinmetall Italia S.p.A. (Italy); Rosario F. Cimmino, Consorzio Nazionale Interuniversitario per i Transporti e la Logistica (Italy) . . . . . [9150-49]

Clustering enterprises to increase chances of involvement into large multinational astrophysics infrastructures projects, Rosario F. Cimmino, Consorzio Nazionale Interuniversitario per i Transporti e la Logistica (Italy); Francesco Romano, Rheinmetall Italia S.p.A. (Italy) . . . . . [9150-50]

Space radiation parameters for EUI and the Sun Sensor of Solar Orbiter, ESIO, and JUDE instruments, Laurence Rossi, Tanguy Thibert, Jean-Philippe A. Halain, Etienne Renotte, Lionel Jacques, Denis Grodent, Univ. de Liège (Belgium)[9150-52]

GAME/ISAS development status, Mario Gai, Alberto Riva, Deborah Busonero, Alberto Vecchiato, Mario G. Lattanzi, INAF - Osservatorio Astrofisico di Torino (Italy); Daniele Gallieni, Paolo Lazzarini, A.D.S. International S.r.l. (Italy) . . [9150-53]

Thermal design and performance of the REgolith x-ray imaging spectrometer (REXIS) instrument, Kevin D. Stout, Rebecca A. Masterson, Massachusetts Institute of Technology (USA) . . . . . [9150-54]

The analysis of GEO satellite camera detection parameters value, Dong Yucui, Shanghai Institute of Technical Physics (China) and Univ. of Chinese Academy of Sciences (China) and Key Lab. of Infrared System Detection and Imaging Technology (China) . . . . . [9150-55]

Design of one large telescope direct drive control system based on TMS320F28xx, Xiao Li Song, Daxing Wang, Chao Zhang, Zhenchao Zhang, Liyan Chen, Changzhi Ren, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9150-56]

Experimental study on cabin overturning of FAST telescope, Mingzhe Li, National Astronomical Observatories (China) and Guizhou Univ. (China); Hui Li, National Astronomical Observatories (China) . . . . . [9150-57]

BIRDY: an interplanetary CubeSat to collect radiation data on the way to Mars and back to prepare the future manned missions, Boris Segret, Observatoire de Paris (France); Jordan Vannitsen, Marco Agnan, National Cheng Kung Univ. (Taiwan); Audrey Porquet, Florent Deleflie, IMCCE, Observatoire de Paris (France); Jiun-Jih Miau, Jyh-Ching Juang, Kaiti Wang, National Cheng Kung Univ. (Taiwan) . . . . . [9150-58]

Chilean Virtual Observatory and Integration with ALMA, Mauricio G. Solar, Jonathan A. Antognini, Univ. Técnica Federico Santa María (Chile); Diego Mardones, Univ. de Chile (Chile); Karim Pichara, Pontificia Univ. Católica de Chile (Chile); Neil Nagar, Univ. de Concepción (Chile); Victor Parada, Univ. de Santiago de Chile (Chile); Jorge F. Ibsen, Lars-Åke Nyman, ALMA (Chile); Walter Fariña, José Marroquín, Univ. Técnica Federico Santa María (Chile) . . . . . [9150-59]

Microprocessed motorized astronomic tracking system based on German equatorial mount for telescopes, Raul A. Schubert, Bertoldo Schneider Jr., Univ. Tecnológica Federal do Paraná (Brazil). . . . . [9150-60]

Plate coil thermal test bench for the Advanced Technology Solar telescope (ATST) carousel cooling system, LeEllen Phelps, National Solar Observatory (USA); Gaizka Murga, IDOM (USA); Guillermo Montijo Jr., David Hauth, National Solar Observatory (USA) . . . . . [9150-62]

FRIDA diffraction limited NIR instrument, the challenges of its verification processes, Beatriz Sánchez, Luis C. Álvarez, Univ. Nacional Autónoma de México (Mexico); Vicente Bringas, Ctr. de Ingenieria y Desarollo Industrial (Mexico); Adi Corrales, Ctr. de Ingenieria y Desarrollo Industrial (Mexico); Salvador Cuevas, Oscar Chapa, Carlos Espejo, Rubén A. Flores-Meza, Jorge Fuentes Fernandez, José Leonardo Garcés, Carolina Keiman, Gerardo Lara, José Alberto Lopez, Univ. Nacional Autónoma de México (Mexico); Diana Lucero, Alberto Rodriguez, Berenice Rodriguez, Diana Torres, Jorge A. Uribe, Ctr. de Ingenieria y Desarrollo Industrial (Mexico); Alan M. Watson, Univ. Nacional Autónoma de México (Mexico) [9150-63]

ATST enclosure modeling and verification during factory assembly and testing, Ibon Larrakoetxea, AEC Idom (USA); William R. McBride, Heather K. Marshall, National Solar Observatory (USA); Gaizka Murga, AEC Idom (USA) . . . . . [9150-64]

Structural influences on intensity correlation interferometry, Arup K. Maji, The Univ. of New Mexico (USA); Mark A. Harris, New Mexico Institute of Mining and Technology (USA) . . . . . [9150-65]

System model of an image stabilization system, Manuel Carmona, José María Gómez, David Roma, Albert Casas, Manel López, José Bosch, Atilà Herms, Josep Sabater, Univ. de Barcelona (Spain); Reiner Volkmer, Frank Heidecke, Thorsten Maue, Eiji Nakai, Wolfgang Schmidt, Kiepenheuer-Institut für Sonnenphysik (Germany) . . . . . [9150-66]

The modeling and identification of 4-m azimuth telescope control system, Liyan Chen, Xiao Li Song, Zhenchao Zhang, Daxing Wang, Nanjing Institute of Astronomical Optics & Technology (China); Zhang chao, NIAOT (China). . [9150-67]

A possible solution on improving damping of FAST cabin suspension, Hui Li, Mingzhe Li, National Astronomical Observatories (China) . . . . . [9150-68]

Synthetic feed array 3D sensor system for SKA project, astrophysical, radio astronomy, metrology, and weather interaction, Francesco Romano, Rheinmetall Italia S.p.A. (Italy); Alessandro Trifiletti, Univ. degli Studi di Roma La Sapienza (Italy); Rosario F. Cimmino, Consorzio Nazionale Interuniversitario per i Transporti e la Logistica (Italy). . . . . [9150-69]

The OTP-model applied to the Aklim site database, Kamilia Mraini, Abdelhadi Jabiri, Zouhair Benkhaldoun, Aziza Bounhir, Youssef Hach, Mohammed Sabil, Abdelfettah Habib, Univ. Cadi Ayyad (Morocco). . . . . [9150-70]

Align metrology for Antarctic telescopes, Zhengyang Li, Xiangyan Yuan, Xiangqun Cui, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9150-71]

Basic angle monitoring software tool in the context of Gaia astrometric verification, Alberto Riva, INAF - Osservatorio Astronomico di Torino (Italy); Federico Russo, INAF - Osservatorio Astronomico di Teramo (Italy); Raffaella Buzzi, Mario Gai, Mario G. Lattanzi, INAF - Osservatorio Astronomico di Torino (Italy) . . . . . [9150-73]

Error reduction and modeling for hexapod positioners of secondary mirrors for large ground-based telescopes, Ryan C. Sneed, Paul J. Keas, Paul C. Janzen, Moog CSA Engineering (USA). . . . . [9150-74]

Integrated modeling for parametric evaluation of smart x-ray optics, Marco Riva, Stefano Basso, Daniele Spiga, Giovanni Pareschi, INAF - Osservatorio Astronomico di Brera (Italy). . . . . [9150-75]

Wind responses of Giant Magellan telescope, Ben Irarrazaval, Giant Magellan Telescope Project (USA); Christine Buleri, Quartus Engineering Inc. (USA) [9150-77]

Target allocation yields for massively multiplexed spectroscopic surveys with fibers, Will Saunders, Scott Smedley, Australian Astronomical Observatory (Australia); Jaime E. Forero-Romero, Univ. de los Andes (Colombia); Stephanie Jouvel, Univ. de Barcelona (Spain); Brian D. Nord, The Univ. of Chicago (USA) . . . . . [9150-78]

The ASTRI SST-2M prototype for the next generation of Cherenkov telescopes: a single framework approach from requirement analysis to integration and verification strategy definition, Mauro Fiorini, Nicola La Palombara, Luca Stringhetti, INAF - IASF Milano (Italy); Rodolfo Canestrari, INAF - Osservatorio Astronomico di Brera (Italy); Osvaldo Catalano, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Enrico Giro, INAF - Osservatorio Astronomico di Padova (Italy); Giuseppe Leto, INAF - Osservatorio Astrofisico di Catania (Italy); Maria C. Maccarone, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Giovanni Pareschi, INAF - Osservatorio Astronomico di Brera (Italy); Gino Tosti, Univ. degli Studi di Perugia (Italy); Stefano Vercellone, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy) . . . . . [9150-79]

E-ELT requirements management, Dominik Schneller, European Southern Observatory (Germany) . . . . . [9150-80]

System engineering at the MEGARA project, Ana Perez-Calpena, María Luisa García-Vargas, FRACTAL S.L.N.E (Spain); Armando Gil de Paz, Jesús Gallego, Univ. Complutense de Madrid (Spain); Esperanza Carrasco, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Francisco Manuel Sánchez-Moreno, Univ. Politécnica de Madrid (Spain); Jorge Iglesias-Páramo, Instituto de Astrofísica de Andalucía (Spain) . . . . . [9150-81]

Introducing questionnaire technique to interface with multi-instrument teams for science operations, Fernando Perez-Lopez, Sara de la Fuente, GMV S.A. (Spain) and European Space Agency (Spain) . . . . . [9150-82]

TUESDAY 24 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . TUE 8:50 TO 10:00

Session Chair: **Gillian S. Wright,** UK Astronomy Technology Ctr. (United Kingdom)

8:50: **SPIE Fellows Awards** presented by H. Philip Stahl, President of SPIE. The following individuals will be recognized for their contributions to SPIE and the scientific community: **Mark Clampin,** NASA Goddard Space Flight Ctr. (United States); **Gary Matthews,** Exelis Inc. (United States); **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (United States)

9:00: **Gaia: scientific in-orbit performance** *(Plenary),* Timo Prusti, European Space Agency (Netherlands) . . . . . [9143-503]

9:30: **ALMA Update** *(Plenary)*, Pierre Cox, Joint ALMA Observatory (Chile); Stuartt A. Corder, National Radio Astronomy Observatory (Chile) [9143-504]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 8

LOCATION: ROOM 523 . . . . . TUE 10:30 TO 12:10

Systems Engineering II

Session Chair: **Michael Sheehan,** Giant Magellan Telescope Project (USA)

10:30: **System modeling of the Thirty Meter telescope alignment and phasing system**, Frank G. Dekens, Byoung-Joon Seo, Mitchell Troy, Jet Propulsion Lab. (USA) . . . . . [9150-36]

10:50: **Systems and context modelling approach to requirements analysis**, Amrit L. Ahuja, Swaminathan Natarajan, Subhrojyoti R. Choudhury, Murali Krishna, Puneet Patwari, Tata Research Development and Design Ctr. (India) . . . . [9150-37]

11:10: **TMT telescope structure thermal model**, Konstantinos Vogiatzis, Amir Sadjadpour, Scott Roberts, Thirty Meter Telescope Observatory Corp. (USA) . . . . . [9150-72]

11:30: **Heat balance and thermal management of the TMT Observatory**, Hugh A. Thompson, Thirty Meter Telescope Observatory Corp. (Canada); Konstantinos Vogiatzis, Thirty Meter Telescope Observatory Corp. (USA) . . . . . [9150-83]

11:50: **Polarimetric analysis of the Thirty Meter telescope (TMT) for modeling instrumental polarization characteristics**, Jenny Atwood, National Research Council Canada (Canada); Warren A. Skidmore, Thirty Meter Telescope Observatory Corp. (USA); G. C. Anupama, Indian Institute of Astrophysics (India); Asoke K. Sen, Assam Univ. (India); Krishna R. Bheemireddy, Aryabhatta Research Institute of Observational Sciences (India) . . . . . [9150-76]

Lunch Break . . . . . Tue 12:10 to 13:40

SESSION 9

LOCATION: ROOM 523 . . . . . TUE 13:40 TO 15:20

System Modeling II

Session Chair: **Mitchell Troy,** Jet Propulsion Lab. (USA)

13:40: **An end-to-end simulation framework for the Large Synoptic Survey telescope**, Andrew P. Connolly, Univ. of Washington (USA); George Z. Angeli, LSST Corp. (USA); Srinivasan Chandrasekharan, National Optical Astronomy Observatory (USA); Charles F. Claver, LSST Corp. (USA); ?eljko Ivezic, R. Lynne Jones, K. Simon Krughoff, Univ. of Washington (USA); En-Hsin Peng, John Peterson, Purdue Univ. (USA); Catherine Petry, LSST Corp. (USA); Andrew P. Rasmussen, SLAC National Accelerator Lab. (USA); Stephen T. Ridgway, Abhijit Saha, National Optical Astronomy Observatory (USA); Glenn Sembroski, Purdue Univ. (USA); Jacob vanderPlas, Peter Yoachim, Univ. of Washington (USA)[9150-38]

14:00: **The LSST operations simulator**, Francisco Delgado, Cerro Tololo Inter-American Observatory (Chile); Abhijit Saha, Srinivasan Chandrasekharan, National Optical Astronomy Observatory (USA); Kem H. Cook, Eureka Scientific, Inc. (USA); Catherine Petry, LSST Corp. (USA); Stephen T. Ridgway, National Optical Astronomy Observatory (USA) . . . . . [9150-39]

14:20: **Operations simulation to take up the Gaia challenge**, Sebastian G. Els, Timothy F. Lock, Gabriele Comoretto, Gonzalo Abril Gracia, William O'Mullane, European Space Astronomy Ctr. (Spain); Antonella Vallenari, INAF - Osservatorio Astronomico di Padova (Italy) . . . . . [9150-40]

14:40: **A framework for modeling the detailed optical response of thick, multiple segment, large format sensors for precision astronomy applications**, Andrew P. Rasmussen, SLAC National Accelerator Lab. (USA); Pierre E. Antilogus, Pierre Astier, Univ. Pierre et Marie Curie (France); Charles F. Claver, National Optical Astronomy Observatory (USA); Peter E. Doherty, Harvard Univ. (USA); Gregory P. Dubois-Felsmann, David K. Gilmore, SLAC National Accelerator Lab. (USA); Steven M. Kahn, SLAC National Accelerator Lab. (USA) and Large Synoptic Survey Telescope Corp. (USA); Ivan V. Kotov, Brookhaven National Lab. (USA); Robert H. Lupton, Princeton Univ. (USA); Paul O'Connor, Andrei Nomerotski, Brookhaven National Lab. (USA); Steven Ritz, Univ. of California, Santa Cruz (USA); Christopher W. Stubbs, Harvard Univ. (USA) . . . . . [9150-41]

15:00: **Have confidence in your coronagraph: statistical analysis of high-contrast space-based coronagraph dynamics error budgets**, Stuart B. Shaklan, Luis Marchen, Lee D. Peterson, Jet Propulsion Lab. (USA) . . . . . [9150-42]

Coffee Break . . . . . Tue 15:20 to 15:50

SESSION 10

LOCATION: ROOM 523 . . . . . TUE 15:50 TO 17:30

Systems Engineering III

Session Chair: **Philippe Dierickx,** European Southern Observatory (Germany)

15:50: **Advanced Technology Solar telescope systems engineering update**, Simon C. Craig, Eric Hansen, Robert P. Hubbard, Ruth A. Kneale, National Solar Observatory (USA). . . . . [9150-43]

16:10: **Managing the system validation of the ATST enclosure**, Javier Ariño, Gaizka Murga, Celia Gomez, AEC Idom (Spain); Heather K. Marshall, National Solar Observatory (USA). . . . . [9150-44]

16:30: **Systems engineering implementation in the conceptual design phase of the 4-metre Multi-Object Spectroscopic telescope**, Olga Bellido-Tirado, Roger Haynes, Roelof S. de Jong, Olivier Schnurr, C. Jakob Walcher, Roland Winkler, Leibniz-Institut für Astrophysik Potsdam (Germany). . . . . [9150-45]

16:50: **From space to specs: requirements for 4MOST**, Olivier Schnurr, C. Jakob Walcher, Cristina Chiappini, Axel D. Schwope, Olga Bellido Tirado, Leibniz-Institut für Astrophysik Potsdam (Germany); Sofia Feltzing, Lund Observatory (Sweden); Richard G. McMahon, Univ. of Cambridge (United Kingdom); Roelof S. de Jong, Leibniz-Institut für Astrophysik Potsdam (Germany); Wolfgang R. Ansorge, RAMS-CON Management Consultants (Germany). . . . . [9150-46]

17:10: **Complexity in the MATISSE cold optics: a risk or a tool?**, Niels Tromp, Felix Bettonvil, Gabby Aitink-Kroes, Tibor Agócs, Ramón Navarro, ASTRON (Netherlands) . . . . . [9150-47]

CONFERENCE 9151 · LOCATION: ROOM 520D

Monday–Friday 23–27 June 2014 • Proceedings of SPIE Vol. 9151

Advances in Optical and Mechanical Technologies for Telescopes and Instrumentation


(Navarro)


(Cunningham)


(Barto)

Conference Chairs: **Ramón Navarro,** NOVA Optical & Infrared Instrumentation Group at ASTRON (Netherlands); **Colin R. Cunningham,** UK Astronomy Technology Ctr. (United Kingdom); **Allison A. Barto,** Ball Aerospace & Technologies Corp. (USA)

Program Committee: **Daniel R. Blanco,** WIYN Observatory (USA); **James H. Burge,** College of Optical Sciences, The Univ. of Arizona (USA); **V. Alfonso Feria,** Jet Propulsion Lab. (USA); **Roland Geyl,** REOSC (France); **Peter Hartmann,** SCHOTT AG (Germany); **Roger Haynes,** Leibniz-Institut für Astrophysik Potsdam (Germany); **Huub Janssen,** Janssen Precision Engineering B.V. (Netherlands); **David M. Montgomery,** UK Astronomy Technology Ctr. (United Kingdom); **Eric Prieto,** Observatoire Astronomique de Marseille-Provence (France); **Andrew T. Sarawit,** Simpson Gumpertz & Heger Inc. (USA); **Jinxue Wang,** Raytheon Space & Airborne Systems (USA)

MONDAY 23 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . MON 8:50 TO 10:00

Session Chair: **Luc Simard,** National Research Council of Canada - Herzberg Institute of Astrophysics (Canada)

08:50: **Welcome**

9:00: **James Webb Space Telescope: the road to first science observations** *(Plenary)*, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) [9143-501]

9:30: **The Square Kilometre Array: a physics machine for the 21st Century** *(Plenary)*, Philip Diamond, SKA Organisation (United Kingdom) . . [9143-502]

Coffee Break . . . . . Mon 10:00 to 10:30

SESSION 1

LOCATION: ROOM 520D . . . . . MON 10:30 TO 12:10

Telescope Structures

Session Chair: **Andrew T. Sarawit,** Simpson Gumpertz & Heger Inc. (USA)

10:30: **Mechanical design of SST-GATE dual-mirror telescope for the Cherenkov Telescope Array**, Jean-Laurent Dournaux, Observatoire de Paris à Meudon (France); Jean-Michel Huet, LESIA - Observatoire de Paris (France); Jean-Philippe Amans, Charles Costille, Delphine Dumas, Philippe Laporte, Hélène Sol, Observatoire de Paris à Meudon (France); Simon Blake, Jurgen Schmoll, Durham Univ. (United Kingdom) . . . . . [9151-1]

10:50: **Active optics system of the ASTRI SST-2M prototype for the Cherenkov Telescope Array**, Daniele Gardiol, Gerardo Capobianco, INAF - Osservatorio Astronomico di Torino (Italy); Daniela Fantinel, Enrico Giro, Luigi Lessio, Gabriele Rodeghiero, Danilo Selvestrel, INAF - Osservatorio Astronomico di Padova (Italy); Antonio C. Volpicelli, INAF - Osservatorio Astronomico di Torino (Italy). . . . [9151-2]

11:10: **Unimorph-type deformable mirror for cryogenic telescopes**, Claudia Reinlein, Matthias Goy, Nicolas Lange, Jan Kinast, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany). . . . . [9151-3]

11:30: **Design and fabrication of ultra-lightweight active shell mirrors for space telescope applications**, John Steeves, Sergio Pellegrino, Marie Laslandes, California Institute of Technology (USA); David C. Redding, Samuel C. Bradford, Jet Propulsion Lab. (USA); Troy Barbee, Lawrence Livermore National Lab. (USA) . . . . . [9151-4]

11:50: **Co-phasing of segmented telescopes using dual wavelength digital holography**, Changwei Li, Sijiong Zhang, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9151-5]

Lunch Break . . . . . Mon 12:10 to 13:40

SESSION 2

LOCATION: ROOM 520D . . . . . MON 13:40 TO 15:20

Active Instruments

Session Chair: **David M. Montgomery,** UK Astronomy Technology Ctr. (United Kingdom)

13:40: **Freeform active mirror experiment (FAME)**, Lars Venema, ASTRON (Netherlands); Emmanuel Hugot, Lab. d'Astrophysique de Marseille (France); Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom); Attila Jaskó, MTA Research Ctr. for Astronomy and Earth Sciences (Hungary); Zalpha Challita, Lab. d'Astrophysique de Marseille (France); Tibor Agócs, Gabby Aitink-Kroes, ASTRON (Netherlands); Chris Miller, William D. Taylor, UK Astronomy Technology Ctr. (United Kingdom) . . . . . [9151-6]

14:00: **An approach to fabrication of large adaptive secondary mirrors**, Allan Wirth, Dan Hammerle, Eric Schwartz, John Vayda, Jeffrey Cavaco, AOA Xinetics (USA) . . . . . [9151-7]

14:20: **The design and performances of the JPCam actuator system**, Joan Manel Casalta Escuer, Albert Molins, Manuel Canchado, Miguel Redondo, Albert Tomàs, NTE-SENER S.A. (Spain); Albert Catalan, Univ. Politècnica de Catalunya (Spain) . . . . . [9151-8]

14:40: **The IRIS aperture design and its efficacy at controlling solar heating on solar pointed payloads in general**, Peter N. Cheimets, Sang Park, William A. Podgorski, Harvard-Smithsonian Ctr. for Astrophysics (USA); Carl Yanari, Cathy Chou, Univ. of California, Berkeley (USA); Henry Bergner, Michael Honsa, Richard Gates, Harvard-Smithsonian Ctr. for Astrophysics (USA). . . . . [9151-9]

15:00: **Design and performance of a cryogenic iris aperture mechanism**, Chris de Jonge, Wouter M. Laauwen, Ed A. de Vries, Martin J. Eggens, Heino P. Smit, Pieter Dieleman, SRON Netherlands Institute for Space Research (Netherlands) . . . . . [9151-10]

Coffee Break . . . . . Mon 15:20 to 15:50

SESSION 3

LOCATION: ROOM 520D . . . . . MON 15:50 TO 17:30

Cryogenic Techniques

Session Chair: **Huub Janssen,** Janssen Precision Engineering B.V. (Netherlands)

15:50: **AO beam steering mirror for the GMT integral field spectrograph**, Rob Sharp, John Hart, Robert Boz, John Davies, David Bundy, Peter McGregor, The Australian National Univ. (Australia) . . . . . [9151-11]

16:10: **Development and characterization of a 2D precision cryogenic chopper for METIS**, Sander L. Paalvast, Huub Jassen, Maurice Teuwen, Janssen Precision Engineering B.V. (Netherlands); Robert Huisman, SRON Netherlands Institute for Space Research (Netherlands); Bayu Jayawardhana, Univ. of Groningen (Netherlands); Bernhard R. Brandl, Leiden Univ. (Netherlands); Frank Molster, Leiden Observatory (Netherlands); Lars Venema, ASTRON (Netherlands). [9151-12]

16:30: **Development and performance validation of a cryogenic linear stage for SPICA-SAFARI verification**, Lorenza Ferrari, Axel Detrain, Martin J. Eggens, Albrecht R. W. de Jonge, Chris de Jonge, Geert Keizer, Wouter M. Laauwen, Heino P. Smit, Pieter Dieleman, SRON Netherlands Institute for Space Research (Netherlands) . . . . . [9151-13]

16:50: **Realization and performance of cryogenic selection mechanisms**, Gabby Aitink-Kroes, Felix Bettonvil, Jan Kragt, Eddy Elswijk, Niels Tromp, ASTRON (Netherlands) . . . . . [9151-14]

17:10: **Cryocooler vibration damping for the Subaru prime focus spectrograph**, Stephen C. Hope, Stephen A. Smee, Johns Hopkins Univ. (USA); James E. Gunn, Princeton Univ. (USA) . . . . . [9151-15]

TUESDAY 24 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . TUE 8:50 TO 10:00

Session Chair: **Gillian S. Wright,** UK Astronomy Technology Ctr. (United Kingdom)

8:50: **SPIE Fellows Awards** presented by H. Philip Stahl, President of SPIE. The following individuals will be recognized for their contributions to SPIE and the scientific community: **Mark Clampin,** NASA Goddard Space Flight Ctr. (United States); **Gary Matthews,** Exelis Inc. (United States); **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (United States)

9:00: **Gaia: scientific in-orbit performance** *(Plenary),* Timo Prusti, European Space Agency (Netherlands) . . . . . [9143-503]

9:30: **ALMA Update** *(Plenary)*, Pierre Cox, Joint ALMA Observatory (Chile); Stuartt A. Corder, National Radio Astronomy Observatory (Chile) [9143-504]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 4

LOCATION: ROOM 520D . . . . . TUE 10:30 TO 12:10

Mirror Materials

Session Chair: **Peter Hartmann,** SCHOTT AG (Germany)

10:30: **ZERODUR® ISOgrid Design of a 3m class light weighted mirror blank for the E-ELT M5**, Thomas Westerhoff, Ralf Jedamzik, Volker Seibert, Antoine Leys, SCHOTT AG (Germany) . . . . . [9151-16]

10:50: **Material characteristics of CLEARCERAM-Z HS 1.5-m diameter mirror blanks for the TMT M1 segment blanks**, Brion D. Hoffman, Ohara Corp. (USA); Naoyuki Goto, Hiroyuki Minamikawa, Takayuki Kishi, Hisashi Murozumi, Kaito Suzuki, Shunsuke Sakai, Ohara Inc. (Japan) . . . . . [9151-17]

11:10: **Production of primary mirror segments for the Giant Magellan telescope**, H. M. Martin, Richard Allen, The Univ. of Arizona (USA); James H. Burge, College of Optical Sciences, The Univ. of Arizona (USA); John Davis, The Univ. of Arizona (USA); Matt Johns, Giant Magellan Telescope Project (USA); D. W. Kim, College of Optical Sciences, The Univ. of Arizona (USA); Jeffrey Kingsley, Kevin Law, Randy Lutz, Peter Strittmatter, The Univ. of Arizona (USA); Peng Su, College of Optical Sciences, The Univ. of Arizona (USA); Michael Tuell, Steve West, The Univ. of Arizona (USA); Ping Zhou, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [9151-105]

11:30: **Recent development of fabrication of extreme light weighted ceramic mirrors**, Matthias Krödel, ECM Engineered Ceramic Materials GmbH (Germany); Daniel Waechter, Fraunhofer-Institut für Produktionstechnologie (Germany); Frank Stahr, FAP Plasmatechnik GmbH (Germany); Claus-Peter Soose, fineoptix GmbH (Germany) . . . . . [9151-19]

11:50: **Space invader asteroids: detect and deter with silicon space based lasers**, Roger A. Paquin, Advanced Materials Consulting (USA) and McCarter Machine, Inc. (USA); Douglas R. McCarter, McCarter Machine, Inc. (USA) [9151-20]

Lunch Break . . . . . Tue 12:10 to 13:40

SESSION 5

LOCATION: ROOM 520D . . . . . TUE 13:40 TO 15:20

Mirror Finishing

Session Chair: **Roland Geyl,** REOSC (France)

13:40: **Ultra-precise manufacturing of aspherical and freeform mirrors for high resolution telescopes**, Stefan Risse, Andreas Gebhardt, Thomas Peschel, Sebastian Scheiding, Matthias Beier, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [9151-21]

14:00: **The technology of production of high precision large-size light-weighted aspherical mirrors with high stability of surface shape**, Magomed A. Abdulkadyrov, Alexey P. Patrikeev, Vladimir E. Patrikeev, Aleksandr P. Semenov, Yury A. Sharov, Lytkarino Optical Glass Factory JSC (Russian Federation)[9151-22]

14:20: **ELT M1 prototypes segment polishing and testing and thin glass shell manufacturing for large adaptive optics**, Eric Ruch, Sagem Défense Sécurité (France) . . . . . [9151-23]

14:40: **Progress in advanced actuated hybrid mirrors (AAHM) and active silicon carbide mirrors**, Eric D. Schwartz, Northrop Grumman Corp (USA) . . . . . [9151-24]

15:00: **Ion beam figuring of large prototype mirror segments for the EELT**, Mauro Ghigo, Stefano Basso, Marta M. Civitani, Giovanni Pareschi, Giorgia Sironi, Gabriele Vecchi, INAF - Osservatorio Astronomico di Brera (Italy) . . . . . [9151-25]

Coffee Break . . . . . Tue 15:20 to 15:50

SESSION 6

LOCATION: ROOM 520D . . . . . TUE 15:50 TO 17:40

Test and Metrology

Session Chair: **James H. Burge,** College of Optical Sciences, The Univ. of Arizona (USA)

15:50: **Lightweighted ZERODUR for telescopes** *(Invited Paper)*, Thomas Westerhoff, Ralf Jedamzik, SCHOTT AG (Germany); Mark Davis, SCHOTT North America, Inc. (USA); Tony B Hull, The University of New Mexico (USA) and SCHOTT North America, Inc. (USA) . . . . . [9151-26]

16:20: **Phase measuring deflectometry for thin actuated mirrors**, Tom Catling, David Brooks, Peter Doel, Univ. College London (United Kingdom) . . . . . [9151-27]

16:40: **Deflectometry for optics evaluation: free-form segments of polynomial mirrors**, Giorgia Sironi, Rodolfo Canestrari, Carlo Pelliciari, Giovanni Pareschi, INAF - Osservatorio Astronomico di Brera (Italy) . . . . . [9151-28]

17:00: **Compact SPR-based etching rate monitoring device for the study of polymers exposed to space plasmas**, Karl Fleury-Frenette, Jurij Hastanin, Cédric Lenaerts, Univ. de Liège (Belgium) . . . . . [9151-29]

17:20: **Damage of optical coatings induced by particle irradiation in the space environment**, Angela M. Piegari, Salvatore Scaglione, ENEA (Italy) . . . . . [9151-30]

WEDNESDAY 25 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . WED 9:00 TO 10:00

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

9:00: **Highlights from the Multi Unit Spectroscopic Explorer (MUSE): a 2nd generation VLT instrument for the VLT** *(Plenary)*, Roland M. Bacon, Observatoire de Lyon (France) . . . . . [9147-506]

9:30: **Canadian Space Astronomy: past, present and future** *(Plenary)*, John B. Hutchings, NRC - Herzberg Institute of Astrophysics (Canada) [9143-505]

Coffee Break . . . . . Wed 10:00 to 10:30

SESSION 7

LOCATION: ROOM 520D . . . . . WED 10:30 TO 12:20

Test and Metrology of Large Optics

Session Chair: **Daniel R. Blanco,** MMT Observatory (USA)

10:30: **Final acceptance testing of the LSST monolithic primary/tertiary mirror** *(Invited Paper)*, Michael Tuell, Steward Observatory, The Univ. of Arizona (USA); James H. Burge, College of Optical Sciences, The Univ. of Arizona (USA); Brian Cuerden, Steward Observatory, The Univ. of Arizona (USA); William J. Gressler, National Optical Astronomy Observatory (USA); H. M. Martin, Steward Observatory, The Univ. of Arizona (USA); Chunyu Zhao, College of Optical Sciences, The Univ. of Arizona (USA); Steve West, Steward Observatory, The Univ. of Arizona (USA) . . . . . [9151-31]

11:00: **Design of an E-ELT M1 segment measurement machine with nanometer accuracy**, Arjo Bos, Technische Univ. Eindhoven (Netherlands) and TNO (Netherlands); Rens Henselmans, TNO (Netherlands); Nick Rosielle, Maarten Steinbuch, Technische Univ. Eindhoven (Netherlands) . . . . . [9151-32]

11:20: **Metrology of flat mirrors with a computer generated hologram**, Giorgio Pariani, Daniela Tresoldi, Manuele Moschetti, Marco Riva, Andrea Bianco, Filippo Maria M. Zerbi, INAF - Osservatorio Astronomico di Brera (Italy) . . . . . [9151-33]

CONFERENCE 9151 · LOCATION: ROOM 520D

11:40: **Measuring large mirrors using SCOTS: the software configurable optical tests system**, James H. Burge, Peng Su, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [9151-34]

12:00: **Polishers around the globe: an overview on the market of large astronomical mirrors**, Thorsten Doehring, Univ. of Applied Sciences Aschaffenburg (Germany) . . . . . [9151-100]

Lunch/Exhibition Break . . . . . Wed 12:20 to 13:50

SESSION 8

LOCATION: ROOM 520D . . . . . WED 13:50 TO 15:10

System Test and Alignment

Session Chair: **James H. Burge,** College of Optical Sciences, The Univ. of Arizona (USA)

13:50: **Design, manufacture, integration, and commissioning of a modified guiding probe arm for the VLT unit telescope 4**, Christoph Frank, Peter Hammersley, Bernard Buzzoni, Antonio Manescau, Robin Arsenault, Pierre-Yves Madec, Martin Birkmann, Michael Mueller, European Southern Observatory (Germany); Fernando Salgado, Stephane Guisard, European Southern Observatory (Chile); Matthias Krödel, ECM Engineered Ceramic Materials GmbH (Germany) . . . . . [9151-36]

14:10: **MUSE Alignment onto VLT**, Florence Laurent, Didier Boudon, Patrick Caillier, Eric Daguisé, Johan Kosmalski, Jean-Emmanuel Migniau, Edgard Renault, Observatoire de Lyon (France); Christophe Dupuy, Jean-Louis Lizon, European Southern Observatory (Germany); Harald Nicklas, Georg-August-Univ. Göttingen (Germany) . . . . . [9151-37]

14:30: **The deterministic optical alignment of the HERMES spectrograph**, Luke Gers, Nick F. Staszak, Australian Astronomical Observatory (Australia) . . [9151-38]

14:50: **Active optics for space applications: an ESA perspective**, Alessandro Zuccaro Marchi, European Space Research and Technology Ctr. (Netherlands) and ATG Europe B.V. (Netherlands); Pascal Hallibert, Joao Pereira Do Carmo, Eric Wille, European Space Research and Technology Ctr. (Netherlands) . . . . . [9151-115]

Coffee Break . . . . . Wed 15:10 to 15:40

SESSION 9

LOCATION: ROOM 520D . . . . . WED 15:40 TO 17:40

Novel Technologies

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

15:40: **Focal plane actuation to achieve ultra-high resolution on suborbital balloon payloads**, Paul A. Scowen, Alexander D. Miller, Arizona State Univ. (USA); Todd J. Veach, NASA Goddard Space Flight Ctr. (USA); Christopher E. Groppi, Philip D. Mauskopf, Arizona State Univ. (USA) . . . . . [9151-40]

16:00: **New generation of photonic lanterns for mid-IR astronomy**, Alexander Arriola Martiarena, Debaditya Choudhury, Robert R. Thomson, Heriot-Watt Univ. (United Kingdom). . . . . [9151-41]

16:20: **A demonstration of wavefront sensing and mirror phasing from the image domain**, Benjamin J. Pope, Univ. of Oxford (United Kingdom) and The Univ. of Sydney (Australia); Nick Cvetojevic, The Univ. of Sydney (Australia) and Australian Astronomical Observatory (Australia); Anthony Cheetham, Peter G. Tuthill, The Univ. of Sydney (Australia); Frantz Martinache, Observatoire de la Côte d'Azur (France) . . . . . [9151-42]

16:40: **Image slicing with a twist: spatial and spectral Nyquist sampling without anamorphic optics**, Matthias Tecza, Univ. of Oxford (United Kingdom). . [9151-43]

17:00: **Manufacturing of diamond annular groove phase masks for the mid infrared region: 5 years of successful process development of diamond plasma etching**, Pontus Forsberg, Ernesto Vargas Catalan, Uppsala Univ. (Sweden); Christian Delacroix, Olivier Absil, Brunella Carlomagno, Univ. de Liège (Belgium); Dimitri Mawet, European Southern Observatory (Chile); Serge Habraken, Jean Surdej, Univ. de Liège (Belgium); Mikael Karlsson, Uppsala Univ. (Sweden) . . . . . [9151-44]

17:20: **Starbug fiber positioning robots: performance and reliability enhancements**, David M. Brown, Australian Astronomical Observatory (Australia); Nick Staszac, Australian Astrononical Observatory (Australia); Jon S. Lawrence, Australian Astronomical Observatory (Australia); Michael Goodwin, Vijay Nichani, Scott Case, Rolf Muller, Julia Tims, Daniel Jacobs, Australian Astrononical Observatory (Australia); James Gilbert, Australian Astronomical Observatory (Australia); Will Saunders, Australian Astrononical Observatory (Australia) [9151-45]

POSTER SESSION–WEDNESDAY

LOCATION: ROOM 516 . . . . . WED 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Wednesday. The interactive poster session with authors in attendance will be Wednesday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Manufacture of the combined primary and tertiary mirrors of the Large Synoptic Survey telescope, H. M. Martin, Richard Allen, The Univ. of Arizona (USA); James H. Burge, College of Optical Sciences, The Univ. of Arizona (USA); Brian Cuerden, The Univ. of Arizona (USA); William J. Gressler, LSST Corp. (USA); William Hubler, Dean Ketelsen, The Univ. of Arizona (USA); D. W. Kim, College of Optical Sciences, The Univ. of Arizona (USA); Jeffrey Kingsley, Kevin Law, Peter Strittmatter, Michael Tuell, Steve West, The Univ. of Arizona (USA); Chunyu Zhao, Ping Zhou, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [9151-18]

Wavefront detection of extended-beacon based on phase-space optics, Xuanzhe Zhang, Shaojun Du, Bohong Shu, National Univ. of Defense Technology (China) . . . . . [9151-75]

The design of force actuator used in extreme low temperature environment, Xiaolong Han, Bozhong Gu, Yu Ye, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9151-76]

Adapting large lightweight primary mirror supports to space active optics capabilities, Clement Escolle, Emmanuel Hugot, Lab. d'Astrophysique de Marseille (France); Marie Laslandes, California Institute of Technology (USA); Thierry Fusco, ONERA (France); Marc Ferrari, Lab. d'Astrophysique de Marseille (France); Vincent Michau, ONERA (France). . . . . [9151-77]

Practical development and implementation of the linear actuator for the active surface experiment of the Delingha 13.7-m radio telescope, Guohua Zhou, Aihua Li, You Wang, Dehua Yang, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9151-78]

Development of a cost-effective precision force actuator for deformable mirror active optics, Dehua Yang, You Wang, Aihua Li, Guohua Zhou, Nanjing Institute of Astronomical Optics & Technology (China). . . . . [9151-79]

Baseline design and requirements for the LSST hexapods and rotator, Douglas Neill, Jacques Sebag, William J. Gressler, National Optical Astronomy Observatory (USA) . . . . . [9151-80]

Performance testing of the LMT primary surface actuators, David Smith, MERLAB, P.C. (USA); Kamal Souccar, Univ. of Massachusetts Amherst (USA); César Arteaga Magaña, Gabriela Montalvo, José Luis Hernández Rebollar, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [9151-81]

Mechanical improvement the interim LMT primary surface actuators, César Arteaga Magaña, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); David Smith, MERLAB, P.C. (USA); José Luis Hernández Rebollar, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico). . . . . [9151-82]

Performance testing of the LMT M2 positioner, David Smith, MERLAB, P.C. (USA); Kamal Souccar, Univ. of Massachusetts Amherst (USA); José Luis Hernández Rebollar, César Arteaga Magaña, David M. Gale, Lizeth Cabrera Cuevas, Maribel Lucero Álvarez, Andrea León-Huerta, David Castro Santos, Emilio Hernández Rios, Carlos Tzile Torres, Josefina Hernández Lázaro, Arak Olmos Tapia, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . [9151-83]

Design of a radio telescope surface segment actuator based on a form-closed eccentric cam, David Smith, MERLAB, P.C. (USA). . . . . [9151-84]

Research on high dynamic range information capture of GEO camera, Sijie Huang, Fan Sheng Chen, Xue Yi Gong, Shanghai Institute of Technical Physics (China) . . . . . [9151-85]

Results of the Thirty Meter telescope jitter studies for the secondary and tertiary mirror systems, Virginia Ford, Christopher J. Carter, Thirty Meter Telescope Observatory Corp. (USA); Pierluigi Fumi, Daniele Gallieni, A.D.S. International S.r.l. (Italy); Eric Gabriel, Christophe Delrez, AMOS Ltd. (Belgium) . . . . . [9151-86]

Fast active optics control of wide-field telescopes based on science image analysis, Ronald Holzlöhner, Andrew Rakich, Lothar Noethe, European Southern Observatory (Germany); Konrad Kuijken, Leiden Univ. (Netherlands); Pietro S. Schipani, INAF - Osservatorio Astronomico di Capodimonte (Italy) . . . . . [9151-87]

The architecture of the active surface control system of the Large Millimeter telescope, Kamal Souccar, Gary Wallace, Ron Grosslein, Univ. of Massachusetts Amherst (USA). . . . . [9151-88]

Large Synoptic Survey telescope (LSST) inner loop controller (ILC) design and characterization, Oliver Wiecha, Paul J. Lotz, National Optical Astronomy Observatory (USA). . . . . [9151-89]

Freeform mirror based optical systems for FAME, Tibor Agócs, Gabby Aitink-Kroes, Lars Venema, ASTRON (Netherlands); Emmanuel Hugot, Lab. d'Astrophysique de Marseille (France); Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom); Attila Jaskó, Konkoly Observatory (Hungary) . . . . . [9151-90]

Active array design for FAME: freeform active mirror experiment, Attila Jaskó, MTA Research Ctr. for Astronomy and Earth Sciences (Hungary); Gabby Aitink-Kroes, ASTRON (Netherlands); Emmanuel Hugot, Lab. d'Astrophysique de Marseille (France); Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom); Lars Venema, ASTRON (Netherlands) . . . . . [9151-91]

Development of a mechanical deformable mirror for wavefront correction of a telescope, Keigo Enya, Hirokazu kataza, Japan Aerospace Exploration Agency (Japan); Hiroshi Mitsui, Mitsuhiro Fukushima, Norio Okada, National Astronomical Observatory of Japan (Japan); Kanae Haze, Japan Aerospace Exploration Agency (Japan); Takayuki Kotani, National Astronomical Observatory of Japan (Japan); Tomoyasu Yamamuro, Optcraft (Japan) . . . . . [9151-92]

Active scale changer for anamorphic, distortion free, telecentric zoom system, Emmanuel Hugot, Xin Wang, Johan Floriot, Lab. d'Astrophysique de Marseille (France) . . . . . [9151-93]

ZERODUR TAILORED for cryogenic application, Ralf Jedamzik, Thomas Westerhoff, SCHOTT AG (Germany) . . . . . [9151-94]

ZERODUR bending strength data for etched surfaces, Peter Hartmann, Antoine Leys, Antoine Carré, Franca Kerz, Thomas Westerhoff, SCHOTT AG (Germany) . . . . . [9151-95]

Process optimization for polishing large aspheric mirrors, James H. Burge, College of Optical Sciences, The Univ. of Arizona (USA); H. M. Martin, The Univ. of Arizona (USA); D. W. Kim, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [9151-96]

Method of defining of the profile of large-dimensioned astronomical mirrors ground aspherical surface, Magomed A. Abdulkadyrov, Lytkarino Optical Glass Factory JSC (Russian Federation) . . . . . [9151-97]

Vacuum system for applying reflective coatings on large-size optical components using the method of magnetron sputtering, Alexander A. Azerbaev, Magomed A. Abdulkadyrov, Timur R. Mukhammedzyanov, Sergey P. Belousov, Yury A. Sharov, Lytkarino Optical Glass Factory JSC (Russian Federation)[9151-98]

SST-GATE dual-mirror telescope For Cherenkov Telescope Array: an innovative mirror manufacturing, Delphine Dumas, Observatoire de Paris à Meudon (France); Jean-Michel Huet, LESIA - Observatoire de Paris (France); Frédéric N. Sayède, Jean-Laurent Dournaux, Philippe Laporte, Cameron Rulten, Hélène Sol, Observatoire de Paris à Meudon (France); Jurgen Schmoll, Simon Blake, Durham Univ. (United Kingdom) . . . . . [9151-99]

The glass cold-shaping technology for the mirrors of the Cherenkov Telescope Array, Rodolfo Canestrari, INAF - Osservatorio Astronomico di Brera (Italy) and For the ASTRI Collaboration (Italy) and For the CTA Consortium (Germany); Giacomo Bonnoli, Giuseppe Crimi, INAF - Osservatorio Astronomico di Brera (Italy); Mauro Fiorini, INAF - IASF Milano (Italy); Enrico Giro, INAF - Osservatorio Astronomico di Padova (Italy); Nicola La Palombara, INAF - IASF Milano (Italy); Giovanni Pareschi, Luca Perri, INAF - Osservatorio Astronomico di Brera (Italy); Gabriele Rodeghiero, INAF - Osservatorio Astronomico di Padova (Italy); Giorgia Sironi, INAF - Osservatorio Astronomico di Brera (Italy); Luca Stringhetti, Giorgio Toso, INAF - IASF Milano (Italy) . . . . . [9151-102]

Production of thin glass mirrors by hot slumping for x-ray telescopes: present process and ongoing development, Bianca Salmaso, INAF - Osservatorio Astronomico di Brera (Italy) and Univ. degli Studi dell'Insubria (Italy); Stefano Basso, Marta M. Civitani, Mauro Ghigo, Giovanni Pareschi, Daniele Spiga, Gianpiero Tagliaferri, Gabriele Vecchi, INAF - Osservatorio Astronomico di Brera (Italy) . . . . . [9151-103]

Fabrication process engineering for the 4.2-m off-axis parabolic primary mirror of Advanced Technology Solar telescope, Chang Jin Oh, Peng Su, D. W. Kim, Greg Smith, Chunyu Zhao, Ping Zhou, James H. Burge, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [9151-104]

An inverse-polished mirror for wavefront correction of space-based telescopes, Keigo Enya, Kanae Haze, Japan Aerospace Exploration Agency (Japan); Yoshiyuki Chibu, Nitto Optical Co., Ltd. (Japan); Takayuki Kotani, National Astronomical Observatory of Japan (Japan); Hidehiro Kaneda, Shinki Oyabu, Daisuke Ishihara, Shinji Oseki, Nagoya Univ. (Japan); Lyu Abe, Univ. de Nice Sophia Antipolis (France); Hitomi Kobayashi, Kyoto Sangyo Univ. (Japan) . . . . . [9151-106]

Method of defining of aspherical surface decetering with respect to the geometrical center of the astronomical mirror, Aleksandr P. Semenov, Lytkarino Optical Glass Factory JSC (Russian Federation) . . . . . [9151-107]

Composite telescope technology, Peter C. Chen, Lightweight Telescopes, Inc. (USA); Douglas M. Rabin, NASA Goddard Space Flight Ctr. (USA) . . . . . [9151-109]

Production of the 4.26-m ZERODUR primary mirror blank for the Advanced Technology Solar telescope (ATST), Thomas Westerhoff, Ralf Jedamzik, Thomas Werner, SCHOTT AG (Germany) . . . . . [9151-110]

A FEM coupling model for properties prediction during the curing of an epoxy adhesive for a novel assembly of radio telescope panel, Wei S. Hu, Yi Chen, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9151-111]

Freeform mirrors and active optics: development of a thin freeform manufacturing process for the FAME project, Zalpha Challita, Emmanuel Hugot, Lab. d'Astrophysique de Marseille (France); Lars Venema, ASTRON (Netherlands); Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom); Marc Ferrari, Jean-Gabriel Cuby, Lab. d'Astrophysique de Marseille (France) . . . . . [9151-112]

Mechanical design and analysis of focal plate for gravity deformation, Jianping Wang, Jiaru Chu, Hongzhuan Hu, Kexuan Li, Univ. of Science and Technology of China (China) . . . . . [9151-113]

Phase rebuilding method for cryogenic deformation of large cryogenic mirror of space optical system, Fan-jiao Tan, Xi-yang Zhi, Shu Qing Zhang, Qingyu Hou, Hong Di Lv, Hong-yuan Wang, Wei Zhang, Funian Long, Harbin Institute of Technology (China) . . . . . [9151-114]

Minimizing the bimetallic bending for cryogenic metal optics based on electroless nickel, Jan Kinast, Enrico Hilpert, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany); Andreas Gebhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Ralf-Rainer Rohloff, Max-Planck-Institut für Astronomie (Germany); Stefan Risse, Ramona Eberhardt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Friedrich-Schiller-Univ. Jena (Germany) . . . . . [9151-116]

Cesic: an excellent material for focal plane applications, Matthias Krödel, ECM Engineered Ceramic Materials GmbH (Germany) . . . . . [9151-117]

New developments in rotating and linear motion mechanisms used in contamination sensitive space telescopes, Toshifumi Shimizu, Kyoko Watanabe, Japan Aerospace Exploration Agency (Japan); Satoshi Nakayama, Takao Tajima, Mitsubishi Precision Co., Ltd. (Japan); Shingo Obara, Japan Aerospace Exploration Agency (Japan); Shinsuke Imada, Nagoya Univ. (Japan); Naoto Nishizuka, Shinnosuke Ishikawa, Hirohisa Hara, National Astronomical Observatory of Japan (Japan) . . . . . [9151-118]

A good attitude towards improved space telescope observations, Tjorven Delabie, Bart Vandenbussche, Joris De schutter, Katholieke Univ. Leuven (Belgium) . . . . . [9151-119]

EMIR Optical Bench: from paper to reality, Fabio Tenegi, Instituto de Astrofísica de Canarias (Spain); José Gómez, Elena Rodilla, TRINOS Vacuum-Projects, S.L. (Spain); Vicente Sánchez, Maria Barreto Cabrera, Jesús Patrón Recio, Instituto de Astrofísica de Canarias (Spain); Francisco Garzón López, Instituto de Astrofísica de Canarias (Spain) and Univ. de La Laguna (Spain) . . . . . [9151-120]

Analysis, testing, and control of telescope's high-precision drive system in low-temperature environment, Fujia Du, Zhang Jian, Haikun Wen, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9151-121]

Low vibration cooling using a pulse tube cooler and cryostat for the GRAVITY beam combiner instrument at the VLTI, Marcus Haug, Stefan Kellner, Frank Haussmann, Frank Eisenhauer, Max-Planck-Institut für extraterrestrische Physik (Germany); Jean-Louis Lizon, Lothar Kern, European Organisation for Astronomical Research in the Southern Hemisphere (Germany); Guenter Thummes, Marc Dietrich, TransMIT GmbH (Germany) and Justus-Liebig-Univ. Giessen (Germany) . . . . . [9151-122]

The LSST camera 500-watt -130 degC mixed refrigerant cooling system, Gordon B. Bowden, J. Bryan Langton, SLAC National Accelerator Lab. (USA); William A. Little, MMR Technologies, Inc. (USA); Rafe H. Schindler, SLAC National Accelerator Lab. (USA); Samuel Spektor, MMR Technologies, Inc. (USA)[9151-123]

Grism cryogenic mount for the Euclid-NISP mission, Christelle Rossin, Robert Grange, Patrice Sanchez, Amandine Caillat, Anne Costille, Philippe Laurent, William Ceria, Lab. d'Astrophysique de Marseille (France) . . . . . [9151-124]

Development of a cryogenic wheel with continuous complex movements for HARMONI, Elvio Hernandez Suarez, Luis Fernando Rodríguez-Ramos, Óscar Tubío, Tomas Moreno, Jorge Sánchez, José Miguel Herreros Linares, Instituto de Astrofísica de Canarias (Spain); Niranjan A. Thatte, Univ. of Oxford (United Kingdom); Ian Bryson, Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom); Fraser Clarke, Matthias Tecza, Univ. of Oxford (United Kingdom) . . . . . [9151-125]

The mechanical design of CHARIS: an exoplanet IFS for the Subaru telescope, Michael Galvin, Michael A. Carr, Tyler D. Groff, N. Jeremy Kasdin, Princeton Univ. (USA); Rad Fagan, L-3 Communications IOS-SSG (USA) . . . . . [9151-126]

Optimized analysis of geometry parameters for honeycomb sandwich mirror, Xiao'an Chen, Yuntao Cheng, Qingna Zeng, Hong Liu, Jingzhong Fang, Changhui Rao, Institute of Optics and Electronics (China) . . . . . [9151-131]

CONFERENCE 9151 · LOCATION: ROOM 520D

Using the DP-190 glue for adhesive attachment of a large space mirror and its rim, Oleg Vlasenko, Institute of Astronomy (Russian Federation); Alexey Zverev, Lavochkin Association (Russian Federation); Mikhail Sachkov, Institute of Astronomy (Russian Federation) . . . . . [9151-132]

The servo control system of KDUST telescope, Zhang Jian, Fujia Du, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9151-133]

Adjustment of aplanatical two-mirror astronomical telescopes using star images, Sergei A. Chuprakov, Svetlana M. Smirnova, Institute of Solar-Terrestrial Physics (Russian Federation) . . . . . [9151-134]

Tests characterization and alignment for the optics of the ASTRI SST-2M telescope prototype for the Cherenkov Telescope Array, Enrico Giro, INAF - Osservatorio Astronomico di Padova (Italy); Giacomo Bonnoli, Rodolfo Canestrari, Paolo Conconi, INAF - Osservatorio Astronomico di Brera (Italy); Mauro Fiorini, INAF - IASF Milano (Italy); Daniela Fantinel, INAF - Osservatorio Astronomico di Padova (Italy); Daniele Gardiol, INAF - Osservatorio Astronomico di Torino (Italy); Luigi Lessio, INAF - Osservatorio Astronomico di Padova (Italy); Nicola La Palombara, INAF - IASF Milano (Italy); Giovanni Pareschi, Luca Perri, INAF - Osservatorio Astronomico di Brera (Italy); Gabriele Rodeghiero, Danilo Selvestrel, INAF - Osservatorio Astronomico di Padova (Italy); Giorgia Sironi, INAF - Osservatorio Astronomico di Brera (Italy); Luca Stringhetti, INAF - IASF Milano (Italy); Giorgio Toso, INAF - Osservatorio Astronomico di Brera (Italy); Gino Tosti, Univ. degli Studi di Perugia (Italy); Antonio C. Volpicelli, Gerardo Capobianco, INAF - Osservatorio Astronomico di Torino (Italy) . . . . . [9151-135]

The optical AIV of the infrared multislit spectro-photometer for GTC, EMIR, Roberto L. López, Patricia Fernandez, Angel Mato, Pablo Redondo, Instituto de Astrofísica de Canarias (Spain) . . . . . [9151-136]

Experimental validation of advanced dispersed fringe sensing (ADFS) algorithm using advanced wavefront sensing and correction testbed (AWCT), Xu Wang, Jet Propulsion Lab. (USA) . . . . . [9151-137]

Field application of moment-based wavefront sensing to in-situ alignment and image quality assessment of astronomical spectrographs: results and analysis of aligning 100 VIRUS unit spectrograph alignment, Hanshin Lee, Gary J. Hill, Sarah E. Tuttle, Eva Noyola, Trent Peterson, Brian L. Vattiat, The Univ. of Texas at Austin (USA) . . . . . [9151-138]

Hybrid phase retrieval using moment-based wavefront sensing and Gerchberg-Saxton iterative transform method, Hanshin Lee, Gary J. Hill, The Univ. of Texas at Austin (USA) . . . . . [9151-139]

Experiences with global laser tracker alignment of the 32.5-m LMT primary surface, Andrea León-Huerta, Lizeth Cabrera Cuevas, David Castro Santos, Emilio Hernández Rios, Josefina Lázaro Hernandez, Maribel Lucero Alvarez, Carlos Tzile Torres, David M. Gale, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Gopal Narayanan, Univ. of Massachusetts Amherst (USA); David Smith, MERLAB, P.C. (USA); Grant Wilson, Univ. of Massachusetts Amherst (USA) . . . . . [9151-140]

Metrology and surface figuring of the LMT secondary mirror, David Castro Santos, Lizeth Cabrera Cuevas, Emilio Hernández Rios, Josefina Lázaro Hernandez, Andrea León-Huerta, Maribel Lucero Alvarez, Carlos Tzile Torres, David M. Gale, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); David Smith, MERLAB, P.C. (USA) . . . . . [9151-141]

Metrology and surface adjustment of primary reflector panels on the LMT, Maribel Lucero Alvarez, Lizeth Cabrera Cuevas, David Castro Santos, Emilio Hernández Rios, Josefina Lázaro Hernandez, Andrea León-Huerta, Carlos Tzile Torres, David M. Gale, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Gopal Narayanan, Univ. of Massachusetts Amherst (USA); David Smith, Grant Wilson, MERLAB, P.C. (USA) . . . . . [9151-142]

Data processing for fabrication of GMT primary segments: raw data to final surface maps, Michael Tuell, William Hubler, H. M. Martin, Steve West, The Univ. of Arizona (USA); Ping Zhou, College of Optical Sciences, The Univ. of Arizona (USA) . . . . . [9151-144]

Apparatus for testing mechanical accuracy of DESI fiber positioners, Robert Besuner, Lawrence Berkeley National Lab. (USA); Patrick N. Jelinsky, Space Sciences Lab. (USA); Claire L. Poppett, Lawrence Berkeley National Lab. (USA); Michael J. Sholl, Univ. of California, Berkeley (USA); Joseph H. Silber, Lawrence Berkeley National Lab. (USA) . . . . . [9151-146]

Low cost high-precision metrology system for the calibration of multi-dof mechanisms, Lorenzo Zago, Mirsad Sarajlic, Fabien Chevalley, HEIG-VD (Switzerland) . . . . . [9151-147]

Efficient diagnosis of radiotelescopes from far-field data, Amedeo Capozzoli, Claudio Curcio, Giuseppe D'Elia, Univ. degli Studi di Napoli Federico II (Italy); Angelo Liseno, Seconda Univ. degli Studi di Napoli (Italy); Salvatore Savarese, Pietro S. Schipani, INAF - Osservatorio Astronomico di Capodimonte (Italy) . . . . . [9151-148]

Measurement machine for exact topographic surface measurements of warm and cooled large detectors for astronomical instruments, Sebastian Deiries, Olaf Iwert, Stefan Stroebele, European Organisation for Astronomical Research in the Southern Hemisphere (Germany) . . . . . [9151-149]

CARMENES in SPIE 2014. N2GPU: very promising results about an ultra-high stability cooling system for CARMENES instrument, Eduard Mirabet Puig, Consejo Superior de Investigaciones Científicas (Spain); Jean-Louis Lizon, European Southern Observatory (Germany); Santiago Becerril, Instituto de Astrofísica de Andalucía - CSIC (Spain); Pedro Carvas, European Southern Observatory (Germany); Pedro J. Amado, Instituto de Astrofísica de Andalucía (Spain) . . . . . [9151-150]

Cryogenic optical mounting for short wave infrared spectrometers, Jim Grant, Trevor Wood, Ianjit Bhatti, Antonio Canas, Phil Reddick, Peter Van wyk, Shailen Bharadia, Thomas Storey, Tom Potterton, Surrey Satellite Technology Ltd. (United Kingdom); Willy Rits, European Space Agency (Netherlands); Harco Meijer, Dutch Space B.V. (Netherlands) . . . . . [9151-151]

Extremely low-temperature properties of silicone compound used for thermal coupling in cryostat of SWIR/ASTER on TERRA, Minoru Kobayashi, Hiroshi Akao, Shigeki Akagi, Mitsubishi Electric Corp. (Japan); Masakuni Kikuchi, Kenji Tatsumi, Japan Space Systems (Japan) . . . . . [9151-232]

THURSDAY 26 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . THU 9:00 TO 10:00

Session Chair: **Masanori Iye,** National Astronomical Observatory of Japan (Japan)

9:00: **Hyper Suprime-Cam for Weak Gravitational Lensing Survey** *(Plenary)*, Satoshi Miyazaki, National Astronomical Observatory of Japan (Japan) . . . . [9143-507]

9:30: **Transiting Exoplanet Survey Satellite (TESS)** *(Plenary)*, George R. Ricker Jr., Massachusetts Institute of Technology (USA) . . . . . [9143-508]

Coffee Break . . . . . Thu 10:00 to 10:30

SESSION 10

LOCATION: ROOM 520D . . . . . THU 10:30 TO 11:50

Coatings

Session Chair: **Allison A. Barto,** Ball Aerospace & Technologies Corp. (USA)

10:30: **Progress and new techniques for protected-silver coatings**, Andrew Phillips, Univ. of California Observatories (USA); David M. Fryauf, Nobuhiko P. Kobayashi, Univ. of California, Santa Cruz (USA); Michael Bolte, Brian DuPraw, Christopher T. Ratliff, David Cowley, Terry Pfister, Univ. of California Observatories (USA) . . . . . [9151-46]

10:50: **UV enhanced silver for ground and space based applications**, Stefan Schwinde, Paul J. Jobst, Mark Schuermann, Olaf Stenzel, Norbert Kaiser, Andreas Tünnermann, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) . . . . . [9151-47]

11:10: **High solar rejection coating for light-weight CFRP optical baffles**, Karl Fleury-Frenette, Frédéric Rabecki, Olivier Dubreuil, Laurence Rossi, Lionel Jacques, Jean-Philippe A. Halain, Etienne Renotte, Pierre L. P. M. Rochus, Univ. de Liège (Belgium) . . . . . [9151-48]

11:30: **Bioinspired broadband antireflection coatings for infrared spectroscopic instruments**, Peng Jiang, Jian Ge, Bo Zhao, David B. Tanner, Univ. of Florida (USA) . . . . . [9151-49]

SESSION 11

LOCATION: ROOM 520D . . . . . .THU 11:50 TO 12:30

Gratings I

Session Chair: **Allison A. Barto,** Ball Aerospace & Technologies Corp. (USA)

11:50: **Bulk silica transmission grating made by ion etching for NIR space instruments**, Amandine Caillat, Lab. d'Astrophysique de Marseille (France); Sandrine Pascal, Observatoire Astronomique de Marseille-Provence (France); Stéphane Tisserand, Silios Technologies (France); Kjetil Dohlen, Robert Grange, Lab. d'Astrophysique de Marseille (France); Sophie Gautier, Vincent Sauget, Silios Technologies (France) . . . . . [9151-50]

12:10: **New metrology techniques improve the production of silicon diffractive optics**, Cynthia B. Brooks, Michael Gully-Santiago, Michelle Grigas, Daniel T. Jaffe, The Univ. of Texas at Austin (USA) . . . . . [9151-35]

Lunch/Exhibition Break . . . . . Thu 12:30 to 13:40

SESSION 12

LOCATION: ROOM 520D . . . . . THU 13:40 TO 15:20

Gratings II

Session Chair: **Ramón Navarro,** NOVA Optical Infrared Instrumentation Group (Netherlands)

13:40: **Ultrafast laser inscribed mid infra-red volume gratings**, David G. MacLachlan, Heriot-Watt Univ. (United Kingdom); David Lee, UK Astronomy Technology Ctr. (United Kingdom); Debaditya Choudhury, Alexander Arriola Martiarena, Heriot-Watt Univ. (United Kingdom); Colin Cunningham, UK Astronomy Technology Ctr. (United Kingdom); Robert R. Thomson, Heriot-Watt Univ. (United Kingdom) . . . . . [9151-51]

14:00: **Echelle volume phase holographic gratings: experimental results**, Andrea Bianco, INAF - Osservatorio Astronomico di Brera (Italy); Lorenzo Caranzi, Mario Caironi, Istituto Italiano di Tecnologia (Italy) . . . . . [9151-52]

14:20: **Mass production of volume phase holographic gratings for the VIRUS spectrograph array**, Taylor S. Chonis, The Univ. of Texas at Austin (USA); Amy Frantz, Syzygy Optics, LLC (USA); Gary J. Hill, The Univ. of Texas at Austin (USA); J. Christopher Clemens, The Univ. of North Carolina at Chapel Hill (USA) and Syzygy Optics, LLC (USA); Hanshin Lee, The Univ. of Texas at Austin (USA); Joshua J. Adams, Carnegie Observatories (USA); Jennifer L. Marshall, Darren L. DePoy, Texas A&M Univ. (USA) . . . . . [9151-53]

14:40: **Curved VPH gratings for novel spectrographs**, J. Christopher Clemens, The Univ. of North Carolina at Chapel Hill (USA) and Syzygy Optics, LLC (USA); Darragh E. O'Donoghue, SALT Foundation Pty. Ltd. (South Africa); Bart Dunlap, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [9151-54]

15:00: **A set of innovative immersed grating based spectrometer designs for METIS**, Tibor Agócs, Ramón Navarro, Lars Venema, ASTRON (Netherlands); Aaldert H. van Amerongen, Paul J. J. Tol, SRON Netherlands Institute for Space Research (Netherlands); Hedser van Brug, TNO Science and Industry (Netherlands); Bernhard R. Brandl, Leiden Univ. (Netherlands); Frank Molster, Leiden Observatory (Netherlands) . . . . . [9151-55]

Coffee Break . . . . . Thu 15:20 to 15:50

SESSION 13

LOCATION: ROOM 520D . . . . . THU 15:50 TO 17:50

High Contrast Imaging

Session Chair: **Jinxue Wang,** Raytheon Space & Airborne Systems (USA)

15:50: **Prime focus wide-field corrector designs with lossless atmospheric dispersion correction**, Will Saunders, Peter Gillingham, Greg Smith, Australian Astronomical Observatory (Australia); Stephen Kent, Fermi National Accelerator Lab. (USA); Peter Doel, Univ. College London (United Kingdom) . . . . . [9151-56]

16:10: **Image quality analysis of a fluid atmospheric dispersion corrector**, Jessica R. Zheng, Jon S. Lawrence, Will Saunder, Australian Astronomical Observatory (Australia); Samuel N. Richards, The Univ. of Sydney (Australia) . . . . . [9151-57]

16:30: **Stop-less Lyot coronagraph for exoplanet characterization: design, manufacturing, and tests of the apodizer**, Arthur Vigan, Lab. d'Astrophysique de Marseille (France); Mamadou N'Diaye, Space Telescope Science Institute (USA); Kjetil Dohlen, Lab. d'Astrophysique de Marseille (France) . . . . . [9151-58]

16:50: **Starshade occulter deployment tolerances demonstration in support of NASA's exoplanet exploration**, David R. Webb, Eric Cady, Mark Thomson, Douglas Lisman, Stuart B. Shaklan, Jet Propulsion Lab. (USA); N. Jeremy Kasdin, Princeton Univ. (USA); Geoffrey Marks, Northrop Grumman Aerospace Systems (USA) . . . . . [9151-59]

17:10: **A novel high-contrast imaging technique based on optical tunneling to search for faint companions around bright stars at the limit of diffraction**, Dominik Derigs, Lucas Labadie, Univ. zu Köln (Germany); Dhriti Sundar Ghosh, ICFO - Institut de Ciències Fotòniques (Spain); Laëtitia Abel-Tibérini, Institut Fresnel (France) . . . . . [9151-60]

17:30: **The vector apodizing phase plate coronagraph: prototyping and new developments**, Gilles Otten, Frans Snik, Matthew A. Kenworthy, Leiden Observatory (Netherlands); Johanan Codona, The Univ. of Arizona (USA); Michael Escuti, Matthew N. Miskiewicz, North Carolina State Univ. (USA) . . . . . [9151-61]

POSTER SESSION–THURSDAY

LOCATION: ROOM 516 . . . . . THU 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Thursday. The interactive poster session with authors in attendance will be Thursday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Design of the KOSMOS oil-coupled spectrograph camera lenses, Thomas P. O'Brien, Mark A. Derwent, Paul Martini, The Ohio State Univ. (USA); Gary Poczulp, National Optical Astronomy Observatory (USA) . . . . . [9151-152]

Development of the camera for the large size telescopes of the Cherenkov Telescope Array, Tokonatsu Yamamoto, Konan Univ. (Japan) . . . . . [9151-153]

Restraint deformation and corrosion protection of gold deposited aluminum mirrors for cold optics of mid-infrared instruments, Mizuho Uchiyama, Takashi Miyata, Shigeyuki Sako, Takafumi Kamizuka, Tomohiko Nakamura, Kentaro Asano, Kazushi Okada, Takashi Onaka, Itsuki Sakon, The Univ. of Tokyo (Japan); Hirokazu Kataza, Yuki Sarugaku, Japan Aerospace Exploration Agency (Japan); Okiharu Kirino, Hiroyuki Nakagawa, Crystal Optics, Inc. (Japan); Norio Okada, Kenji Mitsui, National Astronomical Observatory of Japan (Japan) . . . . . [9151-155]

Practical ZnSe immersion grating for astronomical applications in the short NIR region, Yuji Ikeda, Photocoding (Japan); Naoto Kobayashi, The Univ. of Tokyo (Japan); Paul J. Kuzmenko, Steve Little, Lawrence Livermore National Lab. (USA); Sayumi Kaji, Kyoto Sangyo Univ. (Japan); Yuki Sarugaku, Japan Aerospace Exploration Agency (Japan); Chikako Yasui, The Univ. of Tokyo (Japan); Sohei Kondo, Kyoto Sangyo Univ. (Japan); Kei Fukue, The Univ. of Tokyo (Japan) . . . . . [9151-156]

Polish device for FOCCoS/PFS slit system, Antonio C. de Oliveira, Lab. Nacional de Astrofísica (Brazil); Ligia S. de Oliveira, Oliveira Instrumentação Óptica Ltda. (Brazil); Márcio Vital de Arruda, Lab. Nacional de Astrofísica (Brazil); Lucas S. Marrara, Oliveira Instrumentação Óptica Ltda. (Brazil); Leandro H. Santos, Décio Ferreira, Jesulino B. Santos, Bruno Castilho, Clemens D. Gneiding, Flavio F. Ribeiro, Lab. Nacional de Astrofísica (Brazil); Laerte Sodre, Claudia L. M. de Oliveira, Univ. de São Paulo (Brazil) . . . . . [9151-157]

Towards freeform microlens arrays for near infrared astronomical instruments, Debaditya Choudhury, Alexander Arriola Martiarena, Heriot-Watt Univ. (United Kingdom); Jeremy R. Allington-Smith, Durham Univ. (United Kingdom); Colin Cunningham, UK Astronomy Technology Ctr. (United Kingdom); Robert R. Thomson, Heriot-Watt Univ. (United Kingdom) . . . . . [9151-158]

GRACES: Gemini remote access to CFHT ESPaDOnS spectrograph through the longest astronomical fiber ever made, Andre-Nicolas Chene, Gemini Observatory (USA); John Pazder, National Research Council of Canada (Canada); Gregory Barrick, Canada-France-Hawaii Telescope (USA); Andre Anthony, Robert Wooff, National Research Council of Canada (Canada); Dave Duncan, National Research Council Canada (Canada); Vladimir A. Reshetov, National Research Council of Canada (Canada); Tom Benedict, Tom A. Vermeulen, Canada-France-Hawaii Telescope (USA); Eder Martioli, Lab. Nacional de Astrofisica (Brazil); Claire Moutou, Lison Malo, Canada-France-Hawaii Telescope (USA); Eric V. Tollestrup, Gemini Observatory (USA); Ricardo Schiavon, Liverpool John Moores Univ. (United Kingdom); Jaehyon Rhee, Oregon State Univ. (USA); Vinicius Placco, Gemini Observatory (USA) . . . . . [9151-159]

Interferometers and spectrographs on silicon-platform for astrophysics: trends of astrophotonics, Harendra N. J. Fernando, Andreas Stoll, Leibniz-Institut für Astrophysik Potsdam (Germany); Nick Cvetojevic, The Univ. of Sydney (Australia) and Ctr. for Ultrahigh bandwidth Devices for Optical Systems (Australia) and Australian Astronomical Observatory (Australia); René Eisermann, Nuwan Tharanga, Leibniz-Institut für Astrophysik Potsdam (Germany); Michael Böhm, Univ. Potsdam (Germany); Martin M. Roth, Roger Haynes, Leibniz-Institut für Astrophysik Potsdam (Germany); Lars Zimmermann, IHP GmbH (Germany) . . . . . [9151-160]

Development of a slicer integral field unit for the existing optical imaging spectrograph FOCAS: progress, Shinobu Ozaki, Yoko Tanaka, Takashi Hattori, Kenji Mitsui, Mitsuhiro Fukushima, Norio Okada, Obuchi Yoshiyuki, Toshihiro Tsuzuki, Satoshi Miyazaki, Takuya Yamashita, National Astronomical Observatory of Japan (Japan) . . . . . [9151-161]

CONFERENCE 9151 · LOCATION: ROOM 520D

Astronomical near-infrared echelle gratings, Kenneth H. Hinkle, Richard Joyce, Ming Liang, National Optical Astronomy Observatory (USA) . . . . . [9151-162]

The instrument focal plane mask program at the Large Binocular telescope, Robert O. Reynolds, Large Binocular Telescope Observatory (USA) . . . . [9151-163]

Photonic lantern with cladding-removable fibers, Weimin Sun, Qi Yan, Yao Bi, Haijiao Yu, Xiaoqi Liu, Jiuling Xue, He Tian, Yongjun Liu, Harbin Engineering Univ. (China) . . . . . [9151-164]

Slit device for FOCCoS-PFS-Subaru, Antonio C. de Oliveira, Lab. Nacional de Astrofísica (Brazil); Ligia S. de Oliveira, Oliveira Instrumentação Óptica Ltda. (Brazil); Márcio Vital de Arruda, Leandro H. Santos, Lab. Nacional de Astrofísica (Brazil); Lucas S. Marrara, Oliveira Instrumentação Óptica Ltda. (Brazil); Décio Ferreira, Jesulino B. Santos, Bruno Castilho, Clemens D. Gneiding, Flavio F. Ribeiro, Lab. Nacional de Astrofísica (Brazil); Laerte Sodre, Claudia L. M. de Oliveira, Univ. de São Paulo (Brazil) . . . . . [9151-165]

Temperature control system for optical elements in astronomical instrumentation, Orlando Verducci, Antonio C. de Oliveira, Flavio F. Ribeiro, Márcio Vital de Arruda, Clemens D. Gneiding, Luciano Fraga, Lab. Nacional de Astrofísica (Brazil) . . . . . [9151-166]

Developing new technology in the construction of fiber lens let IFUs, Antonio C. de Oliveira, Lab. Nacional de Astrofísica (Brazil); Ligia S. de Oliveira, Oliveira Instrumentação Óptica Ltda. (Brazil); Márcio Vital de Arruda, Bruno Castilho, Clemens D. Gneiding, Flavio F. Ribeiro, Lab. Nacional de Astrofísica (Brazil) . . . . . [9151-167]

Fiber optical cable and connector system (FOCCoS) for PFS/ Subaru, Antonio C. de Oliveira, Lab. Nacional de Astrofísica (Brazil); Ligia S. de Oliveira, Lucas S. Marrara, Oliveira Instrumentação Óptica Ltda. (Brazil); Leandro H. Santos, Márcio Vital de Arruda, Jesulino B. Santos, Décio Ferreira, Bruno Castilho, Lab. Nacional de Astrofísica (Brazil); Laerte Sodre, Claudia L. M. de Oliveira, Univ. de São Paulo (Brazil); James E. Gunn, Princeton Univ. (USA); Hiroshi Karoji, Hajime Sugai, Atsushi Shimono, Naoyuki Tamura, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Masahiko Kimura, National Taiwan Univ. (Taiwan) and The Univ. of Tokyo (Japan); Naruhisa Takato, Subaru Telescope, National Astronomical Observatory of Japan (USA) . . . . . [9151-168]

Mechanical and thermal design challenges in building a semi-warm infrared spectrograph: considerations from The Robert Stobie Spectrograph/Near Infrared Arm, Michael P. Smith, Marsha J. Wolf, Mark P. Mulligan, Douglas P. Adler, Univ. of Wisconsin-Madison (USA); Jeffrey P. Wong, Paradigm Design Inc. (USA) . . . . . [9151-169]

Polarization gratings for visible and near-infrared astronomy, Max Millar-Blanchaer, Dunlap Institute for Astronomy & Astrophysics (Canada); Dae-Sik Moon, Univ. of Toronto (Canada); Michael Escuti, North Carolina State Univ. (USA); James R. Graham, Univ. of California, Berkeley (USA). . . . . [9151-170]

The optimization method for the FRD of the fiber caused by fiber positioning, Tianyi Zhang, Nanjing Univ. of Aeronautics and Astronautics (China); Yonghui Hou, Yongtian Zhu, Zhongwen Hu, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9151-171]

A comparison of mechanical fiber scramblers for high-resolution spectroscopy, Robert O. Reynolds, Large Binocular Telescope Observatory (USA); Alan Kost, College of Optical Sciences, The Univ. of Arizona (USA) . . . . [9151-172]

Enabling diffraction-limited instruments on seeing-limited telescopes: on-sky demonstration of a diffraction-limited spectrograph interfaced with an on-chip slit reformatting device, Izabela Spaleniak, Tobias Feger, Macquarie Univ. (Australia); Simon Gross, Macquarie Univ. (Australia) and CUDOS (Australia); Nemanja Jovanovic, Subaru Telescope, National Astronomical Observatory of Japan (USA); Jon S. Lawrence, Australian Astronomical Observatory (Australia) and Macquarie Univ. (Australia); Michael J. Withford, Macquarie Univ. (Australia) and CUDOS (Australia); Michael Ireland, Macquarie Univ. (Australia) and Australian Astronomical Observatory (Australia) . . . . . [9151-173]

A laser etched Bowen images slicer, John Pazder, NRC - Herzburg Institute of Astrophysics (Canada) . . . . . [9151-174]

FRIDA integral field unit manufacturing, Salvador Cuevas, Univ. Nacional Autónoma de México (Mexico); Stephen S. Eikenberry, Univ. of Florida (USA); Beatriz Sánchez, Univ. Nacional Autónoma de México (Mexico) . . . . . [9151-175]

FRIDA integral field spectroscopy PSF quality simulations, Salvador Cuevas, Univ. Nacional Autónoma de México (Mexico) . . . . . [9151-176]

Concept and optical design of the near-infrared integral field unit for SWIMS, Yutaro Kitagawa, The Univ. of Tokyo (Japan); Shinobu Ozaki, National Astronomical Observatory of Japan (Japan); Kentaro Motohara, Masahiro Konishi, Hidenori Takahashi, Ken Tateuchi, Soya Todo, Natsuko M. Kato, The Univ. of Tokyo (Japan); Tomohiro Yoshikawa, Kyoto Sangyo Univ. (Japan) . . . . . [9151-177]

System design for detection of LAMOST focal plane optical fiber positional accuracy using front lighting source, Mengxin Wang, National Astronomical Observatory of China (China); Xiaoran Chen, Institute of Microelectronics (China); Ali Luo, National Astronomical Observatory of China (China); Yihan Song, Institute of Microelectronics (China) and National Astronomical Observatory (China) . . . . . [9151-178]

New design and performance of high density integrated actuators for focal plane positioning system, Hongzhuan Hu, Jianping Wang, Zhigang Liu, Zengxiang Zhou, Chao Zhai, Jiaru Chu, Univ. of Science and Technology of China (China) . . . . . [9151-179]

Development of the fibres of MOONS, Isabelle Guinouard, Jean-Philippe Amans, Observatoire de Paris à Meudon (France); Michele Cirasuolo, UK Astronomy Technology Ctr. (United Kingdom); Hector Flores, Observatoire de Paris à Meudon (France); David W. Lunney, Hermine Schnetler, UK Astronomy Technology Ctr. (United Kingdom). . . . . [9151-180]

Miniaturized Shack-Hartmann wavefront sensors for starbugs, Michael Goodwin, Australian Astronomical Observatory (Australia); Samuel N. Richards, The Univ. of Sydney (Australia); Jessica R. Zheng, Jon S. Lawrence, Australian Astronomical Observatory (Australia); Sergio G. Leon-Saval, Alexander Argyros, The Univ. of Sydney (Australia); Belén Alcalde, Univ. Complutense de Madrid (Spain); David M. Brown, Australian Astronomical Observatory (Australia) . . . . . [9151-181]

Laser speckle suppression by the phase modulation of input beam in a multimode fiber, Cong Yang, Yuanjie Wu, Jian Han, Huiqi Ye, Dong Xiao, Nanjing Institute of Astronomical Optics & Technology (China). . . . . [9151-182]

Generation of optical frequency combs in fibers: a pulse analysis, Marina Zajnulina, Leibniz-Institut für Astrophysik Potsdam (Germany); Michael Böhm, Univ. Potsdam (Germany); Keith Blow, Aston Univ. (United Kingdom); Jose Manuel Chavez Boggio, Leibniz-Institut für Astrophysik Potsdam (Germany); Andres A. Rieznik, Instituto Tecnológico de Buenos Aires (Argentina); Roger Haynes, Martin M. Roth, Leibniz-Institut für Astrophysik Potsdam (Germany) . . . . . [9151-183]

PRAXIS: low thermal emission high efficiency OH suppressed fibre spectrograph, Robert Content, Jon S. Lawrence, Simon C. Ellis, Anthony J. Horton, Nick F. Staszak, Ross Zhelem, Luke Gers, Australian Astronomical Observatory (Australia); Joss Bland-Hawthorn, Emma Y. Lindley, Seong-sik Min, Sergio G. Leon-Saval, The Univ. of Sydney (Australia); Pascal Xavier, Australian Astronomical Observatory (Australia); Roger Haynes, Leibniz-Institut für Astrophysik Potsdam (Germany); Keith Shortridge, Australian Astronomical Observatory (Australia). . . . . [9151-184]

Research of fiber position measurement by multi CCD cameras, Zengxiang Zhou, Zhigang Liu, Jianping Wang, Hongzhuan Hu, Chao Zhai, Jiaru Chu, Univ. of Science and Technology of China (China) . . . . . [9151-185]

The fiber positioner for 4MOST: exploration of an alternative R-Θ design, Allar Saviauk, Frank Dionies, Roelof S. de Jong, Roger Haynes, Leibniz-Institut für Astrophysik Potsdam (Germany); Ian R. Parry, Univ. of Cambridge (United Kingdom) . . . . . [9151-187]

A multi fiber slit for the FOCES RV spectroscopy upgrade, Frank U. Grupp, Hanna Kellermann, Univ.-Sternwarte München (Germany); Liang Wang, National Astronomical Observatory of China (China); Anna Brucalassi, Univ.-Sternwarte Muenchen (Germany); Ulrich Hopp, Univ.-Sternwarte München (Germany); Ralf Bender, Max-Planck-Institut für extraterrestrische Physik (Germany) . . . [9151-188]

Studying focal ratio degradation of optical fibers with a core size of 128 microns for FOCCoS/PFS/Subaru, Jesulino B. Santos, Antonio C. de Oliveira, Lab. Nacional de Astrofísica (Brazil); James E. Gunn, Princeton Univ. (USA); Ligia S. de Oliveira, Oliveira Instrumentação Óptica Ltda. (Brazil); Márcio Vital de Arruda, Bruno Castilho, Clemens D Gneiding, Flavio F. Ribeiro, Lab. Nacional de Astrofísica (Brazil); Laerte Sodre, Claudia L. M. de Oliveira, Univ. de São Paulo (Brazil) . . . . . [9151-189]

Development of deployable fibre integral-field-units for the E-ELT, Andreas Kelz, Martin M. Roth, Leibniz-Institut für Astrophysik Potsdam (Germany); Harald Nicklas, Georg-August-Univ. Göttingen (Germany); Thomas Jahn, Justus Neumann, Monika Rutowska, Christer Sandin, Leibniz-Institut für Astrophysik Potsdam (Germany); Heiko Anwand, Univ. Göttingen (Germany) . . . . . [9151-190]

CARMENES fiber link, Julian Stürmer, Otmar Stahl, Landessternwarte Heidelberg (Germany); Christian Schwab, The Pennsylvania State Univ. (USA); Andreas Quirrenbach, Landessternwarte Heidelberg (Germany) . . . . . [9151-191]

Design of the opto-mechanical mounts of the spectograph ESPRESSO, Samuel Santana Tschudi, Ana B. Fragoso Lopez, Manuel Amate Plasencia, Rafael Rebolo-López, Instituto de Astrofísica de Canarias (Spain); Denis Mégevand, Observatoire de Genèva (Switzerland); Filippo Maria M. Zerbi, INAF - Osservatorio Astronomico di Brera (Italy); Francesco A. Pepe, Observatoire de Genèva (Switzerland) . . . . . [9151-193]

MULEC: multiple lenses connectors for optical fibers, Ligia S. de Oliveira, Oliveira Instrumentação Óptica Ltda. (Brazil); Antonio C. de Oliveira, Lab. Nacional de Astrofísica (Brazil); Lucas S. Marrara, Oliveira Instrumentação Óptica Ltda. (Brazil); Jesulino B. Santos, Lab. Nacional de Astrofísica (Brazil); Laerte Sodre, Claudia L. M. de Oliveira, Univ. de São Paulo (Brazil). . . . . [9151-194]

New multicore low mode noise scrambling fiber for applications in high-resolution spectroscopy, Dionne M. Haynes, Leibniz-Institut für Astrophysik Potsdam (Germany); Itandehui Gris-Sanchez, Univ. of Bath (United Kingdom); Katjana Ehrlich, Leibniz-Institut für Astrophysik Potsdam (Germany); Tim A. Birks, Univ. of Bath (United Kingdom); Roger Haynes, Domenico Giannone, Leibniz-Institut für Astrophysik Potsdam (Germany) . . . . . [9151-195]

An economic Fabry-Perot wavelength reference, Gabor Furesz, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9151-196]

Astronomical refraction models in ZEMAX, Paolo Spanò, NRC - Herzburg Institute of Astrophysics (Canada) . . . . . [9151-199]

Space qualification of an anti reflection coating on the ruled surface of a ZnSe grating prism: increasing the throughput of the single-object slit-less spectroscopy mode of NIRISS onboard JWST, Loïc Albert, Univ. de Montréal (Canada); Paul J. Kuzmenko, Lawrence Livermore National Lab. (USA); René Doyon, Univ. de Montréal (Canada); Steve Little, Lawrence Livermore National Lab. (USA); Greg S. Enzor, Thin Film Lab. (USA) . . . . . [9151-200]

Diamond machining of ZnSe grisms for the near infrared imager and slitless spectrograph (NIRISS) onboard JWST, Paul J. Kuzmenko, Steve Little, Lawrence Livermore National Lab. (USA); Loïc Albert, Univ. de Montréal (Canada); David A. Aldridge, COM DEV Canada (Canada); René Doyon, Univ. de Montréal (Canada); Driss Touahri, COM DEV Canada (Canada) . . . . . [9151-201]

Cleaning of extremely sensitive optical surfaces, Jean-Louis Lizon, Sebastian Deiries, European Southern Observatory (Germany) . . . . . [9151-202]

On-sky tests of an A/R coated silicon grism on board NICS@TNG, Fabrizio Vitali, INAF - Osservatorio Astronomico di Roma (Italy); Vittorio Foglietti, CNR Istituto per le Tecnologie della Costruzione (Italy); Dario Lorenzetti, INAF - Osservatorio Astronomico di Roma (Italy); Elena Cianci, Istituto per la Microelettronica e Microsistemi (Italy); Francesca Ghinassi, Telescopio Nazionale Galileo (Spain); Avet Harutyunyan, Fundación Galileo Galilei - INAF (Spain); Simone Antoniucci, INAF - Osservatorio Astronomico di Roma (Italy); Carlos Riverol, Luis Riverol, Fundación Galileo Galilei - INAF (Spain) . . . . . [9151-203]

Birefringence binary Bragg (3B) grating and quasi-Bragg immersion grating, Noboru Ebizuka, Nagoya Univ. (Japan). . . . . [9151-204]

Additional narrow bandpass steep edge optical filters for the JAST/T80 telescope instrumentation, Steffen Reichel, SCHOTT AG (Germany); Ulf Brauneck, Sébastien Bourquin, SCHOTT Suisse SA (Switzerland); Antonio Marín-Franch, Ctr. de Estudios de Física del Cosmos de Aragón (Spain) . . . . . [9151-205]

Design, development, and test of a grism prototype for Euclid-NISP mission, Anne Costille, Amandine Caillat, Robert Grange, Sandrine Pascal, Christelle Rossin, Lab. d'Astrophysique de Marseille (France) . . . . . [9151-206]

Recent progress in multi-core fibre Bragg gratings, Emma Y. Lindley, The Univ. of Sydney (Australia); Seong-sik Min, The Univ. of Sydney (Australia) and Australian Astronomical Observatory (Australia); Sergio G. Leon-Saval, Nick Cvetojevic, The Univ. of Sydney (Australia); Nemanja Jovanovic, Subaru Telescope, National Astronomical Observatory of Japan (USA); Joss Bland-Hawthorn, The Univ. of Sydney (Australia); Jon S. Lawrence, Australian Astronomical Observatory (Australia). . . . . [9151-207]

Development of high-throughput moth-eye silicon lens and grism, Takafumi Kamizuka, Takashi Miyata, Shigeyuki Sako, The Univ. of Tokyo (Japan); Hiroaki Imada, Univ. of Tsukuba (Japan); Kentaro Asano, Mizuho Uchiyama, Kazushi Okada, The Univ. of Tokyo (Japan); Takehiko Wada, Takao Nakagawa, Japan Aerospace Exploration Agency (Japan); Tomohiko Nakamura, Itsuki Sakon, Takashi Onaka, The Univ. of Tokyo (Japan) . . . . . [9151-208]

Coating and surface finishing definition for the Solar Orbiter/METIS inverted external occulter, Federico Landini, INAF - Osservatorio Astrofisico di Arcetri (Italy); Marco Romoli, Univ. degli Studi di Firenze (Italy); Sébastien Vives, Lab. d'Astrophysique de Marseille (France); Maurizio Pancrazzi, Mauro Focardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Vania Da Deppo, IFN-CNR LUXOR Lab. (Italy); Silvano Fineschi, INAF - Osservatorio Astronomico di Torino (Italy)[9151-209]

Fluoride damage to substrates during stripping of mirrors, Andrew Phillips, Brian DuPraw, David Hilyard, Donald Gavel, Daren Dillon, Renate Kupke, Univ. of California Observatories (USA) . . . . . [9151-210]

High reflectivity large scale telescope mirror coatings via long throw sputtering, Joshua H. Gurian, Alexander J. Bourque, Gary S. Ash, DynaVac (USA) . . . . . [9151-211]

High performance Si immersion gratings patterned with electron beam lithography, Michael Gully-Santiago, Daniel T. Jaffe, The Univ. of Texas at Austin (USA); Daniel W. Wilson, Richard E. Muller, Jet Propulsion Lab. (USA) . . [9151-212]

A new facility for manufacturing and testing very large narrow bandpass filters and other high performance optical coatings, Thomas Mooney, Walt Pawlewicz, Michael Merrill, Kerry Hurd, Materion Barr Precision Optics & Thin Film Coatings (USA) . . . . . [9151-213]

A broadband scalar optical vortex coronagraph, Ronnie Errmann, Stefano Minardi, Thomas Pertsch, Friedrich-Schiller-Univ. Jena (Germany) . . . . . [9151-214]

Laboratory demonstration of the Savart-plate lateral-shearing interferometric nuller for exoplanets (SPLINE), Hirofumi Kitou, Naoshi Murakami, Manabu Kida, Naoshi Baba, Hokkaido Univ. (Japan); Taro Matsuo, Kyoto Univ. (Japan); Takayuki Kotani, National Astronomical Observatory of Japan (Japan); Hajime Kawahara, Motohide Tamura, The Univ. of Tokyo (Japan) . . . . . [9151-215]

Performance of an achromatic focal plane mask for exoplanet imaging coronagraphy, Kevin E. Newman, The Univ. of Arizona (USA); Ruslan Belikov, Eugene Pluzhnik, NASA Ames Research Ctr. (USA); Kunjithapatham Balasubramanian, Daniel W. Wilson, Jet Propulsion Lab. (USA) . . . . . [9151-216]

The VORTEX coronagraphic test bench, Aïssa Jolivet, Pierre Piron, Olivier Absil, Christian Delacroix, Serge Habraken, Univ. de Liège (Belgium); Dimitri Mawet, European Southern Observatory (Chile); Jean Surdej, Univ. de Liège (Belgium) . . . . . [9151-217]

High contrast imaging in white light with a self-coherent camera, Jacques-Robert Delorme, Observatoire de Paris à Meudon (France); Raphaël Galicher, Pierre Baudoz, Gérard Rousset, LESIA - Observatoire de Paris (France); Johan Mazoyer, Observatoire de Paris à Meudon (France). . . . . [9151-218]

Apodizing phase plate coronagraph designs for segmented mirror telescopes and non-trivial obscurations, Matthew A. Kenworthy, Leiden Observatory (Netherlands); Johanan Codona, The Univ. of Arizona (USA); Gilles Otten, Leiden Observatory (Netherlands). . . . . [9151-219]

Kinematic modeling and path planning for MIRADAS probe arms, Josep Sabater, José María Gómez, Manuel López, Jordi Torra, Univ. de Barcelona (Spain); Steven N. Raines, Stephen S. Eikenberry, Univ. of Florida (USA). . . . . [9151-220]

Conservation of étendue in a primary objective grating telescope, Thomas D. Ditto, 3DeWitt LLC (USA) . . . . . [9151-222]

On-sky optical performance of a large format silicon immersion grating, Jian Ge, Bo Zhao, Scott Powell, Univ. of Florida (USA) . . . . . [9151-223]

Development of a universal tunable filter for future solar observations, Masaoki Hagino, Kyoto Univ. (Japan); Kiyoshi Ichimoto, Goichi Kimura, Yoshikazu Nakatani, Kyoto Univ. Hida Observatory (Japan); Tomoko Kawate, Kyoto Univ. (Japan); Kazuya Shinoda, Yoshinori Suematsu, Hirohisa Hara, National Astronomical Observatory of Japan (Japan); Toshifumi Shimizu, Japan Aerospace Exploration Agency (Japan) . . . . . [9151-224]

JWST ASPA fiber optic development for testing at 2.12 µm, Benjamin B. Gallagher, John S. Knight, Allison A. Barto, Ball Aerospace & Technologies Corp. (USA); Joe Thomes, Melanie Ott, NASA Goddard Space Flight Ctr. (USA)[9151-225]

Volume phase holographic gratings for astronomy based on solid photopolymers, Alessio Zanutta, Andrea Bianco, INAF - Osservatorio Astronomico di Brera (Italy); Thomas Fäcke, Bayer MaterialScience AG (Germany); Maider Insausti, Francisco Garzón López, Instituto de Astrofísica de Canarias (Spain) . . . . . [9151-226]

WEAVE MOS fibre bundle test plan, Frédéric N. Sayède, Isabelle Guinouard, Gilles Fasola, Observatoire de Paris à Meudon (France); Emilie Lhomé, Isaac Newton Group of Telescopes (Spain); Youssef Younes, Piercarlo Bonifacio, Observatoire de Paris à Meudon (France); Don Carlos Abrams, Isaac Newton Group of Telescopes (Spain); Kevin F. Middleton, Gavin B. Dalton, Rutherford Appleton Lab. (United Kingdom); Jose Alfonso López Aguerri, Instituto de Astrofísica de Canarias (Spain); Scott C. Trager, Univ. of Groningen (Netherlands) . . . . [9151-227]

Cryogenic test of NIR VPHGs, Maider Insausti, Francisco Garzón López, Instituto de Astrofísica de Canarias (Spain); Antonio Fimia, Roque Madrigal, Univ. Miguel Hernández de Elche (Spain); Andrea Bianco, Alessio Zanutta, INAF - Osservatorio Astronomico di Brera (Italy). . . . . [9151-228]

Multi-fibers connectors systems for FOCCoS-PFS-Subaru, Antonio C. de Oliveira, Lab. Nacional de Astrofísica (Brazil); Ligia S. de Oliveira, Lucas S. Marrara, Oliveira Instrumentação Óptica Ltda. (Brazil); Leandro H. Santos, Márcio Vital de Arruda, Jesulino B. Santos, Décio Ferreira, Bruno Castilho, Lab. Nacional de Astrofísica (Brazil); Laerte Sodre, Claudia L. M. de Oliveira, Univ. de São Paulo (Brazil) . . . . . [9151-229]

A wide field corrector with loss-less and purely passive atmospheric dispersion correction, Peter Gillingham, Will Saunders, Australian Astronomical Observatory (Australia) . . . . . [9151-230]

MEMS accelerometers in accurate mount positioning systems, László Mészáros, Attila Jaskó, András Pal, MTA Research Ctr. for Astronomy and Earth Sciences (Hungary) and Konkoly Observatory (Hungary) . . . . . [9151-231]

CONFERENCE 9151 · LOCATION: ROOM 520D

FRIDAY 27 JUNE

SESSION 14

LOCATION: ROOM 520D . . . . . FRI 8:30 TO 10:10

Spectroscopy

Session Chair: **Eric Prieto,** Observatoire Astronomique de Marseille-Provence (France)

8:30: **Development of micro image slicer of integral field unit for spaceborne solar spectrograph**, Takashi Sukegawa, Yukinobu Okura, Nakayasu Tomonao, Yukiya Enokida, Masatsugu Koyama, Canon Inc. (Japan); Yoshinori Suematsu, Shinobu Ozaki, National Astronomical Observatory of Japan (Japan); Saku Tsuneta, Japan Aerospace Exploration Agency (Japan) . . . . . [9151-62]

8:50: **Robust reflective pupil slicing technology**, Jeffrey T. Meade, Bradford B. Behr, Andrew T. Cenko, Arsen R. Hajian, Tornado Spectral Systems (Canada) . . . . . [9151-63]

9:10: **MUSE field splitter unit: fan-shaped separator for 24 integral field units**, Florence Laurent, Observatoire de Lyon (France); Heiko Anwand, Univ. Göttingen (Germany); Didier Boudon, Patrick Caillier, Magali Loupias, Jean-Emmanuel Migniau, Observatoire de Lyon (France); Harald Nicklas, Georg-August-Univ. Göttingen (Germany); Edgard Renault, Observatoire de Lyon (France); Walter Seifert, Landessternwarte Heidelberg (Germany); Yves Salaun, Winlight Optics (France); Wenli Xu, Optical System Engineering (Germany) . . . . . [9151-64]

9:30: **The problem of scattering in fibre-fed VPH spectrographs and possible solutions**, Simon C. Ellis, Will Saunders, Australian Astronomical Observatory (Australia); Michael Ireland, Australian Astronomical Observatory (Australia) and Macquarie Univ. (Australia); Scott Croom, The Univ. of Sydney (Australia) [9151-65]

9:50: **Development of integrated photonic dicers for reformatting the point-spread-function of a telescope**, David G. MacLachlan, Heriot-Watt Univ. (United Kingdom); Robert J. Harris, Durham Univ. (United Kingdom); Debaditya Choudhury, Alexander Arriola Martiarena, Heriot-Watt Univ. (United Kingdom); Graeme Brown, Optoscribe Ltd. (United Kingdom); Jeremy R. Allington-Smith, Durham Univ. (United Kingdom); Robert R. Thomson, Heriot-Watt Univ. (United Kingdom). . . . . [9151-66]

Coffee Break . . . . . Fri 10:10 to 10:40

SESSION 15

LOCATION: ROOM 520D . . . . . FRI 10:40 TO 12:00

Optical Fibers and Positioners I

Session Chair: **Roger Haynes,** Leibniz-Institut für Astrophysik Potsdam (Germany)

10:40: **Advances in the Echidna fiber-positioning technology**, Andrew I. Sheinis, Australian Astronomical Observatory (Australia); James Gilbert, Univ. of Oxford (United Kingdom); Tony J. Farrell, Will Saunders, Lewis G. Waller, Jurek Brzeski, Peter Gillingham, Rolf Muller, Scott Smedley, Greg Smith, Australian Astronomical Observatory (Australia) . . . . . [9151-67]

11:00: **Developing engineering model Cobra fiber positioners for the Subaru telescope's prime focus spectrometer**, Charles D. Fisher, David F. Braun, Michael D. Seiffert, Chaz Morantz, Eamon J. Partos, Hrand Aghazarian, Matthew E. King, Larry E. Hovland, Mark A. Schwochert, Joel Kaluzny, Christopher M. Capocasale, Andrew C. Houck, Jet Propulsion Lab. (USA); Daniel J. Reiley, Peter H. Mao, Reed L. Riddle, Khanh Bui, California Institute of Technology (USA); Todd Haran, Robert Culhane, Eric Walkama, New Scale Technologies, Inc. (USA) . . . . . [9151-68]

11:20: **IFU simulator: a powerful alignment and performance tool for MUSE instrument**, Florence Laurent, Didier Boudon, Eric Daguisé, Jean-Pierre Dubois, Aurélien Jarno, Johan Kosmalski, Alban Remillieux, Edgard Renault, Observatoire de Lyon (France) . . . . . [9151-69]

11:40: **Astronomical optical frequency comb generation in dispersion engineered ring resonators**, Jose Manuel Chavez Boggio, Tino Fremberg, Daniel Bodenmueller, Roger Haynes, Martin M. Roth, Leibniz-Institut für Astrophysik Potsdam (Germany). . . . . [9151-70]

Lunch Break . . . . . Fri 12:00 to 13:30

SESSION 16

LOCATION: ROOM 520D . . . . . FRI 13:30 TO 14:50

Optical Fibers and Positioners II

Session Chair: **Roger Haynes,** Leibniz-Institut für Astrophysik Potsdam (Germany)

13:30: **Commissioning the SALT fiber instrument feed**, Ockert J. Strydom, Janus D. Brink, South African Astronomical Observatory (South Africa) and Southern African Large Telescope (South Africa); Darragh E. O'Donoghue, South African Astronomical Observatory (South Africa) . . . . . [9151-71]

13:50: **Photonic lantern behaviour and implications for instrument design**, Anthony J. Horton, Robert Content, Simon C. Ellis, Jon S. Lawrence, Australian Astronomical Observatory (Australia) . . . . . [9151-72]

14:10: **Practical aspects of building fiber links for precision radial velocity instruments**, Gabor Furesz, Joseph Zajac, Nicholas Langellier, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9151-73]

14:30: **The FRD and transmission of the 270-m GRACES optical fiber link and a 50-m high numerical aperture fiber for astronomy**, John Pazder, NRC - Herzburg Institute of Astrophysics (Canada); Paul Fournier, Rafal Pawluczyk, Fibertech Optica Inc. (Canada) . . . . . [9151-74]

LOCATION: ROOM 520D . . . . . 14:50 TO 15:10

Closing Session

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

Award Ceremony: Best Poster and Best Oral Presentation

CONFERENCE 9152 · LOCATION: ROOM 520E

Sunday–Thursday 22–26 June 2014 • Proceedings of SPIE Vol. 9152

Software and Cyberinfrastructure for Astronomy III


(Chiozzi)


(Radziwill)

Conference Chairs: **Gianluca Chiozzi,** European Southern Observatory (Germany); **Nicole M. Radziwill,** James Madison Univ. (USA)

Program Committee: **Alan Bridger,** UK Astronomy Technology Ctr. (United Kingdom); **Tom Donaldson,** Space Telescope Science Institute (USA); **Kim K. Gillies,** Thirty Meter Telescope Observatory Corp. (USA); **Juan C. Guzman,** Commonwealth Scientific and Industrial Research Organisation (Australia); **Bret Goodrich,** National Solar Observatory (USA); **Hilton A. Lewis,** W. M. Keck Observatory (USA), Univ. of Hawai'i {United States); **David L. Terrett,** RAL Space (United Kingdom)

SUNDAY 22 JUNE

SESSION 1

LOCATION: ROOM 520E . . . . . .SUN 9:00 TO 10:30

Project Overview

Session Chairs: **Gianluca Chiozzi,** European Southern Observatory (Germany); **Hilton A. Lewis,** W. M. Keck Observatory (USA)

9:00: **Quasi-automatic software supports for Gaia ground based optical tracking** *(Invited Paper)*, Sebastien Bouquillon, Christophe Barache, Teddy Carlucci, Francois Taris, Observatoire de Paris (France); Martin Altmann, Univ. Heidelberg (Germany); Alexandre H. Andrei, Observatório Nacional (Brazil) and INAF - Osservatorio Astronomico di Torino (Italy) and Observatoire de Paris (France); Richard Smart, INAF - Osservatorio Astronomico di Torino (Italy); Iain A. Steele, Liverpool John Moores Univ. (United Kingdom); Sebastian G. Els, European Space Astronomy Ctr. (Spain). . . . . [9152-1]

9:30: **The ASTRI/CTA mini-array software system**, Gino Tosti, Univ. degli Studi di Perugia (Italy); Joseph Schwarz, INAF - Osservatorio Astronomico di Brera (Italy); Angelo L. Antonelli, INAF - Osservatorio Astronomico di Roma (Italy); Massimo Trifoglio, INAF - IASF Bologna (Italy); Osvaldo Catalano, Maria C. Maccarone, INAF - IASF Palermo (Italy); Giuseppe Leto, INAF - Osservatorio Astrofisico di Catania (Italy); Fulvio Gianotti, INAF - IASF Bologna (Italy); Rodolfo Canestrari, INAF - Osservatorio Astronomico di Brera (Italy); Enrico Giro, INAF - Osservatorio Astronomico di Padova (Italy); Mauro Fiorini, Nicola La Palombara, INAF - IASF Milano (Italy); Giovanni Pareschi, INAF - Osservatorio Astronomico di Brera (Italy); Luca Stringhetti, INAF - IASF Milano (Italy); Stefano Vercellone, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy) and for theASTRI collaboration and for the CTA Consortium (Italy) . . . . . [9152-2]

9:50: **Discovery Channel telescope software progress report: addressing early commissioning and operations challenges**, Michael Lacasse, Paul J. Lotz, Lowell Observatory (USA). . . . . [9152-3]

10:10: **Large Binocular Telescope Observatory (LBTO) software and IT group operations status update and near-term development roadmap**, Douglas M. Summers, David S. Ashby, Joar G. Brynnel, Christopher Biddick, Chris Cox, Dan Cox, Taras Golota, John K. Little, Michele D. De La Peña, Douglas Fisher, John M. Hill, Stephen Hooper, Joseph Kraus, Tom Sargent, Kellee R. Summers, Christian Veillet, R. Mark Wagner, Large Binocular Telescope Observatory (USA) . [9152-110]

Coffee Break . . . . . Sun 10:30 to 11:00

SESSION 2

LOCATION: ROOM 520E . . . . . SUN 11:00 TO 12:00

Control Systems Using PLC Technology and Field Buses

Session Chairs: **Juan C. Guzman,** Commonwealth Scientific and Industrial Research Organisation (Australia); **David L. Terrett,** Rutherford Appleton Lab. (United Kingdom)

11:00: **PC based PLCs and Ethernet based fieldbus: the new standard platform for future VLT instrument control systems**, Mario Kiekebusch, Christian Lucuix, Toomas M. Erm, Gianluca Chiozzi, Michele Zamparelli, Lothar Kern, Roland Brast, Werther Pirani, Roland Reiss, Dan Popovic, Jens Knudstrup, Michel Duchateau, Stefan Sandrock, European Southern Observatory (Germany) . . . . . [9152-7]

11:20: **Developing a PLC-friendly state machine model: lessons learned**, Wim Pessemier, Geert Deconinck, Gert Raskin, Katholieke Univ. Leuven (Belgium); Philippe Saey, Katholieke Univ. Leuven (Belgium) and KAHO Sint-Lieven (Belgium); Hans Van Winckel, Katholieke Univ. Leuven (Belgium). . . . . [9152-5]

11:40: **Motion control solution for new PLC-based standard development platform for VLT instrument control systems**, Dan Popovic, Roland Brast, Nicola Di Lieto, Mario Kiekebusch, Jens Knudstrup, Christian Lucuix, European Southern Observatory (Germany) . . . . . [9152-6]

Lunch Break . . . . . Sun 12:00 to 13:30

SESSION 3

LOCATION: ROOM 520E . . . . . SUN 13:30 TO 15:30

Data Management and Archives

Session Chairs: **Nicole M. Radziwill,** James Madison Univ. (USA); **Tom Donaldson,** Space Telescope Science Institute (USA)

13:30: **The design and operation of the Keck Observatory archive**, Graham B. Berriman, Christopher R. Gelino, California Institute of Technology (USA); Robert W. Goodrich, Jennifer Holt, W. M. Keck Observatory (USA); Mihseh Kong, Anastasia C. Laity, California Institute of Technology (USA); Jeffrey A. Mader, W. M. Keck Observatory (USA); Melanie Swain, California Institute of Technology (USA); Hien D. Tran, W. M. Keck Observatory (USA) . . . . . [9152-8]

13:50: **GRBSpec: a multi-observatory database for gamma-ray burst spectroscopy**, Antonio de Ugarte Postigo, Instituto de Astrofísica de Andalucía (Spain) and Univ. of Copenhagen (Denmark); Martin Blazek, Astronomical Institute of the ASCR, v.v.i. (Czech Republic) and Czech Technical Univ. in Prague (Czech Republic); Petr Janout, Czech Technical Univ. in Prague (Czech Republic); Christina C. Thoene, Instituto de Astrofísica de Andalucía (Spain); Javier U. Gorosabel, Consejo Superior de Investigaciones Científicas (Spain) and IKERBASQUE. Basque Foundation for Science (Spain) and Instituto de Astrofísica de Andalucía (Spain); Ruben Sanchez-Ramirez, Instituto de Astrofísica de Andalucía (Spain). . . . [9152-9]

14:10: **Modular VO oriented Java EE service deployer**, Marco Molinaro, Francesco Cepparo, Marco De Marco, Cristina Knapic, Pietro Apollo, Riccardo Smareglia, INAF - Osservatorio Astronomico di Trieste (Italy) . . . . . [9152-10]

14:30: **Practical experience with test-driven development during commissioning of the multi-star AO system ARGOS**, Martin Kulas, José Luis Borelli, Wolfgang Gaessler, Max-Planck-Institut für Astronomie (Germany); Sebastian Rabien, Max-Planck-Institut für extraterrestrische Physik (Germany); Lorenzo Busoni, Marco Bonaglia, Tommaso Mazzoni, INAF - Osservatorio Astrofisico di Arcetri (Italy); Gilles Orban de Xivry, Max-Planck-Institut für extraterrestrische Physik (Germany); Diethard Peter, Max-Planck-Institut für Astronomie (Germany); Gustavo Rahmer, Large Binocular Telescope Observatory (USA) . . . . . [9152-11]

14:50: **ODI-portal, pipeline, and archive (ODI-PPA): a web based astronomical compute archive, visualization, and analysis service**, Arvind Gopu, Soichi Hayashi, Michael D. Young, Indiana Univ. (USA); Daniel R. Harbeck, WIYN Observatory (USA); Todd Boroson, National Optical Astronomy Observatory (USA); Wilson M. Liu, WIYN Observatory (USA); Richard A. Shaw, National Optical Astronomy Observatory (USA); Robert Henschel, Indiana Univ. (USA); Jayadev K. Rajagopal, National Optical Astronomy Observatory (USA); Patricia M. Knezek, WIYN Observatory (USA); Pierre Martin, Univ. of Hawai'i at Hilo (USA); Kevin Archbold, Key Consulting, Inc. (USA) . . . . . [9152-12]

15:10: **Exploring No-SQL alternatives for ALMA monitoring system**, Tzu-Chiang Shen, Patricio Merino, Leonel Pena, Alvaro Aguirre, Ruben Soto, Jorge F. Ibsen, ALMA (Chile) . . . . . [9152-13]

Coffee Break . . . . . Sun 15:30 to 16:00

CONFERENCE 9152 · LOCATION: ROOM 520E

SESSION 4

LOCATION: ROOM 520E . . . . . SUN 16:00 TO 17:00

Control Systems: Camera and Data Acquisition

Session Chairs: **David L. Terrett,** Rutherford Appleton Lab. (United Kingdom); **Hilton A. Lewis,** W. M. Keck Observatory (USA)

16:00: **Lessons learned: reviewing the DECam data acquisition system after one year in service**, Klaus Honscheid, The Ohio State Univ. (USA) and The Dark Energy Survey Collaboration (USA). . . . . [9152-14]

16:20: **Wendelstein Observatory control software**, Claus A. Gössl, Ludwig-Maximilians-Univ. München (Germany); Jan M. Snigula, Max-Planck-Institut für extraterrestrische Physik (Germany) and Ludwig-Maximilians-Univ. München (Germany); Mihael Kodric, Ludwig-Maximilians-Univ. München (Germany) . . . . . [9152-108]

16:40: **VLT instruments: industrial solutions for non-scientific detector systems**, Philippe R. Duhoux, Jens Knudstrup, Paul Lilley, European Southern Observatory (Germany); Paolo Di Marcantonio, Roberto Cirami, Marco Mannetta, INAF - Osservatorio Astronomico di Trieste (Italy) . . . . . [9152-16]

LOCATION: ROOM 520E . . . . . 17:00 TO 18:00

Open Discussion / Astroshare

Session Chairs: **Alan Bridger,** UK Astronomy Technology Ctr. (United Kingdom); **Bret Goodrich,** National Solar Observatory (USA)

As in past SPIE conferences, we have reserved one session for an open discussion on how we can develop and strengthen our astronomical software development community.

Topics to be discussed include what realistic and practical collaboration opportunities exist, how to continue discussions between SPIE conferences, how to facilitate sharing work with others, the Astroshare wiki and other possibilities for fostering connections and collaborations.

This will be an opportunity to air and discuss new ideas in an informal setting and by scheduling the session early in the conference there is the possibility of smaller groups meeting to achieve practical result before the conference ends.

POSTER SESSION–SUNDAY

LOCATION: ROOM 516 . . . . . SUN 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Sunday. The interactive poster session with authors in attendance will be Sunday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

INO340 telescope control system: software architecture and development, Reza Ravanmehr, Asghar Jafarzadeh, Iranian National Observatory (Iran, Islamic Republic of); Babak Sedehi, Canadian Telescopes (Canada). . . . . [9152-4]

Similarities between GCS and human motor cortex: complex movement coordination, Jose Antonio Rodriguez Losada, Rosa M. Macías-Verde, Jordi Molgó Sendra, Dailos Guerra Ramos, Instituto de Astrofísica de Canarias (Spain) . . . . . [9152-47]

OCS: towards a more efficient telescope, Jose Guerra Sr., Marcello Lodi, José San Juan Gómez, Nauzet Hernandez, Manuel D. Gonzalez, Adriano Ghedina, Telescopio Nazionale Galileo (Spain) . . . . . [9152-60]

Development of aberration measurement program using curvature sensing technique, Hyun-Il Sung, Korea Astronomy and Space Science Institute (Korea, Republic of) . . . . . [9152-61]

The control, monitor, and alarm system for the ICT equipment of the ASTRI SST-2M telescope prototype for the Cherenkov Telescope Array, Fulvio Gianotti, INAF - IASF Bologna (Italy); Giuseppe Leto, INAF - Osservatorio Astronomico di Capodimonte (Italy); Stefano Gallozzi, INAF - Osservatorio Astronomico di Roma (Italy); Andrea A. Bulgarelli, Vito Conforti, Massimo Trifoglio, Giuseppe Malaguti, Valentina Fioretti, Alessandro Tacchini, Andrea Zoli, INAF - IASF Bologna (Italy) . . . . . [9152-62]

Dual redundant tracking control system for telescope, Heng Li, Changzhi Ren, Yong Niu, Nanjing Institute of Astronomical Optics & Technology (China). [9152-64]

One sliding mode control algorithm for telescope tracking system, Yong Niu, Changzhi Ren, Heng Li, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9152-65]

Using DARC in a multi-object AO bench and in a dome seeing instrument, Norman Saez, ALMA (Chile) and Pontificia Univ. Católica de Chile (Chile); Alastair G. Basden, Durham Univ. (United Kingdom); Christian Dani Guzman Carmine, Pontificia Univ. Católica de Chile (Chile) . . . . . [9152-66]

A CCD experimental platform for large telescope in Antarctica based on FPGA, Yuhua Zhu, Yongjun Qi, Nanjing Institute of Astronomical Optics & Technology (China) . . . . . [9152-67]

VLTI reflective memory network recorder upgrade: an opportunity to benchmark Intel Multicore versus Freescale Power PC architecture on a low latency real time application., Roberto Abuter, Robert Frahm, Helmut Tischer, European Southern Observatory (Germany) . . . . . [9152-68]

Improving the WIYN telescope's pointing and tracking performance with a star tracker camera, Jayadev K. Rajagopal, National Optical Astronomy Observatory (USA); Daniel R. Harbeck, WIYN Observatory (USA); Charles Corson, Behzad Abareshi, National Optical Astronomy Observatory (USA); Eric J. Hooper, WIYN Observatory (USA); Jeffrey W. Percival, Kurt P. Jaehnig, Univ. of Wisconsin-Madison (USA). . . . . [9152-70]

INO340 telescope control system: hardware design and development, Asghar Jafarzadeh, Reza Ravanmehr, Iranian National Observatory (Iran, Islamic Republic of) . . . . . [9152-71]

CARMENES instrument control system and operational scheduler, Josep Guàrdia, Álvaro García Piquer, Josep Colomé, Ignasi Ribas, Lluis Gesa, ICE - Institut de Ciències de l'Espai (Spain). . . . . [9152-72]

A complete solar eruption activities processing tool with robotization and real time (II), Ganghua Lin, Xiao Yang, Cui Zhao, National Astronomical Observatories (China) . . . . . [9152-73]

The software for the AAT's HERMES instrument, Tony J. Farrell, Michael N. Birchall, Michael Goodwin, Ron Heald, Keith Shortridge, Scott Smedley, Minh V. Vuong, Australian Astronomical Observatory (Australia). . . . . [9152-75]

MUSE instrumentation software, Gérard Zins, Institut de Planétologie et d'Astrophysique de Grenoble (France); Arlette Pécontal-Rousset, Ctr. de Recherche Astronomique de Lyon (France); Marie Larrieu, Nathalie Girard, Institut de Recherche en Astrophysique et Planétologie (France); Aurélien Jarno, Ctr. de Recherche Astronomique de Lyon (France); Claudio Cumani, European Southern Observatory (Germany); Pedro Baksai, European Southern Observatory (Chile); Mauro Comin, Mario Kiekebusch, Jens Knudstrup, Dan Popovic, European Southern Observatory (Germany); Roland M. Bacon, Johan Richard, Ctr. de Recherche Astronomique de Lyon (France); Remko Stuik, Leiden Observatory (Netherlands); Joel R. D. Vernet, European Southern Observatory (Chile) . [9152-76]

Spectrograph control system of Chinese SONG telescope, Jianing Wang, Pengfei Gao, Yizhong Zeng, Songxin Dai, Zhongwen Hu, Yuhua Zhu, Nanjing Institute of Astronomical Optics & Technology (China). . . . . [9152-77]

Developments in simulations and software for a near-infrared precision radial velocity spectrograph, Ryan C. Terrien, Chad F. Bender, Suvrath Mahadevan, Samuel Halverson, Lawrence W. Ramsey, Frederick R. Hearty, The Pennsylvania State Univ. (USA). . . . . [9152-78]

The telescope control unit of the ASTRI SST-2M prototype for the Cherenkov telescope Array: hardware and software design and architecture, Elisa Antolini, Univ. degli Studi di Perugia (Italy); Enrico Cascone, INAF - Osservatorio Astronomico di Capodimonte (Italy); Joseph Schwarz, European Southern Observatory (Germany); Luca Stringhetti, INAF - IASF Milano (Italy); Gino Tosti, Univ. degli Studi di Perugia (Italy) and for the ASTRI Collaboration and the CTA Comnsortium (Italy) . . . . . [9152-79]

ESPRESSO instrument control electronics: a PLC based distributed layout for a second generation instrument @ ESO VLT, Veronica Baldini, Roberto Cirami, Igor Coretti, Stefano Cristiani, Paolo Di Marcantonio, Marco Mannetta, Paolo Santin, INAF - Osservatorio Astronomico di Trieste (Italy); Denis Mégevand, Observatoire de Genève (Switzerland); Filippo Maria M. Zerbi, INAF - Osservatorio Astronomico di Brera (Italy). . . . . [9152-80]

The upgrade of an educational observatory control system with a PLC-based architecture, Veronica Baldini, Roberto Cirami, Igor Coretti, Paolo Di Marcantonio, Samuele Galeotta, Giulia Iafrate, Marco Mannetta, Paolo Santin, INAF - Osservatorio Astronomico di Trieste (Italy) . . . . . [9152-81]

HERMES travels by CAN bus, Lewis G. Waller, Keith Shortridge, Tony J. Farrell, Rolf Muller, Minh V. Vuong, Australian Astronomical Observatory (Australia). . . . . [9152-82]

MathWorks Simulink and C++ integration to the new VLT PLC-based standard development platform for instrument control systems, Mario Kiekebusch, Nicola Di Lieto, Stefan Sandrock, Dan Popovic, Gianluca Chiozzi, European Southern Observatory (Germany) . . . . . [9152-84]

Advances in the development of FRIDA´s mechanisms control system and house-keeping, Rubén A. Flores-Meza, Gerardo Lara, José Leonardo Garcés, Beatriz Sánchez, Carlos Espejo, Carolina Keiman, Salvador Cuevas, Univ. Nacional Autónoma de México (Mexico); Jose J. Díaz, Instituto Astrofísico de Canarias (Spain) . . . . . [9152-85]

The ASTRI SST-2M telescope prototype for the Cherenkov Telescope Array: DAQ software architecture, Vito Conforti, Massimo Trifoglio, Andrea A. Bulgarelli, Fulvio Gianotti, Giuseppe Malaguti, INAF - IASF Bologna (Italy); Milvia Capalbi, Osvaldo Catalano, INAF - IASF Palermo (Italy); Valentina Fioretti, Alessandro Tacchini, Andrea Zoli, INAF - IASF Bologna (Italy) . . . . . [9152-86]

LBT prime focus camera (LBC) control software upgrades, Kellee R. Summers, Large Binocular Telescope Observatory (USA); Andrea Di Paola, Mauro Centrone, INAF - Osservatorio Astronomico di Roma (Italy); Michelle L. Edwards, John M. Hill, Olga P. Kuhn, Large Binocular Telescope Observatory (USA); Fernando Pedichini, INAF - Osservatorio Astronomico di Roma (Italy); Douglas M. Summers, Large Binocular Telescope Observatory (USA) . . . . . [9152-88]

Recent developments for the Large Binocular telescope guiding control subsystem, Taras Golota, Large Binocular Telescope Observatory (USA); Michele D. De La Peña, The Univ. of Arizona (USA); Christopher Biddick, Robert L. Meeks, Large Binocular Telescope Observatory (USA); Michael P. Lesser, The Univ. of Arizona (USA); Torsten Leibold, Bruker Nano Inc. (USA); Douglas L. Miller, Large Binocular Telescope Observatory (USA); Thomas Hahn, Leibniz-Institut für Astrophysik Potsdam (Germany); Douglas M. Summers, Large Binocular Telescope Observatory (USA); Jesper Storm, Leibniz-Institut für Astrophysik Potsdam (Germany); John M. Hill, Large Binocular Telescope Observatory (USA); Joseph Kraus, The Univ. of Arizona (USA); Stephen Hooper, Univ. of Arizona Imaging Technology Lab. (USA); Douglas Fisher, Large Binocular Telescope Observatory (USA) . . . . . [9152-89]

The control system of the 12-m Mid-Size telescope prototype: a test-ground for the CTA array control, Igor Oya, Ekrem Oguzhan Anguner, Humboldt-Univ. zu Berlin (Germany); Bagmeet Behera, Deutsches Elektronen-Synchrotron (Germany); Emrah Birsin, Humboldt-Univ. zu Berlin (Germany); Matthias Fuessling, Univ. Potsdam (Germany); Rico Lindemann, David Melkumyan, Torsten Schmidt, Deutsches Elektronen-Synchrotron (Germany); Ullrich Schwanke, Humboldt-Univ. zu Berlin (Germany); Peter Wegner, Stephan Wiesand, Deutsches Elektronen-Synchrotron (Germany) . . . . . [9152-90]

A traffic analyzer for multiple SpaceWire links, Scige J. Liu, Giovanni Giusi, Anna Maria Di Giorgio, Nello Vertolli, Emanuele Galli, David Biondi, Maria Farina, Stefano Pezzuto, Luigi Spinoglio, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy) . . . . . [9152-91]

Metadata and data management for the Keck Observatory archive, Hien D. Tran, Robert W. Goodrich, Jennifer Holt, Jeffrey A. Mader, W. M. Keck Observatory (USA); Melanie Swain, Anastasia C. Laity, Mihseh Kong, Christopher R. Gelino, Graham B. Berriman, NASA Exoplanet Science Institute (USA) . . . . . [9152-92]

Advanced data products for the JCMT Science Archive, Graham S. Bell, Sarah F. Graves, Malcolm J. Currie, David S. Berry, Harriet A. L. Parsons, Joint Astronomy Ctr. (USA); Timothy Jenness, Joint Astronomy Ctr. (USA) and Cornell Univ. (USA); Russell O. Redman, Jessica T. Dempsey, Douglas I. Johnstone, Joint Astronomy Ctr. (USA); Frossie Economou, Joint Astronomy Ctr. (USA) and National Optical Astronomy Observatory (USA) . . . . . [9152-93]

The ASTRI project within Cherenkov Telescope Array: data analysis and archiving, Lucio Angelo Antonelli, INAF - Osservatorio Astronomico di Roma (Italy) and Agenzia Spaziale Italiana (Italy); Saverio Lombardi, INAF - Osservatorio Astronomico di Roma (Italy); Fabrizio Lucarelli, INAF - Osservatorio Astronomico di Roma (Italy) and Agenzia Spaziale Italiana (Italy); Denis Bastieri, Sara Buson, Univ. degli Studi di Padova (Italy); Milvia Capalbi, INAF - IASF Palermo (Italy); Alessandro Carosi, Agenzia Spaziale Italiana (Italy) and INAF - Osservatorio Astronomico di Roma (Italy); Andrea Di Paola, Stefano Gallozzi, INAF - Osservatorio Astronomico di Roma (Italy); Dario Gasparrini, Agenzia Spaziale Italiana (Italy) and INAF - Osservatorio Astronomico di Roma (Italy); Matteo Perri, INAF - Osservatorio Astronomico di Roma (Italy) and Agenzia Spaziale Italiana (Italy); Vincenzo Testa, INAF - Osservatorio Astronomico di Roma (Italy) . . . . . [9152-94]

An experiment in Big Data: Storage, querying and visualisation of data taken from the Liverpool Telescope's wide field cameras, Robert M. Barnsley, Iain A. Steele, Liverpool John Moores Univ. (United Kingdom) . . . . . [9152-95]

Data service system of Korea Data Center for SDO, Ji-Hye Baek, Seonghwan Choi, Eunmi Hwang, Jongyeob Park, Yeon-Han Kim, Young-Deuk Park, Korea Astronomy and Space Science Institute (Korea, Republic of) . . . . . [9152-96]

EMIR Data factory system, Josefina Rosich Minguell, Maria Barreto Cabrera, Nieves Castro Rodriguez, Instituto de Astrofísica de Canarias (Spain); Francisco Garzón López, Instituto de Astrofísica de Canarias (Spain) and Univ. de La Laguna (Spain); Dailos Guerra Ramos, GRANTECAN S.A. (Spain); Maider Insausti, Luis López, Instituto de Astrofísica de Canarias (Spain); Jordi Molgó Sendra, GRANTECAN S.A. (Spain); Jesús Patrón Recio, Instituto de Astrofísica de Canarias (Spain) . . . . . [9152-97]

Architectures of transfer and storage systems of Korea Data Center for SDO, Eunmi Hwang, Seonghwan Choi, Ji-Hye Baek, Yeon-Han Kim, Young-Deuk Park, Jongyeob Park, Korea Astronomy and Space Science Institute (Korea, Republic of) . . . . . [9152-98]

Chilean Virtual Observatory services implementation for the ALMA public data, Jonathan A. Antognini, Mauricio G. Solar, Univ. Técnica Federico Santa María (Chile); Jorge F. Ibsen, Lars-Åke Nyman, ALMA (Chile); Diego Mardones, Univ. de Chile (Chile); Karim Pichara, Pontificia Univ. Católica de Chile (Chile); Neil Nagar, Univ. de Concepción (Chile); Victor Parada, Univ. de Santiago de Chile (Chile); Camilo Valenzuela, Patricio Ramirez, Christopher Fernandez, Marco Peña, Mario Garces, Univ. Técnica Federico Santa María (Chile) . . . . . [9152-99]

On board detection and removal of CR and SEP signatures for the Solar Orbiter-METIS coronagraph, Vincenzo Andretta, INAF - Osservatorio Astronomico di Capodimonte (Italy); Alessandro Bemporad, INAF - Osservatorio Astronomico di Torino (Italy); Mauro Focardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Catia Grimani, Univ. degli Studi di Urbino Carlo Bo (Italy); Federico Landini, Maurizio Pancrazzi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Clementina Sasso, INAF - Osservatorio Astronomico di Capodimonte (Italy); Daniele Spadaro, INAF - Osservatorio Astrofisico di Catania (Italy); Thomas Straus, INAF - Osservatorio Astronomico di Capodimonte (Italy); Michela C. Uslenghi, INAF - IASF Milano (Italy); Ester Antonucci, Silvano Fineschi, INAF - Osservatorio Astronomico di Torino (Italy); Giampiero Naletto, Univ. degli Studi di Padova (Italy); Gianalfredo Nicolini, INAF - Osservatorio Astronomico di Torino (Italy); Piergiorgio Nicolosi, Univ. degli Studi di Padova (Italy); Marco Romoli, Univ. degli Studi di Firenze (Italy) . . . . . [9152-100]

Automatic detection and automatic classification of structures in astronomical images, Rodrigo A. Gregorio, Univ. Técnica Federico Santa María (Chile); Diego Mardones, Univ. de Chile (Chile); Mauricio G. Solar, Univ. Técnica Federico Santa María (Chile); Karim Pichara, Pontificia Univ. Católica de Chile (Chile); Ricardo Contreras, Univ. de Concepción (Chile); Victor Parada, Univ. de Santiago de Chile (Chile) . . . . . [9152-101]

BASKET on-board software library, Roland Ottensamer, Franz Kerschbaum, Armin Luntzer, Univ. Wien (Austria) . . . . . [9152-103]

Improving Herschel imaging datasets, Roland Ottensamer, Univ. Wien (Austria) . . . . . [9152-104]

Integrating the ODI-PPA scientific gateway with the QuickReduce pipeline for on-demand processing, Michael D. Young, Indiana Univ. (USA); Ralf Kotulla, Univ. of Wisconsin-Milwaukee (USA); Arvind Gopu, Indiana Univ. (USA); Wilson M. Liu, WIYN Observatory (USA) . . . . . [9152-106]

Cherenkov Telescope Array science data analysis using the ctools, Jürgen Knödlseder, Sylvie Brau-Nogué, Institut de Recherche en Astrophysique et Planétologie (France); Christoph Deil, Chia-Chun Lu, Max-Planck-Institut für Kernphysik (Germany); Pierrick Martin, Institut de Recherche en Astrophysique et Planétologie (France); Michael Mayer, Anneli Schulz, DESY (Germany). . [9152-107]

An overview of the planned CCAT software system, Timothy Jenness, Cornell Univ. (USA); Martin C. Shepherd, California Institute of Technology (USA); Reinhold Schaaf, Argelander-Institut für Astronomie (Germany); Jack Sayers, California Institute of Technology (USA); Volker Ossenkopf, Univ. zu Köln (Germany); Thomas Nikola, Cornell Univ. (USA); Gaelen Marsden, The Univ. of British Columbia (Canada); Ronan Higgins, Univ. zu Köln (Germany); Kevin Edwards, Univ. of Waterloo (Canada); Adam Brazier, Cornell Univ. (USA); . . . . . [9152-109]

Large Binocular Telescope Observatory (LBTO) software and IT group operations status update and near-term development roadmap, Douglas M. Summers, David S. Ashby, Joar G. Brynnel, Christopher Biddick, Chris Cox, Dan Cox, Taras Golota, John K. Little, Michele D. De La Peña, Douglas Fisher, John M. Hill, Stephen Hooper, Joseph Kraus, Tom Sargent, Kellee R. Summers, Christian Veillet, R. Mark Wagner, Large Binocular Telescope Observatory (USA) . [9152-110]

Evolution of a generic control software connecting astronomical instruments to the reflective memory data recording system of VLTI, Eszter Pozna, Than P. Duc, Roberto Abuter, European Southern Observatory (Germany); Andres Ramirez, Antoine Mérand, André Müller, European Southern Observatory (Chile) . [9152-112]

A multi-threaded approach to using asynchronous C libraries with Java, John Gates, Univ. of California Observatories (USA) . . . . . [9152-113]

CONFERENCE 9152 · LOCATION: ROOM 520E

MONDAY 23 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . MON 8:50 TO 10:00

Session Chair: **Luc Simard,** National Research Council of Canada - Herzberg Institute of Astrophysics (Canada)

08:50: **Welcome**

9:00: **James Webb Space Telescope: the road to first science observations** *(Plenary)*, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) [9143-501]

9:30: **The Square Kilometre Array: a physics machine for the 21st Century** *(Plenary)*, Philip Diamond, SKA Organisation (United Kingdom) . . [9143-502]

Coffee Break . . . . . Mon 10:00 to 10:30

SESSION 5

LOCATION: ROOM 520E . . . . . MON 10:30 TO 12:30

Data Processing and Pipelines

Session Chairs: **Tom Donaldson,** Space Telescope Science Institute (USA); **Juan C. Guzman,** Commonwealth Scientific and Industrial Research Organisation (Australia)

10:30: **ALMA service data analysis and level 2 quality assurance with CASA**, Dirk Petry, European Southern Observatory (Germany) . . . . . [9152-17]

10:50: **On board CME detection algorithm for the Solar Orbiter-METIS coronagraph**, Alessandro Bemporad, INAF - Osservatorio Astronomico di Torino (Italy); Vincenzo Andretta, INAF - Osservatorio Astronomico di Capodimonte (Italy); Maurizio Pancrazzi, Mauro Focardi, INAF - Osservatorio Astrofisico di Arcetri (Italy); Thomas Straus, Clementina Sasso, INAF - Osservatorio Astronomico di Capodimonte (Italy); Daniele Spadaro, INAF - Osservatorio Astrofisico di Catania (Italy); Michela C. Uslenghi, INAF - IASF Milano (Italy); Ester Antonucci, Silvano Fineschi, Lucia Abbo, Gianalfredo Nicolini, INAF - Osservatorio Astronomico di Torino (Italy); Federico Landini, INAF - Osservatorio Astrofisico di Arcetri (Italy); Marco Romoli, Univ. degli Studi di Firenze (Italy); Giampiero Naletto, Piergiorgio Nicolosi, Univ. degli Studi di Padova (Italy). . . . . [9152-18]

11:10: **CRUSH: data reduction and imaging for future (sub)millimeter arrays**, Attila Kovacs, California Institute of Technology (USA) and Univ. of Minnesota (USA) . . . . . [9152-19]

11:30: **4MOST: 4-metre multi-object spectroscopic telescope: science data system**, Nicholas A. Walton, Michael J. Irwin, Eduardo Gonzalez-Solares, James R. Lewis, Univ. of Cambridge (United Kingdom); Dietrich Baade, European Southern Observatory (Germany); C. Jakob Walcher, Roelof S. de Jong, Leibniz-Institut für Astrophysik Potsdam (Germany). . . . . [9152-20]

11:50: **MASCARA: data handling, processing, and calibration**, Remko Stuik, Anna-Léa Lesage, Arthur Jakobs, Julien F. P. Spronck, Ignas A. G. Snellen, Leiden Univ. (Netherlands) . . . . . [9152-21]

12:10: **Data management pipeline and hardware facilities for J-PAS and J-PLUS surveys archiving and processing**, David Cristóbal-Hornillos, Mariano Moles, A. Javier Cenarro, Antonio Marín-Franch, Axel Yanes Díaz, Ctr. de Estudios de Física del Cosmos de Aragón (Spain) . . . . . [9152-22]

Lunch Break . . . . . Mon 12:30 to 13:40

SESSION 6

LOCATION: ROOM 520E . . . . . MON 13:40 TO 15:20

Control Systems for Spectrographs

Session Chairs: **Alan Bridger,** UK Astronomy Technology Ctr. (United Kingdom); **Bret Goodrich,** National Solar Observatory (USA)

13:40: **Fibre positioning algorithms for the WEAVE spectrograph**, David L. Terrett, Rutherford Appleton Lab. (United Kingdom); Ian J. Lewis, Gavin B. Dalton, Univ. of Oxford (United Kingdom); Don Carlos Abrams, Jose Alfonso López Aguerri, Isaac Newton Group of Telescopes (Spain); Piercarlo Bonifacio, Observatoire de Paris à Meudon (France); Kevin F. Middleton, Rutherford Appleton Lab. (United Kingdom); Scott C. Trager, Kapteyn Astronomical Instituut (Netherlands). [9152-23]

14:00: **Collision avoidance algorithm: discretization of velocity profiles**, Laleh Makarem, Jean-Paul Kneib, Denis Gillet, Hannes Bleuler, Mohamed Bouri, Laurent Jenni, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Francisco Prada, Univ. Autónoma de Madrid (Spain); Justo Sánchez, Instituto de Astrofísica de Andalucía (Spain). . . . . [9152-24]

14:20: **WEAVE: The next generation fibre spectroscopy facility for the William Herschel telescope: core data processing**, Nicholas A. Walton, Michael J. Irwin, James R. Lewis, Eduardo Gonzalez-Solares, Univ. of Cambridge (United Kingdom); Gavin B. Dalton, Rutherford Appleton Lab. (United Kingdom) and Univ. of Oxford (United Kingdom); Carlos Allende Prieto, Jose Alfonso López Aguerri, Instituto de Astrofísica de Canarias (Spain); Chris R. Benn, Isaac Newton Group of Telescopes (Spain); Scott C. Trager, Univ. of Groningen (Netherlands); Don Carlos Abrams, Isaac Newton Group of Telescopes (Spain); Kevin F. Middleton, Rutherford Appleton Lab. (United Kingdom); Piercarlo Bonifacio, Observatoire de Paris à Meudon (France) . . . . . [9152-25]

14:40: **Field target allocation and routing algorithms for starbugs**, Michael Goodwin, Nuria P. F. Lorente, Australian Astronomical Observatory (Australia); Sungwook E. Hong, Korea Institute for Advanced Study (Korea, Republic of); Christophe Satorre, Ecole Polytechnique Fédérale de Lausanne (Switzerland) . . . . . [9152-26]

15:00: **Commissioning MOS and Fabry Perot modes for the Robert Stobie spectrograph on the Southern African Large telescope**, Anthony R. Koeslag, Theodore Williams, South African Astronomical Observatory (South Africa); Kenneth H. Nordsieck, Univ. of Wisconsin-Madison (USA); Encarni Romero Colmenero, Petri Vaisanen, South African Astronomical Observatory (South Africa). . . . . [9152-27]

Coffee Break . . . . . Mon 15:20 to 15:50

SESSION 7

LOCATION: ROOM 520E . . . . . MON 15:50 TO 17:30

Cyberinfrastructure I

Session Chairs: **Bret Goodrich,** National Solar Observatory (USA); **Alan Bridger,** UK Astronomy Technology Ctr. (United Kingdom)

15:50: **Recommissioning Cassegrain Instruments at the telescope currently still known as UKIRT**, Maren Hauschildt-Purves, Craig A. Walther, Timothy C. Chuter, Ryan M. Berthold, Bryan H. Gorges, Joint Astronomy Ctr. (USA) [9152-111]

16:10: **ALMA communication backbone in Chile goes optical**, Giorgio Filippi, European Southern Observatory (Germany); Jorge F. Ibsen, European Southern Observatory (Chile); Sandra Jaque, Red Univ. Nacional (Chile); Fernando Liello, Univ. e della Ricerca (Italy) . . . . . [9152-29]

16:30: **Back to the future: virtualization of the computing environment at the W. M. Keck Observatory**, Kevin L. McCann, Denny J. Birch, William Randolph, Josephine A. Ward, W. M. Keck Observatory (USA). . . . . [9152-30]

16:50: **Refactoring GBT software to support high data rate instruments using data streaming technology**, Mark Whitehead, Ramon E. Creager, National Radio Astronomy Observatory (USA) . . . . . [9152-31]

17:10: **Software design for the VIS instrument onboard the EUCLID mission: a multilayer approach**, Emanuele Galli, Anna Maria Di Giorgio, Stefano Pezzuto, Scige J. Liu, Giovanni Giusi, INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Maria Farina, INAF - Osservatorio Astronomico di Palermo Giuseppe S. Vaiana (Italy); Gianluca Li Causi, INAF - Osservatorio Astronomico di Roma (Italy); Jamie Denniston, Sami Niemi, Mark S. Cropper, Univ. College London (United Kingdom) . . . . . [9152-32]

TUESDAY 24 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . TUE 8:50 TO 10:00

Session Chair: **Gillian S. Wright,** UK Astronomy Technology Ctr. (United Kingdom)

8:50: **SPIE Fellows Awards** presented by H. Philip Stahl, President of SPIE. The following individuals will be recognized for their contributions to SPIE and the scientific community: **Mark Clampin,** NASA Goddard Space Flight Ctr. (United States); **Gary Matthews,** Exelis Inc. (United States); **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (United States)

9:00: **Gaia: scientific in-orbit performance** *(Plenary),* Timo Prusti, European Space Agency (Netherlands) . . . . . [9143-503]

9:30: **ALMA Update** *(Plenary)*, Pierre Cox, Joint ALMA Observatory (Chile); Stuartt A. Corder, National Radio Astronomy Observatory (Chile) [9143-504]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 8

LOCATION: ROOM 520E . . . . . TUE 10:30 TO 12:10

Control Systems

Session Chairs: **Kim K. Gillies,** Thirty Meter Telescope Observatory Corp. (USA); **Gianluca Chiozzi,** European Southern Observatory (Germany)

10:30: **DKIST controls model for synchronization of instrument cameras, polarization modulators, and mechanisms**, Andrew Ferayorni, Bret Goodrich, Chris Berst, National Solar Observatory (USA) . . . . . [9152-33]

10:50: **ACS (Alma Common Software) operating a set of robotic telescopes**, Christian Westhues, Holger Drass, Michael Ramolla, Roland Lemke, Rolf Chini, Ruhr-Univ. Bochum (Germany) . . . . . [9152-34]

11:10: **Achieving autonomous operation of the automated planet finder (APF)**, Jennifer A. Burt, Univ. of California, Santa Cruz (USA); Steven S. Vogt, Univ. of California Observatories (USA); R. Paul Butler, Pamela Arriagada, Carnegie Institution of Washington (USA); Russell Hanson, Greg Laughlin, Univ. of California, Santa Cruz (USA). . . . . [9152-35]

11:30: **STARS: a software application for the EBEX autonomous daytime star cameras**, Daniel Chapman, Joy Didier, Columbia Univ. (USA); Yury Vinokurov, Carnegie Mellon Univ. (USA) . . . . . [9152-36]

11:50: **Upgrade and standardization of real-time software for telescope systems at the Gemini telescopes**, William N. Rambold, Pedro Gigoux, Cristian Urrutia, Gemini Observatory (Chile); Angelic Ebbers, Gemini Observatory (USA); Philip Taylor, Observatory Sciences Ltd. (United Kingdom); Mathew J. Rippa, Gemini Observatory (USA); Roberto Rojas, Gemini Observatory (Chile); Tom Cumming, Gemini Observatory (USA). . . . . [9152-37]

Lunch Break . . . . . Tue 12:10 to 13:30

SESSION 9

LOCATION: ROOM 520E . . . . . TUE 13:30 TO 16:10

Software Engineering

Session Chairs: **Juan C. Guzman,** Commonwealth Scientific and Industrial Research Organisation (Australia); **Nicole M. Radziwill,** James Madison Univ. (USA)

13:30: **Your data is your dogfood: DevOps in the astronomical observatory** *(Invited Paper)*, Frossie Economou, Joshua C. Hoblitt, Pat Norris, National Optical Astronomy Observatory (USA) . . . . . [9152-38]

14:00: **Software and cyber-infrastructure development to control the Observatorio Astrofísico de Javalambre (OAJ)**, Axel Yanes Díaz, A. Javier Cenarro, Antonio Marín-Franch, David Cristóbal-Hornillos, Mariano Moles, Ctr. de Estudios de Física del Cosmos de Aragón (Spain) . . . . . [9152-39]

14:20: **Evolution of the SOFIA tracking system**, Norbert Fiebig, redlogix Software & System Engineering GmbH (Germany); Holger Jakob, Univ. Stuttgart (Germany) and NASA Dryden Flight Research Ctr. (USA); Manuel Wiedemann, Enrico Pfüller, Jürgen Wolf, Univ. Stuttgart (Germany) and NASA Ames Research Ctr. (USA); Hans-Peter Röser, Univ. Stuttgart (Germany) . . . . . [9152-40]

14:40: **Towards a global software architecture for operating and controlling the Cherenkov Telescope Array**, Matthias Fuessling, Univ. Potsdam (Germany); Igor Oya, Humboldt-Univ. zu Berlin (Germany); Peter Wegner, Deutsches Elektronen-Synchrotron (Germany); Ullrich Schwanke, Humboldt-Univ. zu Berlin (Germany); Josep Colomé, Jordi Campreciós, ICE - Institut de Ciències de l'Espai (Spain); Thierry Le Flour, Univ. de Savoie (France); Rico Lindemann, Deutsches Elektronen-Synchrotron (Germany); Etienne Lyard, Univ. de Genève (Switzerland); Gino Tosti, Univ. degli Studi di Perugia (Italy); Amanda Weinstein, Iowa State Univ. (USA); Dirk Hoffmann, Ctr. de Physique des Particules de Marseille (France) and Institut National de Physique Nucléaire et de Physique des Particules (France) and Aix-Marseille Univ. (France); Thomas B. Humensky, Columbia Univ. (USA); Michael Punch, Univ. Paris 7-Denis Diderot (France) and Institut National de Physique Nucléaire et de Physique des Particules (France) and Observatoire de Paris (France); Torsten Schmidt, Deutsches Elektronen-Synchrotron (Germany); Joseph Schwarz, INAF - Osservatorio Astronomico di Brera (Italy); Ralf Wischnewski, Deutsches Elektronen-Synchrotron (Germany). . . . . [9152-41]

15:00: **Experiences with the design and construction of wideband spectral line and pulsar instrumentation with CASPER hardware and software: the digital backend system**, Richard M. Prestage, Marty Bloss, John M. Ford, National Radio Astronomy Observatory (USA) . . . . . [9152-42]

15:20: **Phasing up ALMA**, Matias Mora Klein, National Radio Astronomy Observatory (USA); Geoffrey Crew, MIT Haystack Observatory (USA); Helge Rottmann, Max-Planck-Institut für Radioastronomie (Germany) . . . . . [9152-44]

Coffee Break . . . . . Tue 15:40 to 16:10

LOCATION: ROOM 520E . . . . . 16:10 TO 17:30

Lightning Talks

Session Chairs: **Nicole M. Radziwill,** James Madison Univ. (USA); **Kim K. Gillies,** Thirty Meter Telescope Observatory Corp. (USA)

Lightning talks are short (less than 5 minute) interest-driven talks where you can ask questions to the audience, present a new idea or insight, share an untested hypothesis, or just communicate lessons learned or other things you've found useful in your work. Simply show up and present your proposal and be prepared to give your brief presentation if selected.

You are encouraged to visit http://perl.plover.com/lt/osc2003/lightning-talks.html for examples of past sessions.

WEDNESDAY 25 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . WED 9:00 TO 10:00

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

9:00: **Highlights from the Multi Unit Spectroscopic Explorer (MUSE): a 2nd generation VLT instrument for the VLT** *(Plenary)*, Roland M. Bacon, Observatoire de Lyon (France) . . . . . [9147-506]

9:30: **Canadian Space Astronomy: past, present and future** *(Plenary)*, John B. Hutchings, NRC - Herzberg Institute of Astrophysics (Canada) [9143-505]

Coffee Break . . . . . Wed 10:00 to 10:30

SESSION 10

LOCATION: ROOM 520E . . . . . WED 10:30 TO 12:30

Innovations

Session Chairs: **Kim K. Gillies,** Thirty Meter Telescope Observatory Corp. (USA); **Tom Donaldson,** Space Telescope Science Institute (USA)

10:30: **A web-based dashboard for the high-level monitoring of ALMA** *(Invited Paper)*, Emmanuel Pietriga, INRIA Chile (Chile); Giorgio Filippi, European Southern Observatory (Germany); Fernando del Campo, Luis Veliz, INRIA Chile (Chile); Jorge F. Ibsen, ALMA (Chile) . . . . . [9152-45]

11:00: **Software for autonomous astronomical observatories: challenges and opportunities in the age of big data** *(Invited Paper)*, Piotr W. Sybilski, Rafal Pawlaszek, Stanislaw K. Kozlowski, Maciej Konacki, Milena Ratajczak, Nicolaus Copernicus Astronomical Ctr. (Poland); Krzysztof G. Helminiak, Pontificia Univ. Católica de Chile (Chile) and Nicolaus Copernicus Astronomical Ctr. (Poland) . . . . . [9152-46]

11:30: **DKIST visible tunable filter control software: connecting the DKIST framework to OPC UA**, Alexander Bell, Clemens Halbgewachs, Andreas Fischer, Thomas J. Kentischer, Oskar von der Lühe, Wolfgang Schmidt, Michael Sigwarth, Kiepenheuer-Institut für Sonnenphysik (Germany) . . . . . [9152-83]

11:50: **The Robo-AO automated intelligent queue system**, Reed L. Riddle, Kristina Hogstrom, California Institute of Technology (USA); Athanasios Papadopoulos, Aristotle Univ. of Thessaloniki (Greece); Christoph Baranec, Univ. of Hawai'i (USA); Nicholas M. Law, The Univ. of North Carolina at Chapel Hill (USA) . . . . . [9152-48]

12:10: **Nonlinear switching quantitative feedback theory for optical telescopes**, William Lounsbury, Mario Garcia-Sanz, Case Western Reserve Univ. (USA) . . . . . [9152-49]

Lunch/Exhibition Break . . . . . Wed 12:30 to 13:40

CONFERENCE 9152 · LOCATION: ROOM 520E

SESSION 11

LOCATION: ROOM 520E . . . . . .WED 13:40 TO 15:20

Cyberinfrastructure II

Session Chairs: **David L. Terrett,** Rutherford Appleton Lab. (United Kingdom); **Alan Bridger,** UK Astronomy Technology Ctr. (United Kingdom)

13:40: **Unveiling ALMA software behavior using a decoupled log analysis framework**, Juan P. Gil, ALMA Observatory (Chile); Alexis Tejeda, National Radio Astronomy Observatory (USA); Tzu-Chiang Shen, Norman Saez, ALMA Observatory (Chile). . . . . [9152-50]

14:00: **Performance testing open source products for the TMT event service**, Kim K. Gillies, Thirty Meter Telescope Observatory Corp. (USA); Yogesh Bhate, Persistent Systems Ltd. (India) . . . . . [9152-51]

14:20: **EMIR: a configurable hierarchical system for event monitoring and incident response**, William T. S. Deich, Univ. of California Observatories (USA) . . . . . [9152-52]

14:40: **On-summit data processing pipeline for the DKIST visible broadband imager using data handling system and graphical processing units**, Andrew Beard, Andrew Ferayorni, Bruce Cowan, National Solar Observatory (USA)[9152-53]

15:00: **Software framework for the 2014 MMT Observatory primary mirror re-aluminization**, J. Duane Gibson, Dusty L. Clark, Dallan Porter, MMT Observatory (USA) . . . . . [9152-54]

Coffee Break . . . . . .Wed 15:20 to 15:50

SESSION 12

LOCATION: ROOM 520E . . . . . .WED 15:50 TO 17:40

Project Management

Session Chairs: **Hilton A. Lewis,** W. M. Keck Observatory (USA); **Gianluca Chiozzi,** European Southern Observatory (Germany)

15:50: **Ten things we would do differently today: reflections on a decade of ALMA software development** *(Invited Paper)*, Erich Schmid, A. Maurizio Chavan, European Southern Observatory (Germany); Brian E. Glendenning, Jeffrey S. Kern, Morgan Griffith, National Radio Astronomy Observatory (USA); George Kosugi, Manabu Watanabe, Subaru Telescope, National Astronomical Observatory of Japan (Japan); Jorge F. Ibsen, Ruben Soto, Joint ALMA Observatory (Chile). . . . . [9152-55]

16:20: **Implementing Kanban for agile process management within the ALMA Software Operations Group**, Johnny W. Reveco, ALMA (Chile); Matias Mora Klein, National Radio Astronomy Observatory (USA); Tzu-Chiang Shen, Ruben Soto, Jorge Sepúlveda, ALMA (Chile). . . . . [9152-56]

16:40: **Commissioning of the SPHERE instrumentation software**, Andrea Baruffolo, Daniela Fantinel, INAF - Osservatorio Astronomico di Padova (Italy); Laurence Gluck, Institut de Planétologie et d'Astrophysique de Grenoble (France); Bernardo Salasnich, INAF - Osservatorio Astronomico di Padova (Italy); Gérard Zins, Institut de Planétologie et d'Astrophysique de Grenoble (France); Dan Popovic, Marcos Suarez Valles, Robert H. Donaldson, Christian Soenke, Claudio Reinero, Enrico Fedrigo, Stefano Zampieri, European Southern Observatory (Germany) . . . . . [9152-57]

17:00: **End-to-end observatory software modeling using domain specific languages**, José Filgueira, Matthieu Bec, Ning Liu, Chien Y. Peng, Jose M. Soto, Giant Magellan Telescope Project (USA) . . . . . [9152-58]

17:20: **The cost of developing and maintain the monitoring and control software of large ground-based telescopes**, Juan C. Guzman, Commonwealth Scientific and Industrial Research Organisation (Australia); Alan Bridger, UK Astronomy Technology Ctr. (United Kingdom); Gianluca Chiozzi, European Southern Observatory (Germany) . . . . . [9152-59]

LOCATION: ROOM 520E . . . . . .17:40 TO 18:00

Conference Conclusions

THURSDAY 26 JUNE

LOCATION: ROOM 520E . . . . . 9:00 TO 17:00

Software Hack Day

Session Chair: **Sarah Kendrew,** Univ. of Oxford (United Kingdom)

The SPIE Astronomical Telescopes + Instrumentation meeting will host its first Hack Day in 2014. This will be an all-day open event in conjunction with conference 9152, without formal presentations. The goal is to bring creative minds and talented developers together to share ideas, experiment, solve problems, explore or create new data in innovative ways. Software is an area where the right combination of ideas and skills can lead to rapid results, so we hope that many budding and experienced developers will join this inaugural event, eat pizza, write code, and make history.

Biography: Sarah Kendrew is an Astrophysicist at the University of Oxford, where she works on instrumentation projects for the European Extremely Large Telescope and the James Webb Space Telescope, with an interest in star formation studies from the Milky Way Galaxy to high redshifts. She is co-organiser of the .Astronomy conference series, which has hosted astronomy Hack Days annually since 2009.

CONFERENCE 9153 · LOCATION: ROOM 520A

Tuesday–Friday 24–27 June 2014 • Proceedings of SPIE Vol. 9153

Millimeter, Submillimeter, and Far-Infrared Detectors and Instrumentation for Astronomy VII


(Holland)


(Zmuidzinas)

Conference Chairs: **Wayne S. Holland,** UK Astronomy Technology Ctr. (United Kingdom); **Jonas Zmuidzinas,** California Institute of Technology (USA)

Program Committee: **Jian-Rong Gao,** SRON Netherlands Institute for Space Research (Netherlands), Delft Univ. of Technology {Netherlands); **Kent D. Irwin,** Stanford Univ. (USA); **J. Anthony Murphy,** National Univ. of Ireland, Maynooth (Ireland); **Albrecht Poglitsch,** Max-Planck-Institut für extraterrestrische Physik (Germany); **Karl Schuster,** IRAM-Domaine Univ. de Grenoble (France); **Gordon J. Stacey,** Cornell Univ. (USA); **Christopher K. Walker,** The Univ. of Arizona (USA)

TUESDAY 24 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . TUE 8:50 TO 10:00

Session Chair: **Gillian S. Wright,** UK Astronomy Technology Ctr. (United Kingdom)

8:50: **SPIE Fellows Awards** presented by H. Philip Stahl, President of SPIE. The following individuals will be recognized for their contributions to SPIE and the scientific community: **Mark Clampin,** NASA Goddard Space Flight Ctr. (United States); **Gary Matthews,** Exelis Inc. (United States); **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (United States)

9:00: **Gaia: scientific in-orbit performance** *(Plenary),* Timo Prusti, European Space Agency (Netherlands) . . . . . [9143-503]

9:30: **ALMA Update** *(Plenary)*, Pierre Cox, Joint ALMA Observatory (Chile); Stuart A. Corder, National Radio Astronomy Observatory (Chile) [9143-504]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 1

LOCATION: ROOM 520A . . . . . TUE 10:30 TO 12:30

Current/Near-Term Cameras and Arrays

Session Chair: **Wayne S. Holland,** UK Astronomy Technology Ctr. (United Kingdom)

10:30: **The NIKA 2013-2014 observation campaigns: control of systematic effects and results**, Andrea Catalano, LPSC Grenoble (France); Nicolas Ponthieu, Institut de Planétologie et d'Astrophysique de Grenoble (France); Alessia Ritacco, Rémi Adam, LPSC Grenoble (France); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Philippe André, Commissariat à l'Énergie Atomique (France); Alexandre Beelen, Institut d'Astrophysique Spatiale (France); Benoit Bélier, Institut d'Electronique Fondamentale (France); Alain Benoit, Institut NÉEL (France); Aurelien Bideaud, Cardiff Univ. (United Kingdom); Nicolas P. Billot, Instituto de RadioAstronomía Milimétrica (Spain); Olivier Bourrion, LPSC Grenoble (France); Martino Calvo, Institut NÉEL (France); Grégoire Coiffard, IRAM-Domaine Univ. de Grenoble (France); Antonio D'Addabbo, Institut NÉEL (France); François-Xavier Désert, Institut de Planétologie et d'Astrophysique de Grenoble (France); Simon M. Doyle, Cardiff Univ. (United Kingdom); Johannes Goupy, Institut NÉEL (France); Carster Kramer, Instituto de RadioAstronomía Milimétrica (Spain); Samuel Leclercq, IRAM-Domaine Univ. de Grenoble (France); Joseph Martino, Institut d'Astrophysique Spatiale (France); Philip D. Mauskopf, Cardiff Univ. (United Kingdom); Frédéric Mayet, LPSC Grenoble (France); Alessandro Monfardini, Institut NÉEL (France); François P. Pajot, Institut d'Astrophysique Spatiale (France); Enzo Pascale, Cardiff Univ. (United Kingdom); Vincent Revéret, Louis R. Rodriguez, Commissariat à l'Énergie Atomique (France); Giorgio Savini, Univ. College London (United Kingdom); Karl Schuster, IRAM-Domaine Univ. de Grenoble (France); Albrecht Sievers, Instituto de RadioAstronomía Milimétrica (Spain); Carole E. Tucker, Cardiff Univ. (United Kingdom); Robert Zylka, IRAM-Domaine Univ. de Grenoble (France) . . . . . [9153-1]

10:50: **SCUBA-2: an update on the performance of the 10,000 pixel bolometer camera after 2 years of science operation at the JCMT**, Daniel Bintley, Joint Astronomy Ctr. (USA); Wayne S. Holland, Michael J. MacIntosh, UK Astronomy Technology Ctr. (United Kingdom); Per Friberg, Graham S. Bell, Daniel A. Berke, David S. Berry, Ryan M. Berthold, Iain M. Coulson, Malcolm J. Currie, Jessica T. Dempsey, Joint Astronomy Ctr. (USA); Andrew G. Gibb, The Univ. of British Columbia (Canada); Bryan H. Gorges, Sarah F. Graves, Joint Astronomy Ctr. (USA); Timothy Jenness, Cornell Univ. (USA); Douglas I. Johnstone, Harriet A. L. Parsons, Holly S. Thomas, Craig A. Walther, Jan G. Wouterloot, Joint Astronomy Ctr. (USA) . . . . . [9153-2]

11:10: **The status of MUSIC: the multiwavelength sub/millimeter inductance camera**, Clint Bockstiegel, National Institute of Standards and Technology (USA); Spencer Brugger, Univ. of Colorado at Boulder (USA); Nicole G. Czakon, Academia Sinica (Taiwan); Peter K. Day, Jet Propulsion Lab. (USA); Thomas P. Downes, Univ. of Wisconsin (USA); Ran P. Duan, California Institute of Technology (USA); Jiansong Gao, National Institute of Standards and Technology (USA); Amandeep K. Gill, Jason Glenn, Univ. of Colorado at Boulder (USA); Sunil R. Golwala, Matthew I. Hollister, Albert Lam, California Institute of Technology (USA); Henry G. LeDuc, Jet Propulsion Lab. (USA); Philip R. Maloney, Univ. of Colorado at Boulder (USA) and Ctr. for Astrophysics & Space Astronomy (USA); Benjamin A. Mazin, Sean G. McHugh, Univ. of California, Santa Barbara (USA); David A. Miller, California Institute of Technology (USA); Anthony K. Mroczkowski, U.S. Naval Research Lab. (USA); Omid Noroozian, NASA Goddard Space Flight Ctr. (USA); Hien Trong Nguyen, Jet Propulsion Lab. (USA); Jack Sayers, James A. Schlaerth, Seth R. Siegel, Anastasios K. Vayonakis, California Institute of Technology (USA); Philip R. Wilson, Jet Propulsion Lab. (USA); Jonas Zmuidzinas, California Institute of Technology (USA) and Jet Propulsion Lab. (USA) . . . . . [9153-3]

11:30: **The ArTeMiS wide-field submillimeter camera: on-sky performance at 350 microns**, Vincent Revéret, Philippe André, Jean Le-Pennec, Michel Talvard, Patrick Agnèse, Agnès Arnaud, Jean-Charles Cigna, Laurent Clerc, Commissariat à l'Énergie Atomique (France); Carlos De Breuck, European Southern Observatory (Germany); Cyrille Delisle, Eric Doumayrou, Lionel Duband, Didier Dubreuil, Luc Dumaye, Eric Ercolani, Pascal Gallais, Elodie Groult, Thierry Jourdan, Commissariat à l'Énergie Atomique (France); Bernadette Leriche, Institut d'Astrophysique Spatiale (France); Bruno Maffei, The Univ. of Manchester (United Kingdom); Michel Lortholary, Jérôme Martignac, Wilfried Rabaud, Johan Relland, Louis R. Rodriguez, Aurélie Vandeneynde, Francois Visticot, Commissariat à l'Énergie Atomique (France) . . . . . [9153-4]

11:50: **The current status of MAKO**, Christopher M. McKenney, California Institute of Technology (USA); Henry G. LeDuc, Charles D. Dowell, Jet Propulsion Lab. (USA); Matthew I. Hollister, Loren J. Swenson, California Institute of Technology (USA); Attila Kovacs, California Institute of Technology (USA) and Univ. of Minnesota (USA); Hiroshige Yoshida, Caltech Submillimeter Observatory (USA); Hien Trong Nguyen, Jet Propulsion Lab. (USA); Ryan M. Monroe, California Institute of Technology (USA); Jonas Zmuidzinas, California Institute of Technology (USA) and Jet Propulsion Lab. (USA) . . . . . [9153-5]

12:10: **ZEUS-2: on-sky performance, integration of 215/645 micron TES bolometer arrays, and an optimized diffraction grating**, Amit Vishwas, Cornell Univ. (USA); Carl Ferkinhoff, Cornell Univ. (USA) and Max-Planck-Institut für Astronomie (Germany); Stephen Parshley, Thomas Nikola, Gordon J. Stacey, Cornell Univ. (USA); Peter A. R. Ade, Carole E. Tucker, Cardiff Univ. (United Kingdom); Kent D. Irwin, Stanford Univ. (USA); Hsiao-Mei Cho, National Institute of Standards and Technology (USA); Michael D. Niemack, Cornell Univ. (USA); Mark Halpern, The Univ. of British Columbia (Canada); Matthew Hasselfield, Princeton Univ. (USA); Mandana Amiri, The Univ. of British Columbia (Canada) . . . . . [9153-6]

Lunch Break . . . . . Tue 12:30 to 14:00

CONFERENCE 9153 · LOCATION: ROOM 520A

SESSION 2

LOCATION: ROOM 520A . . . . . TUE 14:00 TO 15:20

Transition-Edge Sensors: Theory and Design

Session Chair: **Kent D. Irwin,** Stanford Univ. (USA)

14:00: **Large area TES spiderweb bolometer for multi-mode cavity microwave detect**, Michele Biasotti, Univ. degli Studi di Genova (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); Daniela Bagliani, Univ degli Studi di Genova (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); Dario Corsini, Istituto Nazionale di Fisica Nucleare (Italy); Paolo de Bernardis, Univ. degli Studi di Roma La Sapienza (Italy); Flavio Gatti, Univ degli Studi di Genova (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); Riccardo Gualtieri, Luca Lamagna, Silvia Masi, Univ. degli Studi di Roma La Sapienza (Italy); Giulio Pizzigoni, Univ. degli Studi di Genova (Italy) and Istituto Nazionale di Fisica Nucleare (Italy); Alessandro Schillaci, Univ. degli Studi di Roma La Sapienza (Italy). . . . . [9153-7]

14:20: **Monolayer graphene bolometer as sensitive far-IR detector**, Boris S. Karasik, Jet Propulsion Lab. (USA); Christopher B. McKitterick, Daniel E. Prober, Yale Univ. (USA) . . . . . [9153-8]

14:40: **Cold electron bolometers for mm and sub-mm future sky surveys**, Maria Salatino, Paolo de Bernardis, Univ. degli Studi di Roma La Sapienza (Italy); Leonid S. Kuzmin, Sumedh Mahashabde, Chalmers Univ. of Technology (Sweden); Silvia Masi, Univ. degli Studi di Roma La Sapienza (Italy) . . . . . [9153-9]

15:00: **Scalable background-limited polarization-sensitive detectors for mm-wave applications**, Karwan Rostem, David T. Chuss, Felipe Colazo, Erik Crowe, Kevin L. Denis, Samuel Harvey Moseley Jr., Thomas R. Stevenson, Deborah Towner, Kongpop U-Yen, Edward J. Wollack, NASA Goddard Space Flight Ctr. (USA); Charles L. Bennett, Tobias Marriage, Thomas Essinger-Hileman, John W. Appel, Aamir Ali, Johns Hopkins Univ. (USA) . . . . . [9153-11]

Coffee Break . . . . . Tue 15:20 to 15:50

SESSION 3

LOCATION: ROOM 520A . . . . . TUE 15:50 TO 17:30

Transition-Edge Sensors: Performance and Developments

Session Chair: **Jian-Rong Gao,** SRON Netherlands Institute for Space Research (Netherlands)

15:50: **Development of TES arrays using DRIE for the short wavelength band of the SAFARI Instrument on SPICA**, Pourya Khosropanah, Toyoaki Suzuki, Richard A. Hijmering, Marcel L. Ridder, SRON Netherlands Institute for Space Research (Netherlands); Jian-Rong Gao, SRON Netherlands Institute for Space Research (Netherlands) and Kavli Institute of NanoScience Delft (Netherlands); Hiroki Akamatsu, Luciano Gottardi, Jan van der Kuur, Henk F. C. Hoevers, Michael D. Audley, Gerhard de Lange, Brian D. Jackson, SRON Netherlands Institute for Space Research (Netherlands). . . . . [9153-12]

16:10: **Advancements in feedhorn-coupled transition edge sensor polarimeter arrays**, Johannes Hubmayr, National Institute of Standards and Technology (USA); Jason E. Austermann, Univ. of Colorado at Boulder (USA); James A. Beall, Daniel T. Becker, Hsiao-Mei Cho, National Institute of Standards and Technology (USA); Rahul Datta, Univ. of Michigan (USA); Mark J. Devlin, Univ. of Pennsylvania (USA); Emily Grace, Princeton Univ. (USA); Nils W. Halverson, Univ. of Colorado at Boulder (USA); Shawn W. Henderson, Cornell Univ. (USA); Jason W. Henning, Univ. of Colorado at Boulder (USA); Gene C. Hilton, National Institute of Standards and Technology (USA); P. Ho, Princeton Univ. (USA); Kent D. Irwin, Stanford Univ. (USA); Brian Koopman, Cornell Univ. (USA); Dale Li, National Institute of Standards and Technology (USA); Jeff McMahon, Charles Munson, Univ. of Michigan (USA); L. B. Newburgh, Univ. of Toronto (Canada); Michael D. Niemack, Cornell Univ. (USA); C. G. Pappas, Princeton Univ. (USA); Benjamin L. Schmitt, Univ. of Pennsylvania (USA); Sara M. Simon, Suzanne T. Staggs, Princeton Univ. (USA); R. Thornton, West Chester Univ. of Pennsylvania (USA); Jeff Van Lanen, National Institute of Standards and Technology (USA); Edward J. Wollack, NASA Goddard Space Flight Ctr. (USA). . . . . [9153-13]

16:30: **Optical characterization of ultra-sensitive TES bolometers for SAFARI**, Michael D. Audley, Gerhard de Lange, SRON Netherlands Institute for Space Research (Netherlands); Jian-Rong Gao, SRON Netherlands Institute for Space Research (Netherlands) and Kavli Institute of Nanoscience Delft (Netherlands) and Delft Technische Univ. Delft (Netherlands); Pourya Khosropanah, Marcel L. Ridder, SRON Netherlands Institute for Space Research (Netherlands); Philip D. Mauskopf, Arizona State Univ. (USA) and Cardiff Univ. (United Kingdom); Dmitry Morozov, Cardiff Univ. (United Kingdom); Neil Trappe, Stephen Doherty, National Univ. of Ireland, Maynooth (Ireland); Stafford Withington, Univ. of Cambridge (United Kingdom) . . . . . [9153-14]

16:50: **TES-microstrip spectrometers for the tomographic ionized carbon mapping experiment (TIME): a new probe of reionization**, Roger C. O'Brient, James J. Bock, Jet Propulsion Lab. (USA) and California Institute of Technology (USA); Abigail T. Crites, California Institute of Technology (USA); Jonathon Hunacek, Jet Propulsion Lab. (USA) and California Institute of Technology (USA); Charles M. Bradford, Jet Propulsion Lab. (USA); Steven Hailey-Dunsheath, Eric D. Shirokoff, Zachary Staniszewski, Anthony D. Turner, California Institute of Technology (USA); Henry G. LeDuc, Jet Propulsion Lab. (USA). . . . . [9153-15]

17:10: **Reduction of thermal conductivity and heat capacity in membrane-isolated silicon nitride structures**, Andrew D. Beyer, Bruce Bumble, Matthew E. Kenyon, Pierre M. Echternach, Marcus C. Runyan, Charles M. Bradford, James J. Bock, Warren A. Holmes, Jet Propulsion Lab. (USA) and California Institute of Technology (USA) . . . . . [9153-16]

WEDNESDAY 25 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . WED 9:00 TO 10:00

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

9:00: **Highlights from the Multi Unit Spectroscopic Explorer (MUSE): a 2nd generation VLT instrument for the VLT** *(Plenary)*, Roland M. Bacon, Observatoire de Lyon (France). . . . . [9147-506]

9:30: **Canadian Space Astronomy: past, present and future** *(Plenary)*, John B. Hutchings, NRC - Herzberg Institute of Astrophysics (Canada) [9143-505]

Coffee Break . . . . . Wed 10:00 to 10:30

SESSION 4

LOCATION: ROOM 520A . . . . . WED 10:30 TO 12:30

Future Cameras and Arrays

Session Chair: **Christopher K. Walker,** The Univ. of Arizona (USA)

10:30: **The next-generation BLASTPol experiment**, Brad J. Dober, Univ. of Pennsylvania (USA); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Peter Ashton, Northwestern Univ. (USA); James A. Beall, Daniel T. Becker, Justus A. Brevik, National Institute of Standards and Technology (USA); Hsiao-Mei Cho, National Institute of Standards and Technology (USA) and Univ. of Pennsylvania (USA); Mark J. Devlin, Univ. of Pennsylvania (USA); Simon M. Doyle, Cardiff Univ. (United Kingdom); Laura M. Fissel, Northwestern Univ. (USA); Yasuo Fukui, Nagoya Univ. (Japan); Nicholas Galitzki, Univ. of Pennsylvania (USA); Jiansong Gao, Gene C. Hilton, Johannes Hubmayr, National Institute of Standards and Technology (USA); Kent D. Irwin, Stanford Univ. (USA); Jeffrey M. Klein, Univ. of Pennsylvania (USA); Jeff Van Lanen, Dale Li, National Institute of Standards and Technology (USA); Zhi-Yun Li, Univ. of Virginia (USA); Nathan Lourie, Univ. of Pennsylvania (USA); Peter Martin, Univ. of Toronto (Canada); Philip D. Mauskopf, Arizona State Univ (USA); Fumitaka Nakamura, National Astronomical Observatory of Japan (Japan); Giles Novak, Northwestern Univ. (USA); David P. Pappas, National Institute of Standards and Technology (USA); Enzo Pascale, Cardiff Univ. (United Kingdom); Douglas Scott, The Univ. of British Columbia (Canada); Giorgio Savini, Univ. College London (United Kingdom); Sara Stanchfield, Univ. of Pennsylvania (USA); Joel N. Ullom, Michael R. Vissers, National Institute of Standards and Technology (USA); Derek Ward-Thompson, Univ. of Central Lancashire (United Kingdom). . . . . [9153-17]

10:50: **GISMO-2: a two color millimeter camera for the IRAM 30-m telescope**, Johannes G. Staguhn, Johns Hopkins Univ. (USA) and NASA Goddard Space Flight Ctr. (USA); Dominic J. Benford, NASA Goddard Space Flight Ctr. (USA); Gene C. Hilton, National Institute of Standards and Technology (USA); Dale J. Fixsen, NASA Goddard Space Flight Ctr. (USA); Kent D. Irwin, Stanford Univ. (USA); Christine A. Jhabvala, NASA Goddard Space Flight Ctr. (USA); Attila Kovacs, California Institute of Technology (USA); Samuel Leclercq, IRAM-Domaine Univ. de Grenoble (France); Stephen F. Maher, Timothy M. Miller, Samuel Harvey Moseley Jr., Elmer H. Sharp III, Edward J. Wollack, NASA Goddard Space Flight Ctr. (USA). . . . . [9153-18]

11:10: **MUSTANG2: millimeter astronomy on large single dish telescopes**, Simon R. Dicker, Univ. of Pennsylvania (USA); Peter A. R. Ade, Cardiff Univ. (United Kingdom); James Aguirre, Univ. of Pennsylvania (USA); Justus A. Brevik, Hsiao-Mei Cho, National Institute of Standards and Technology (USA); Rahul Datta, Univ. of Michigan (USA); Mark J. Devlin, Brad J. Dober, Univ. of Pennsylvania (USA); Dennis M. Egan, John M. Ford, Pam Ford, National Radio Astronomy Observatory (USA); Gene C. Hilton, National Institute of Standards and Technology (USA); Kent D. Irwin, Stanford Univ. (USA); Johannes Hubmayr, National Institute of Standards and Technology (USA); Brian S. Mason, Paul Marganian, Melinda J. Mello, National Radio Astronomy Observatory (USA); Jeff McMahon, Univ. of Michigan (USA); Anthony K. Mroczkowski, U.S. Naval Research Lab. (USA); Carole E. Tucker, Cardiff Univ. (United Kingdom); Leila R. Vale, National Institute of Standards and Technology (USA); Steven D. White, Mark Whitehead, National Radio Astronomy Observatory (USA); Alexander H. Young, Univ. of Pennsylvania (USA) . . . [9153-19]

11:30: **The kilopixel array pathfinder project (KAPPA): a 16-pixel integrated heterodyne focal plane array, characterization of the single pixel prototype**, Caleb H. Wheeler, Christopher E. Groppi, Hamdi Mani, Arizona State Univ. (USA); Patrick McGarey, Univ. of Toronto (Canada); Linda Kuenzi, Arizona State Univ. (USA); Sander Weinreb, California Institute of Technology (USA); Damon S. Russell, Jet Propulsion Lab. (USA); Jacob W. Kooi, California Institute of Technology (USA); Arthur W. Lichtenberger, Univ. of Virginia (USA); Christopher K. Walker, Craig A. Kulesa, The Univ. of Arizona (USA) . . . . . [9153-20]

11:50: **SWCam: the short wavelength camera for the CCAT observatory**, Gordon J. Stacey, Stephen Parshley, Thomas Nikola, German Cortes-Medellin, Justin Schoenwald, Ganesan Rajagopalan, Michael D. Niemack, Cornell Univ. (USA); Charles D. Dowell, California Institute of Technology (USA); Peter K. Day, Jet Propulsion Lab. (USA); Matthew I. Hollister, Attila Kovacs, California Institute of Technology (USA); Henry G. LeDuc, Jet Propulsion Lab. (USA); Christopher M. McKenney, California Institute of Technology (USA); Ryan M. Monroe, Jet Propulsion Lab. (USA); Hiroshige Yoshida, Jonas Zmuidzinas, Loren J. Swenson, Simon J. Radford, California Institute of Technology (USA); Hien Trong Nguyen, Jet Propulsion Lab. (USA); Anthony K. Mroczkowski, California Institute of Technology (USA); Jason Glenn, Univ. of Colorado at Boulder (USA); Joseph D. Adams, SOFIA / USRA (USA); Frank Bertoldi, Reinhold Schaaf, Rheinische Friedrich-Wilhelms-Univ. Bonn (Germany); Mark Halpern, Douglas Scott, Gaelen Marsden, The Univ. of British Columbia (Canada); Scott Chapman, Dalhousie Univ. (Canada); Joaquin D. Vieira, California Institute of Technology (USA). . . . . [9153-21]

12:10: **SuperSpec: a broadband on-chip millimeter-wave spectrometer for high-redshift galaxy surveys**, Steven Hailey-Dunsheath, California Institute of Technology (USA); Peter Barry, Cardiff Univ. (United Kingdom); Charles M. Bradford, California Institute of Technology (USA); Goutam Chattopadhyay, Peter K. Day, Jet Propulsion Lab. (USA); Simon M. Doyle, Cardiff Univ. (United Kingdom); Matthew I. Hollister, California Institute of Technology (USA); Attila Kovacs, Univ. of Minnesota, Twin Cities (USA); Henry G. LeDuc, Jet Propulsion Lab. (USA); Nuria Llombart, Univ. Complutense de Madrid (Spain); Philip D. Mauskopf, Arizona State Univ. (USA); Christopher M. McKenney, California Institute of Technology (USA); Ryan M. Monroe, Hien Trong Nguyen, Jet Propulsion Lab. (USA); Roger C. O'Brient, Stephen Padin, California Institute of Technology (USA); Theodore J. Reck, Jet Propulsion Lab. (USA); Erik D. Shirokoff, Loren J. Swenson, California Institute of Technology (USA); Carole E. Tucker, Cardiff Univ. (United Kingdom); Jonas Zmuidzinas, California Institute of Technology (USA) . . . . . [9153-22]

Lunch/Exhibition Break . . . . . Wed 12:30 to 13:40

SESSION 5

LOCATION: ROOM 520A . . . . . WED 13:40 TO 15:20

Coherent Detector Technology

Session Chair: **Albrecht Poglitsch,** Max-Planck-Institut für extraterrestrische Physik (Germany)

13:40: **ALMA band 10 (787-950 GHz): summary of the production of 73 receivers and first light results**, Alvaro Gonzalez, Yasunori Fujii, Keiko Kaneko, Matthias Kroug, Takafumi Kojima, National Astronomical Observatory of Japan (Japan); Koichi Kuroiwa, Orient Microwave Corp. (Japan); Akihira Miyachi, National Astronomical Observatory of Japan (Japan); Kazumasa Makise, Zhen Wang, National Institute of Information and Communications Technology (Japan); Shin'ichiro Asayama, National Astronomical Observatory of Japan (Chile); Yoshinori Uzawa, National Astronomical Observatory of Japan (Japan) . . . . . [9153-23]

14:00: **Local oscillator development for focal plane array and supra-THz astronomy receivers**, Manju Henry, Brian N. Ellison, Peter G. Huggard, Rutherford Appleton Lab. (United Kingdom); Ghassan Yassin, Univ. of Oxford (United Kingdom); Stafford Withington, Univ. of Cambridge (United Kingdom); Doris Maier, IRAM-Domaine Univ. de Grenoble (France) . . . . . [9153-24]

14:20: **Argus: a 16-pixel millimeter-wave spectrometer for the Green Bank telescope**, Matthew Sieth, Kiruthika Devaraj, Patricia Voll Larkoski, Sarah E. Church, Stanford Univ. (USA); Kieran A. Cleary, California Institute of Technology (USA); Dennis M. Egan, David T. Frayer, National Radio Astronomy Observatory (USA); Todd C. Gaier, Jet Propulsion Lab. (USA); Rohit S. Gawande, California Institute of Technology (USA); Paul F. Goldsmith, Jet Propulsion Lab. (USA); Joshua O. Gundersen, Univ. of Miami (USA); Andrew I. Harris, Univ. of Maryland, College Park (USA); Pekka P. Kangaslahti, Jet Propulsion Lab. (USA); Anthony C. S. Readhead, Rodrigo A. Reeves, California Institute of Technology (USA); Lorene A. Samoska, Jet Propulsion Lab. (USA) and California Institute of Technology (USA); Steven D. White, National Radio Astronomy Observatory (USA) . . . . . [9153-25]

14:40: **A multifeed S-band cryogenic receiver for the Sardinia Radio telescope primary focus**, Giuseppe Valente, INAF - Osservatorio Astronomico di Cagliari (Italy); Adelaide Ladu, Tonino Pisanu, Pasqualino Marongiu, INAF - Osservatorio Astronomico di Cagliari (Italy) . . . . . [9153-26]

15:00: **A 77-118 GHz resonance-free Septum polarizer**, Yen-Lin Chen, Hsiao-Feng Teng, Tzihong Chiueh, National Taiwan Univ. (Taiwan) . . . . . [9153-27]

Coffee Break . . . . . Wed 15:20 to 15:50

SESSION 6

LOCATION: ROOM 520A . . . . . WED 15:50 TO 17:50

Kinetic Inductance Detectors

Session Chair: **Jonas Zmuidzinas,** California Institute of Technology (USA)

15:50: **Optimisation of kinetic inductance detectors for millimetre and submillimetre wave detection**, Grégoire Coiffard, Karl Schuster, Amar Adane, Arnaud Barbier, Catherine Boucher, Instituto de RadioAstronomía Milimétrica (France); Martino Calvo, Johannes Goupy, Institut NÉEL (France); Samuel Leclercq, Instituto de RadioAstronomía Milimétrica (France); Alessandro Monfardini, Institut NÉEL (France); Stéphane Pignard, Lab. des Matériaux et du Génie Physique (France) . . . . . [9153-28]

16:10: **Kinetic inductance detectors with background limited performance using phase readout for ground-based submillimeter astronomy**, Reinier M. Janssen, Technische Univ. Delft (Netherlands); Jochem J. Baselmans, SRON Netherlands Institute for Space Research (Netherlands); Akira Endo, Technische Univ. Delft (Netherlands); Lorenza Ferrari, Stephen Yates, SRON Netherlands Institute for Space Research (Netherlands); Andrey M. Baryshev, Technische Univ. Delft (Netherlands) and Univ. of Groningen (Netherlands); Teunis Martien Klapwijk, Technische Univ. Delft (Netherlands) and Moscow State Pedagogical Univ. (Russian Federation) . . . . . [9153-29]

16:30: **Anomalous optical response in TiN LEKIDs**, Juan Bueno, SRON Netherlands Institute for Space Research (Netherlands); P. C. J. J. Coumou, G. Zheng, Technische Univ. Delft (Netherlands); Pieter J. de Visser, Technische Univ. Delft (Netherlands) and SRON Netherlands Institute for Space Research (Netherlands); B. Blazquez, Technische Univ. Delft (Netherlands); Eduard F. Driessen, CEA-INAC (France); Simon M. Doyle, Cardiff Univ. (United Kingdom); Nuria Llombart, Technische Univ. Delft (Netherlands); Jochem J. Baselmans, SRON Netherlands Institute for Space Research (Netherlands); Teunis Martien Klapwijk, Technische Univ. Delft (Netherlands) and Moscow State Pedagogical Univ. (Russian Federation) . . . . . [9153-30]

16:50: **Full instrument model for the multiwavelength sub/millimeter inductance camera (MUSIC)**, Seth R. Siegel, California Institute of Technology (USA); Clint Bockstiegel, National Institute of Standards and Technology (USA); Spencer Brugger, Univ. of Colorado at Boulder (USA); Nicole G. Czakon, Academia Sinica (Taiwan); Peter K. Day, Jet Propulsion Lab. (USA); Thomas P. Downes, Univ. of Wisconsin (USA); Ran P. Duan, California Institute of Technology (USA); Jiansong Gao, National Institute of Standards and Technology (USA); Amandeep K. Gill, Jason Glenn, Univ. of Colorado at Boulder (USA); Sunil R. Golwala, Matthew I. Hollister, Albert Lam, California Institute of Technology (USA); Henry G. LeDuc, Jet Propulsion Lab. (USA); Philip R. Maloney, Univ. of Colorado at Boulder (USA); Benjamin A. Mazin, Univ. of California, Santa Barbara (USA); Sean G. McHugh, Univ. of California (USA); David A. Miller, California Institute of Technology (USA); Anthony K. Mroczkowski, U.S. Naval Research Lab. (USA); Omid Noroozian, NASA Goddard Space Flight Ctr. (USA); Hien Trong Nguyen, Jet Propulsion Lab. (USA); Jack Sayers, James A. Schlaerth, Anastasios K. Vayonakis, California Institute of Technology (USA); Philip R. Wilson, Jet Propulsion Lab. (USA); Jonas Zmuidzinas, California Institute of Technology (USA) . . . . . [9153-74]

17:10: **Lumped element kinetic inductance detectors for CMB polarization studies**, Derek Araujo, Columbia Univ. (USA); Peter A. R. Ade, Cardiff Univ. (United Kingdom); J. Richard Bond, Canadian Institute for Theoretical Astrophysics, Inc. (Canada); Kristi J. Bradford, Arizona State Univ. (USA); Daniel Chapman, Columbia Univ. (USA); George Che, Arizona State Univ. (USA); Peter K. Day, Jet Propulsion Lab. (USA) and California Institute of Technology (USA); Joy Didier, Columbia Univ. (USA); Simon M. Doyle, Cardiff Univ. (United Kingdom); Hans K. Eriksen, Univ. I Oslo (Norway); Daniel Flanigan, Columbia Univ. (USA); Christopher E. Groppi, Arizona State Univ. (USA); Seth N. Hillbrand, Bradley Johnson, Columbia Univ. (USA); Glenn E. Jones, Columbia Univ. (USA) and National Radio Astronomy Observatory (USA); Michele Limon, Amber Miller, Columbia Univ. (USA); Philip D. Mauskopf, Arizona State Univ. (USA); Heather McCarrick, Columbia Univ. (USA); Anthony K. Mroczkowski, California Institute of Technology (USA); Britt Reichborn-Kjennerud, Brian Smiley, Joshua Sobrin, Columbia Univ. (USA); Ingunn K. Wehus, Jet Propulsion Lab. (USA) and California Institute of Technology (USA); Jonas Zmuidzinas, California Institute of Technology (USA) and Jet Propulsion Lab. (USA) . . . . . [9153-32]

17:30: **Ultrasensitive microresonator detectors for far-infrared spectroscopy in space**, Omid Noroozian, Emily M. Barrentine, Ari-David Brown, Negar Ehsan, Wen-Ting Hseih, Thomas R. Stevenson, Edward J. Wollack, Kongpop U-Yen, Samuel Harvey Moseley Jr., NASA Goddard Space Flight Ctr. (USA). . . . . [9153-33]

CONFERENCE 9153 · LOCATION: ROOM 520A

POSTER SESSION–WEDNESDAY

LOCATION: ROOM 516 . . . . . .WED 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Wednesday. The interactive poster session with authors in attendance will be Wednesday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

Design of antenna coupled titanium nitride KIDs for long-wavelength multi-color imager, Chenguang Ji, California Institute of Technology (USA); Andrew D. Beyer, Jet Propulsion Lab. (USA); Jack Sayers, Sunil R. Golwala, California Institute of Technology (USA) . . . . . [9153-31]

SCUBA-2 Fourier transform spectrometer (FTS-2) commissioning results, Brad G. Gom, David A. Naylor, Univ. of Lethbridge (Canada); Per Friberg, Graham S. Bell, Daniel Bintley, Joint Astronomy Ctr. (USA); Sherif Abdelazim, Matt Sherwood, Univ. of Lethbridge (Canada) . . . . . [9153-72]

The spectral response of the SCUBA-2 850 and 450 micron photometric bands, David A. Naylor, Brad G. Gom, Sherif Abdelazim, Univ. of Lethbridge (Canada); Per Friberg, Daniel Bintley, Joint Astronomy Ctr. (USA); Wayne S. Holland, Michael J. MacIntosh, UK Astronomy Technology Ctr. (United Kingdom); Peter A. R. Ade, Carole E. Tucker, Cardiff Univ. (United Kingdom) . . . . . [9153-73]

Cryogenic system for the ArTeMiS large sub millimeter camera, Eric Ercolani, Commissariat à l'Énergie Atomique (France); Jerome Relland, CEA-Ctr. de SACLAY (France); Laurent Clerc, CEA-Grenoble (France); Lionel Duband, Michel Talvard, Commissariat à l'Énergie Atomique (France); Jean Le-Pennec, Commissariat à l'Énergie Atomique (France) and Univ. Paris 7-Denis Diderot (France); Jérôme Martignac, Francois Visticot, Commissariat à l'Énergie Atomique (France) [9153-75]

Spectral definition of the ArTeMiS instrument, Bruno Maffei, Charles V. Haynes, Giampaolo Pisano, The Univ. of Manchester (United Kingdom); Didier Dubreuil, Cyrille Delisle, Jean Le Pennec, Commissariat à l'Énergie Atomique (France); Norma Hurtado, Univ. zu Köln (Germany) . . . . . [9153-76]

The design of the wavefront front sensor for CCAT, David A. Naylor, Univ. of Lethbridge (Canada); Brad G. Gom, Blue Sky Spectroscopy Inc. (Canada); Mélanie R. Leclerc, Mathieu Legros, INO (Canada); Stephen Padin, California Institute of Technology (USA); Eugene Serabyn, Jet Propulsion Lab. (USA) . . . . . [9153-77]

Optics and cryogenics for the 1.1 THz multi-pixel heterodyne receiver for APEX, Norma Hurtado, Urs U. Graf, Univ. zu Köln (Germany); Henning Adams, Univ .zu Köln (Germany); C. E. Honingh, Karl Jacobs, Patrick Pütz, Univ. zu Köln (Germany); Rolf Güsten, Max-Planck-Institut für Radioastronomie (Germany); Jürgen Stutzki, Univ. zu Köln (Germany) . . . . . [9153-78]

Cryogenic test bench system for millimeter wavelength detectors, Salvador Ventura, Daniel Ferrusca Rodriguez, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Eduardo Ibarra-Medel, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [9153-79]

Hacking for astronomy: Can 3D printers and open-hardware enable low-cost sub-/millimeter instrumentation?, Carl Ferkinhoff, Cornell Univ. (USA) and Max-Planck-Institut für Astronomie (Germany) . . . . . [9153-82]

The opto-cryo-mechanical design of the short wavelength camera for the CCAT observatory, Stephen Parshley, Cornell Univ. (USA); Joseph D. Adams, SOFIA / USRA (USA); Thomas Nikola, German Cortes-Medellin, Gordon J. Stacey, Cornell Univ. (USA) . . . . . [9153-83]

Optical characterization of SuperSpec: a mm-wave on-chip spectrometer, Erik D. Shirokoff, The Univ. of Chicago (USA) and California Institute of Technology (USA); Peter Barry, Cardiff Univ. (United Kingdom); Charles M. Bradford, Goutam Chattopadhyay, Peter K. Day, Jet Propulsion Lab. (USA); Simon M. Doyle, Cardiff Univ. (United Kingdom); Steven Hailey-Dunsheath, Matthew I. Hollister, Attila Kovacs, California Institute of Technology (USA); Henry G. LeDuc, Jet Propulsion Lab. (USA); Christopher M. McKenney, California Institute of Technology (USA); Philip D. Mauskopf, Arizona State Univ. (USA); Hien Trong Nguyen, Jet Propulsion Lab. (USA); Roger C. O'Brient, Stephen Padin, California Institute of Technology (USA); Theodore J. Reck, Jet Propulsion Lab. (USA); Loren J. Swenson, California Institute of Technology (USA); Carole E. Tucker, Cardiff Univ. (United Kingdom); Jonas Zmuidzinas, California Institute of Technology (USA) . . . . . [9153-84]

An automated test system for terahertz receiver characterization, Linda Kuenzi, Caleb H. Wheeler, Hamdi Mani, Christopher E. Groppi, Arizona State Univ. (USA) . . . . . [9153-85]

The software-based polarization spectrometer PolariS, Seiji Kameno, Joint ALMA Observatory (Chile); Izumi Mizuno, Nobeyama Radio Observatory (Japan) and Kagoshima Univ. (Japan); Fumitaka Nakamura, National Astronomical Observatory of Japan (Japan); Makoto Kuroo, Shoyo High School (Japan); Amane Kano, Kagoshima Univ. (Japan); Noriyuki Kawaguchi, Katsunori Shibata, National Astronomical Observatory of Japan (Japan); Nario Kuno, Shuro Takano, Nobeyama Radio Observatory (Japan); Seisuke Kuji, Mizusawa VLBI Observatory (Japan) . . . . . [9153-86]

A digital sideband-separating receiver for the millimeter band, Rafael Rodríguez, Ricardo Finger, F. Patricio Mena, Leonardo Bronfman, Ernest A. Michael, Univ. de Chile (Chile) . . . . . [9153-87]

A 16 channel flex circuit for cryogenic microwave signal transmission, Patrick McGarey, Arizona State Univ. (USA) and Univ. of Toronto (Canada); Christopher E. Groppi, Caleb H. Wheeler, Arizona State Univ. (USA) . . . . . [9153-88]

Proof of concept of a photonic sideband-separating receiver for submm-wave applications, Jorge S. Castillo, ALMA Observatory (Chile); Roberto Roman, F. Patricio Mena, Ernest A. Michael, Univ. de Chile (Chile) . . . . . [9153-89]

Development of band-1 receiver cartridge for Atacama Large Millimeter/submillimeter array (ALMA), Yuh-Jing Hwang, Chau-Ching Chiong, Institute of Astronomy and Astrophysics (Taiwan) and Academia Sinica (Taiwan); Yau-De Huang, Institute of Astronomy and Astrophysics (Taiwan); Yue-Fang Kuo, Institute of Astronomy and Astrophysics (Taiwan) and Academia Sinica (Taiwan); Chi-Chang Lin, Academia Sinica (Taiwan) and Institute of Astronomy and Astrophysics (Taiwan); Chin-Ting Ho, Institute of Astronomy and Astrophysics (Taiwan) and Academia Sinica (Taiwan); M. W. Pospieszalski, Kamaljeet S. Saini, National Radio Astronomy Observatory (USA); Doug Henke, NRC - Herzberg Institute of Astrophysics (Canada); Stéphane M. X. Claude, National Research Council Canada (Canada); Nicolás Reyes, Ricardo Finger, Univ. de Chile (Chile); Hedy Chuang, Academia Sinica (Taiwan) and Institute of Astronomy and Astrophysics (Taiwan) . . . . . [9153-90]

Detecting loss of coherence based on telescope calibration results in ALMA, Alejandro Saez, ALMA (Chile); Jorge Sepúlveda, Joint ALMA Observatory (Chile); Daniel E. Herrera, ALMA Observatory (Chile) . . . . . [9153-91]

A 3-mm SIS receiver for the Sardinia Radio telescope, Adelaide Ladu, Tonino Pisanu, INAF - Osservatorio Astronomico di Cagliari (Italy); Alessandro Navarrini, Instituto de RadioAstronomía Milimétrica (France); Giuseppe Valente, Pasqualino Marongiu, Enrico Urru, INAF - Osservatorio Astronomico di Cagliari (Italy) [9153-92]

Performing sanity check of the ALMA digitizers before starting a round of observations, Alejandro Saez, ALMA Observatory (Chile); Jorge Sepúlveda, Joint ALMA Observatory (Chile); Daniel E. Herrera, ALMA Observatory (Chile) . [9153-93]

Efficient spurious signal detection and mitigation in single-dish radio spectroscopy, Seiji Kameno, Joint ALMA Observatory (Chile); Maurizio Miccolis, Masahiro Sugimoto, ALMA (Chile); Theodoros Nakos, Joint ALMA Observatory (Chile) . . . . . [9153-94]

An infrastructure for multi-backend observations to the Sardinia Radio telescope, Andrea Melis, INAF - Osservatorio Astronomico di Cagliari (Italy); Massimo Barbaro, Univ. degli Studi di Cagliari (Italy); Carlo Migoni, Sergio Poppi, Raimondo Concu, Giuseppe Valente, Andrea Tarchi, Francesco Gaudiomonte, INAF - Osservatorio Astronomico di Cagliari (Italy); Giorgio Montisci, Univ. degli Studi di Cagliari (Italy) . . . . . [9153-95]

Comparison of cryogenic W band low noise amplifier based on different III-V HEMT foundry process and technologies, Luca Valenziano, Andrea Cremonini, Istituto Nazionale di AstroFisica (Italy); Mario Zannoni, Univ. degli Studi di Milano-Bicocca (Italy); Sergio Mariotti, INAF - Istituto di Radioastronomia (Italy); Filomena Schiavone, Adriano De Rosa, INAF - IASF Bologna (Italy) . . . . . [9153-98]

A single-chip dual-band switched SIS mixer fed with broadband planar Yagi antenna at supra-THz frequencies, Boon-Kok Tan, Ghassan Yassin, Univ. of Oxford (United Kingdom); Stafford Withington, Univ. of Cambridge (United Kingdom) . . . . . [9153-99]

Developments of wide field submillimeter optics and lens antenna-coupled MKID cameras, Yutaro Sekimoto, Kenichi Karatsu, National Astronomical Observatory of Japan (Japan); Tom Nitta, Univ. of Tsukuba (Japan); Masakazu Sekine, Shigeyuki Sekiguchi, Takashi Okada, Shibo Shu, The Univ. of Tokyo (Japan); Takashi Noguchi, National Astronomical Observatory of Japan (Japan); Masato Naruse, Saitama Univ. (Japan); Kenji Mitsui, Toshihiro Tsuzuki, Norio Okada, Hiroshi Matsuo, National Astronomical Observatory of Japan (Japan) . . . . . [9153-100]

Kinetic inductance detectors for space missions, Antonio D'Addabbo, Martino Calvo, Alain Benoit, Institut NÉEL (France); Olivier Bourrion, Andrea Catalano, LPSC Grenoble (France); Johannes Goupy, Alessandro Monfardini, Institut NÉEL (France) . . . . . [9153-101]

Design, fabrication, and noise and responsivity measurements for 3-mm lumped element kinetic inductance detectors, Amy E. Lowitz, Univ. of Wisconsin-Madison (USA); Ari-David Brown, Thomas R. Stevenson, NASA Goddard Space Flight Ctr. (USA); Peter T. Timbie, Univ. of Wisconsin-Madison (USA); Edward J. Wollack, NASA Goddard Space Flight Ctr. (USA) . . . . . [9153-102]

SPACEKIDs: the development of kinetic inductance detectors for space-based applications, Juan Bueno, SRON Netherlands Institute for Space Research (Netherlands); Andrey M. Baryshev, SRON Netherlands Institute for Space Research (Netherlands) and Kapteyn Astronomical Institute, Univ. of Groningen (Netherlands); Jochem J. Baselmans, SRON Netherlands Institute for Space Research (Netherlands); Aurelien Bideaud, Cardiff Univ. (United Kingdom); B. Blazquez, Technische Univ. Delft (Netherlands); Martino Calvo, Institut NÉEL (France); Simon M. Doyle, Cardiff Univ. (United Kingdom); Nuria Llombart, Technische Univ. Delft (Netherlands); Matthew J. Griffin, Peter C. Hargrave, Cardiff Univ. (United Kingdom); Teunis Martien Klapwijk, Technische Univ. Delft (Netherlands) and Moscow State Pedagogical Univ. (Russian Federation); Jesus Martin-Pintado, Consejo Superior de Investigaciones Científicas (Spain); Alessandro Monfardini, Institut NÉEL (France); Andrea Neto, Technische Univ. Delft (Netherlands); Ken Wood, QMC Instruments Ltd. (United Kingdom); Adam L. Woodcraft, The Royal Observatory, Edinburgh (United Kingdom) . . . . . [9153-103]

Fabrication of 721-pixel silicon lens array of MKID camera, Kenji Mitsui, Yutaro Sekimoto, Norio Okada, Takashi Noguchi, National Astronomical Observatory of Japan (Japan); Tom Nitta, National Astronomical Observatory of Japan (Japan) and Univ. of Tsukuba (Japan); Kenichi Karatsu, National Astronomical Observatory of Japan (Japan); Shigeyuki Sekiguchi, Masakazu Sekine, National Astronomical Observatory of Japan (Japan) and The Univ. of Tokyo (Japan) . . . . . [9153-104]

Design of wide-field Nasmyth optics for a submillimeter camera, Toshihiro Tsuzuki, National Astronomical Observatory of Japan (Japan); Tom Nitta, Hiroaki Imada, Masumichi Seta, Naomasa Nakai, Univ. of Tsukuba (Japan); Shigeyuki Sekiguchi, The Univ. of Tokyo (Japan); Yutaro Sekimoto, National Astronomical Observatory of Japan (Japan) . . . . . [9153-105]

Optical modelling of far-infrared astronomical instrumentation exploiting multimode horn antennas, Créidhe O'Sullivan, Daniel Wilson, Ian McAuley, J. Anthony Murphy, Marcin L. Gradziel, Neil Trappe, Tully Peacocke, National Univ. of Ireland, Maynooth (Ireland); Giorgio Savini, Univ. College London (United Kingdom); Ken Ganga, AstroParticule et Cosmologie (France) . . . . . [9153-106]

High performance WR-1.5 corrugated horn based on stacked rings, Bruno Maffei, The Univ. of Manchester (United Kingdom); Arndt von Bieren, Emile de Rijk, Alessandro Macor, SWISSto12 SA (Switzerland); Jean-Philippe Ansermet, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Giampaolo Pisano, The Univ. of Manchester (United Kingdom). . . . . [9153-107]

RF and thermal data on ECCOSORB (TM) CR/MF absorber, Luca Valenziano, Istituto Nazionale di AstroFisica (Italy); Mario Zannoni, Univ. degli Studi di Milano-Bicocca (Italy); Riccardo Tascone, IEIIT Torino (Italy); Roberto Lapini, Pasquali Microwave Systems (Italy). . . . . [9153-108]

Beam performance of a millimetre wave flat lens based on metal mesh metamaterials, Giampaolo Pisano, Bruno Maffei, Ming Wah Ng, Fahri Ozturk, The Univ. of Manchester (United Kingdom) . . . . . [9153-109]

Antireflection coatings for submillimeter silicon lenses, Jason Glenn, Jordan Wheeler, Philip R. Maloney, Spencer Brugger, Univ. of Colorado at Boulder (USA); Brian Koopman, German Cortes-Medellin, Stephen Parshley, Michael D. Niemack, Gordon J. Stacey, Cornell Univ. (USA); Christopher M. McKenney, Charles D. Dowell, Jet Propulsion Lab. (USA); Sunil R. Golwala, California Institute of Technology (USA) . . . . . [9153-111]

Co-alignment of receiver beams of the submillimeter array using a vector near-field beam scanner, Robert Christensen, Smithsonian Astrophysical Observatory (USA); Ramprasad Rao, Academia Sinica (USA); Edward C. Tong, Tirupati K. Sridharan, Smithsonian Astrophysical Observatory (USA) . . . [9153-112]

Deep reactive ion etching of silicon anti-reflection coatings for sub-millimeter optics, Brian Koopman, Galen Marchetti, German Cortes-Medellin, Michael D. Niemack, Gordon J. Stacey, Cornell Univ. (USA); Jordan Wheeler, Philip R. Maloney, Jason Glenn, Univ. of Colorado at Boulder (USA). . . . . [9153-113]

THURSDAY 26 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . THU 9:00 TO 10:00

Session Chair: **Masanori Iye,** National Astronomical Observatory of Japan (Japan)

9:00: **Hyper Suprime-Cam for Weak Gravitational Lensing Survey** *(Plenary)*, Satoshi Miyazaki, National Astronomical Observatory of Japan (Japan). . . . . [9143-507]

9:30: **Transiting Exoplanet Survey Satellite (TESS)** *(Plenary)*, George R. Ricker Jr., Massachusetts Institute of Technology (USA) . . . . . [9143-508]

Coffee Break . . . . . Thu 10:00 to 10:30

SESSION 7

LOCATION: ROOM 520A . . . . . THU 10:30 TO 12:30

CMB Instruments: Current and Near-Term

Session Chair: **Karl Schuster,** IRAM-Domaine Univ. de Grenoble (France)

10:30: **Characterization of the Atacama B-mode Search**, Sara M. Simon, Princeton Univ. (USA); John W. Appel, Johns Hopkins Univ. (USA); Hsiao-Mei Cho, National Institute of Standards and Technology (USA); Thomas Essinger-Hileman, Johns Hopkins Univ. (USA); Kent D. Irwin, Stanford Univ. (USA); Akito Kusaka, Princeton Univ. (USA); Michael D. Niemack, Cornell Univ. (USA); Mike R. Nolta, Univ. of Toronto (Canada); Lyman Page, Lucas P. Parker, Princeton Univ. (USA); Srinivasan Raghunathan, Univ. de Chile (Chile); Jonathan LeRoy Sievers, Univ. of KwaZulu-Natal (South Africa); Suzanne T. Staggs, Katerina Visnjic, Princeton Univ. (USA) . . . . . [9153-34]

10:50: **Design, deployment, and operation of ACTPol, a millimeter wavelength, polarization sensitive receiver for the Atacama Cosmology telescope**, Benjamin L. Schmitt, Univ. of Pennsylvania (USA) and ACTPol Collaboration, Princeton Univ. (USA) . . . . . [9153-35]

11:10: **ACTPol: on-sky performance and characterization**, Emily Grace, Princeton Univ. (USA) and ACTPol Collaboration (USA). . . . . [9153-36]

11:30: **The performance of the bolometer array and readout system during the recent flight of the E and B experiment (EBEX)**, Kevin D. MacDermid, McGill Univ. (Canada); Asad Aboobaker, Francois Aubin, Univ. of Minnesota, Twin Cities (USA); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Carlo Baccigalupi, Scuola Internazionale Superiore di Studi Avanzati (Italy); Kevin Bandura, McGill Univ. (Canada); Chaoyun Bao, Univ. of Minnesota, Twin Cities (USA); Julian Borrill, Univ. of California, Berkeley (USA); Daniel Chapman, Joy Didier, Columbia Univ. (USA); Matthew A. Dobbs, McGill Univ. (Canada); Benjamin Gold, Univ. of Minnesota, Twin Cities (USA); William Grainger, Cardiff Univ. (United Kingdom); Shaul Hanany, Univ. of Minnesota, Twin Cities (USA); Kyle R. Helson, Brown Univ. (USA); Seth N. Hillbrand, Columbia Univ. (USA); Gene C. Hilton, Johannes Hubmayr, National Institute of Standards and Technology (USA); Kent D. Irwin, Stanford Univ. (USA); Bradley Johnson, Univ. of California, Berkeley (USA); Andrew Jaffe, Imperial College London (United Kingdom); Terry J. Jones, Univ. of Minnesota, Twin Cities (USA); Theodore S. Kisner, Lawrence Berkeley National Lab. (USA); Jeffrey M. Klein, Univ. of Minnesota, Twin Cities (USA); Andrei L. Korotkov, Brown Univ. (USA); Samuel Leach, Scuola Internazionale Superiore di Studi Avanzati (Italy); Adrian T. Lee, Univ. of California, Berkeley (USA); Lorne Levinson, Weizmann Institute of Science (Israel); Michele Limon, Amber Miller, Columbia Univ. (USA); Michael Milligan, Univ. of Minnesota, Twin Cities (USA); Enzo Pascale, Univ. of Toronto (Canada); Catherine Raach, Univ. of Minnesota, Twin Cities (USA); Britt Reichborn-Kjennerud, Columbia Univ. (USA); Ilan Sagiv, Weizmann Institute of Science (Israel); Graeme M. Smecher, McGill Univ. (Canada); Gregory S. Tucker, Brown Univ. (USA); Benjamin Westbrook, Univ. of California, Berkeley (USA); Kyle Zilic, Univ. of Minnesota, Twin Cities (USA) . . . . . [9153-37]

11:50: **BICEP2 and Keck array: upgrades and improved beam characterization**, Immanuel Buder, Harvard-Smithsonian Ctr for Astrophysics (USA). . . . . [9153-38]

12:10: **Pre-flight integration and characterization of the SPIDER balloon-borne telescope**, Alexandra S. Rahlin, Princeton Univ. (USA); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Mandana Amiri, The Univ. of British Columbia (Canada); Steven J. Benton, Univ. of Toronto (Canada); James J. Bock, California Institute of Technology (USA) and Jet Propulsion Lab. (USA); J. Richard Bond, Canadian Institute for Theoretical Astrophysics, Inc. (Canada); Joseph A. Bonetti, Jet Propulsion Lab. (USA); Sean A. Bryan, Case Western Reserve Univ. (USA); Hsin C. Chiang, Univ. of KwaZulu-Natal (South Africa); Carlo R. Contaldi, Imperial College London (United Kingdom); Brendan P. Crill, Olivier P. Doré, California Institute of Technology (USA) and Jet Propulsion Lab. (USA); Marzieh Farhang, Canadian Institute for Theoretical Astrophysics, Inc. (Canada) and Univ. of Toronto (Canada); Jeffrey P. Filippini, California Institute of Technology (USA); Laura M. Fissel, Northwestern Univ. CIERA (USA) and Northwestern Univ. CIERA (Canada); Aurelien A. Fraisse, Anne E. Gambrel, Princeton Univ. (USA); Natalie N. Gandilo, Univ. of Toronto (Canada); Jon E. Gudmundsson, Princeton Univ. (USA); Mark Halpern, The Univ. of British Columbia (Canada); Matthew Hasselfield, Princeton Univ. (USA) and The Univ. of British Columbia (Canada); Gene C. Hilton, National Institute of Standards and Technology (USA); Warren A. Holmes, Jet Propulsion Lab. (USA); Viktor V. Hristov, California Institute of Technology (USA); Kent D. Irwin, Stanford Univ. (USA); William C. Jones, Zigmund D. Kermish, Princeton Univ. (USA); Peter V. Mason, California Institute of Technology (USA); Carolyn J. MacTavish, Univ. of Cambridge (United Kingdom); Krigor G. Megerian, Jet Propulsion Lab. (USA); Lorenzo Moncelsi, California Institute of Technology (USA); Thomas E. Montroy, Case Western Reserve Univ. (USA); Tracy A. Morford, California Institute of Technology (USA); Johanna M. Nagy, Case Western Reserve Univ. (USA); Calvin B. Netterfield, Univ. of Toronto (Canada); Carl D. Reintsema, National Institute of Standards and Technology (USA); John E. Ruhl, Case Western Reserve Univ. (USA); Marcus C. Runyan, Jet Propulsion Lab. (USA); Juan D. Soler, Institut d'Astrophysique Spatiale (France) and Univ. of Toronto (Canada); Jamil A. Shariff, Univ. of Toronto (Canada); Amy Trangsrud, California Institute of Technology (USA); Carole E. Tucker, Cardiff Univ. (United Kingdom); Rebecca S. Tucker, California Institute of Technology (USA); Anthony D. Turner, Alexis C. Weber, Jet Propulsion Lab. (USA); Donald V. Wiebe, The Univ. of British Columbia (Canada); Edward Y. Young, Princeton Univ. (USA) . . . . . [9153-39]

Lunch/Exhibition Break . . . . . Thu 12:30 to 13:30

SESSION 8

LOCATION: ROOM 520A . . . . . THU 13:30 TO 15:30

Optics and Components

Session Chair: **J. Anthony Murphy,** National Univ. of Ireland, Maynooth (Ireland)

13:30: **Refractive telescope systems for future cosmic microwave background polarimetry satellites**, Peter C. Hargrave, Cardiff Univ. (United Kingdom); Giorgio Savini, Univ. College London (United Kingdom); Marcin L. Gradziel, Neil Trappe, Niall Tynan, Massimo Candotti, National Univ. of Ireland, Maynooth (Ireland); Anthony D. Challinor, Univ. of Cambridge (United Kingdom); Stig Sorenson, TICRA (Denmark); Peter A. R. Ade, Rashmi V. Sudiwala, Ian Walker, Cardiff Univ. (United Kingdom); Maarten van der Vorst, European Space Research and Technology Ctr. (Netherlands) . . . . . [9153-40]

13:50: **Review and comparison of recent and future CMB telescope optics designs**, Michael D. Niemack, Cornell Univ. (USA) . . . . . [9153-41]

14:10: **Efficient algorithms for optimising the optical performance of profiled smooth walled horns for future CMB and Far-IR missions**, Darragh McCarthy, J. Anthony Murphy, Créidhe O'Sullivan, Neil Trappe, Marcin L. Gradziel, Stephen Doherty, Colm Bracken, Niall Tynan, National Univ. of Ireland, Maynooth (Ireland); Arturo Polegre, European Space Research and Technology Ctr. (Netherlands) . . . . . [9153-42]

14:30: **Development of large radii half-wave plates for CMB satellite missions**, Giampaolo Pisano, Bruno Maffei, Ming Wah Ng, Charles V. Haynes, Michael D. Brown, Fabio Noviello, The Univ. of Manchester (United Kingdom); Paolo de Bernardis, Silvia Masi, Francesco Piacentini, Luca Pagano, Maria Salatino, Univ. degli Studi di Roma La Sapienza (Italy); Brian N. Ellison, Manju Henry, Rutherford Appleton Lab. (United Kingdom); Peter J. I. de Maagt, Brian Shortt, European Space Research and Technology Ctr. (Netherlands) . . . . . [9153-43]

14:50: **Polarization properties of multi-moded optics for the primordial inflation explorer mission**, Alan J. Kogut, NASA Goddard Space Flight Ctr. (USA); Dale J. Fixsen, Univ. of Maryland (USA); Paul Mirel, NASA Goddard Space Flight Ctr. (USA) . . . . . [9153-44]

15:10: **Optical design for the 450 µm, 350 µm, and 200 µm ArTeMiS camera**, Didier Dubreuil, Jérôme Martignac, Jean Christian Toussaint, Cyrille Delisle, Francois Visticot, Pascal Gallais, Jean Le Pennec, Thierry Lerch, Philippe André, Michel Lortholary, Commissariat à l'Énergie Atomique (France); Norma Hurtado, Univ. zu Köln (Germany); Vincent Revéret, Louis R. Rodriguez, Michel Talvard, Commissariat à l'Énergie Atomique (France) . . . . . [9153-45]

Coffee Break . . . . . Thu 15:30 to 16:00

SESSION 9

LOCATION: ROOM 520A . . . . . THU 16:00 TO 17:40

Multiplexing and Readout Systems

Session Chair: **Jian-Rong Gao,** SRON Netherlands Institute for Space Research (Netherlands)

16:00: **Digital frequency domain multiplexing readout electronics for the next generation of millimeter telescopes**, Amy N. Bender, Jean-Francois Cliche, Tijmen de Haan, Matthew A. Dobbs, Adam Gilbert, Joshua Montgomery, McGill Univ. (Canada); Neil Rowlands, COM DEV Canada (Canada); Graeme M. Smecher, Three-Speed Logic, Inc. (Canada); Kenneth W. Smith, Andrew Wilson, COM DEV Canada (Canada). . . . . [9153-46]

16:20: **Frequency domain multiplexed readout of kilopixel arrays of transition edge sensor bolometers**, Kaori Hattori, High Energy Accelerator Research Organization (Japan); Yoshiki Akiba, The Graduate Univ. for Advanced Studies (Japan); Kam S. Arnold, Darcy Barron, Univ. of California, San Diego (USA); Amy N. Bender, Matthew A. Dobbs, Tijmen de Haan, McGill Univ. (Canada); Nicholas Harrington, Univ. of California, Berkeley (USA); Masaya Hasegawa, Masashi Hazumi, High Energy Accelerator Research Organization (Japan); William L. Holzapfel, Univ. of California, Berkeley (USA); Yasuto Hori, High Energy Accelerator Research Organization (Japan); Brian G. Keating, Univ. of California, San Diego (USA); Adrian T. Lee, Univ. of California, Berkeley (USA); Joshua Montgomery, McGill Univ. (Canada); Hideki Morii, High Energy Accelerator Research Organization (Japan); Michael J. Myers, Univ. of California, Berkeley (USA); Graeme M. Smecher, Three-Speed Logic, Inc. (Canada); Aritoki Suzuki, Univ. of California, Berkeley (USA); Takayuki Tomaru, High Energy Accelerator Research Organization (Japan). . . . . [9153-47]

16:40: **Chirp readout for kinetic inductance detectors**, Attila Kovacs, California Institute of Technology (USA) and Univ. of Minnesota (USA); Jonas Zmuidzinas, Jet Propulsion Lab. (USA) and California Institute of Technology (USA); Christopher M. McKenney, California Institute of Technology (USA); Loren J. Swenson, Jet Propulsion Lab. (USA); Matthew I. Hollister, California Institute of Technology (USA); Ryan M. Monroe, Jet Propulsion Lab. (USA); Charles D. Dowell, Charles M. Bradford, Jet Propulsion Lab. (USA) and California Institute of Technology (USA) . . . . . [9153-48]

17:00: **Microwave multiplexing for large-format arrays of cosmic microwave background polarimeters**, Kent D. Irwin, Stanford Univ. (USA); Justus A. Brevik, Hsiao-Mei Cho, Jiansong Gao, Gene C. Hilton, Johannes Hubmayr, Dale Li, John A. B. Mates, Carl D. Reintsema, Joel N. Ullom, Leila R. Vale, National Institute of Standards and Technology (USA); Christopher M. Williams, Stanford Univ. (USA); Betty A. Young, Santa Clara Univ. (USA) . . . . . [9153-49]

17:20: **Crosstalk in a 160-pixel FDM readout system for SAFARI**, Richard A. Hijmering, Netherlands Institute for Space Research (Netherlands); Roland H. den Hartog, Brian D. Jackson, SRON Netherlands Institute for Space Research (Netherlands) . . . . . [9153-50]

POSTER SESSION–THURSDAY

LOCATION: ROOM 516 . . . . . THU 18:00 TO 20:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Thursday. The interactive poster session with authors in attendance will be Thursday evening from 18:00 to 20:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

The QUIJOTE thirty gigahertz instrument (TGI), Roger J. Hoyland, Marta Aguiar-González, Ricardo Génova-Santosa, Francisca Gómez-Reñasco, Carlos López-Caraballo, Rafael Rebolo-López, Jose Alberto Rubiño, Vicente Sánchez-de-la-Rosa, Afrodisio Vega-Moreno, Teodora A. Viera-Curbelo, Alba E. Peláez-Santos, Riccardo Vignaga, Denis Tramonte, Frank Poidevin, Ángeles R. Pérez de Taoro, Instituto de Astrofísica de Canarias (Spain); Enrique Martinez-Gonzalez, Univ. de Cantabria (Spain) and Instituto de Física de Cantabria (Spain); Beatriz Aja, Univ. de Cantabria (Spain); Eduardo Artal, Jaime Cagigas, Juan L. Cano-de-Diego, E. M. Cuerno, Luisa de la Fuente, A. Perez, J. V. Terán, Enrique Villa, Univ. de Cantabria (Spain); Lucio Piccirillo, The Univ. of Manchester (United Kingdom) and Jodrell Bank Ctr .for Astrophysics (United Kingdom); Mike Hobson, Univ. of Cambridge (United Kingdom). . . . . [9153-114]

Deployment of multichroic polarimeters on ACTPol, Charles Munson, Jeff McMahon, Rahul Datta, Univ. of Michigan (USA); Johannes Hubmayr, National Institute of Standards and Technology (USA) . . . . . [9153-117]

The readout system for the ArTeMis camera, Michel Lortholary, CEA-Ctr. de SACLAY (France); Eric Doumayrou, Luc Dumaye, CEA-Ctr. de SACLAY (France); Gérard Hamon, CEA-IRAMIS (France) . . . . . [9153-119]

Development and characterization of the readout system for POLARBEAR-2, Darcy Barron, Brian G. Keating, Univ. of California, San Diego (United States); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Yoshiki Akiba, The Graduate Univ. for Advanced Studies (Japan); Christopher Aleman, Kam S. Arnold, Univ. of California, San Diego (United States); Amy N. Bender, McGill Univ. (Canada); Julian Borrill, Lawrence Berkeley National Lab. (United States); Scott Chapman, Dalhousie Univ. (Canada); Yuji Chinone, High Energy Accelerator Research Organization (Japan); Ari Cukierman, Univ. of California, Berkeley (United States); Matthew A. Dobbs, McGill Univ. (Canada); Tucker Elleflot, Univ. of California, San Diego (United States); Josquin Errard, Lawrence Berkeley National Lab. (United States); Giulio Fabbian, Scuola Internazionale Superiore di Studi Avanzati (Italy); Guangyuan Feng, Univ. of California, San Diego (United States); Adam Gilbert, McGill Univ. (Canada); Nils W. Halverson, Univ. of Colorado at Boulder (United States); Masaya Hasegawa, Kaori Hattori, Masashi Hazumi, High Energy Accelerator Research Organization (Japan); William L. Holzapfel, Univ. of California, Berkeley (United States); Yasuto Hori, High Energy Accelerator Research Organization (Japan); Yuki Inoue, High Energy Accelerator Research Organization, KEK (Japan); Greg Jaehnig, Univ. of Colorado at Boulder (United States); Nobuhiko Katayama, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Zigmund D. Kermish, Princeton Univ. (United States); Reijo Keskitalo, Theodore S. Kisner, Lawrence Berkeley National Lab. (United States); Adrian T. Lee, Univ. of California, Berkeley (United States); Maude Le Jeune, AstroParticule et Cosmologie (France); Frederick Matsuda, Univ. of California, San Diego (United States); Tomotake Matsumura, Hideki Morii, High Energy Accelerator Research Organization (Japan); Michael J. Myers, Univ. of California, Berkeley (United States); Martin Navroli, Univ. of California, San Diego (United States); Haruki Nishino, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Takahiro Okamura, High Energy Accelerator Research Organization (Japan); Julien Peloton, AstroParticule et Cosmologie (France); Christian Reichardt, Paul L. Richards, Univ. of California, Berkeley (United States); Colin Ross, Kaja M. Rotermund, Dalhousie Univ. (Canada); Michael J. Sholl, Lawrence Berkeley National Lab. (United States); Praween Siritanasak, Univ. of California, San Diego (United States); Graeme M. Smecher, McGill Univ. (Canada); Nathan C. Stebor, Univ. of California, San Diego (United States); Bryan Steinbach, Univ. of California, Berkeley (United States); Radek Stompor, AstroParticule et Cosmologie (France); Aritoki Suzuki, Univ. of California, Berkeley (United States); Jun-ichi Suzuki, High Energy Accelerator Research Organization (Japan); Suguru Takada, National Institute for Fusion Science (Japan); Takayuki Tomaru, High Energy Accelerator Research Organization (Japan); Brandon Wilson, Univ. of California, San Diego (United States); Hiroshi Yamaguchi, High Energy Accelerator Research Organization (Japan); Oliver Zahn, Lawrence Berkeley National Lab. (United States) . . . . . [9153-120]

Development of a cryogenic DC-low noise amplifier for SQuID-based readout electronics, Claudio Macculi, INAF - IASF Roma (Italy); Guido Torrioli, Istituto di Fotonica e Nanotecnologie (Italy); Anna Maria Di Giorgio, INAF - IASF Roma (Italy); Luigi Spinoglio, INAF - Istituto di Fisica dello Spazio Interplanetario (Italy); Luigi Piro, INAF - IASF Roma (Italy) . . . . . [9153-121]

Optimizing time division multiplexing readout for ACTPol and future instruments, Shawn W. Henderson, Cornell Univ. (USA) and The ACTPol Collaboration (USA) . . . . . [9153-122]

An RFI monitoring system based on a hybrid configuration for radioastronomy, Andrea Melis, Giuseppe Valente, INAF - Osservatorio Astronomico di Cagliari (Italy); Massimo Barbaro, Univ. degli Studi di Cagliari (Italy); Raimondo Concu, Francesco Gaudiomonte, Carlo Migoni, Giampaolo Serra, INAF - Osservatorio Astronomico di Cagliari (Italy) . . . . . [9153-123]

Readout electronics for the CCAT observatory's instruments at first light and beyond, Ganesan Rajagopalan, Cornell Univ. (USA); Attila Kovacs, California Institute of Technology (USA) and Univ. of Minnesota (USA); Ryan M. Monroe, Jet Propulsion Lab. (USA); Hiroshige Yoshida, California Institute of Technology (USA); Justin Schoenwald, Thomas Nikola, Cornell Univ. (USA); Charles M. Bradford, Jet Propulsion Lab. (USA); Sunil R. Golwala, California Institute of Technology (USA); Gordon J. Stacey, Cornell Univ. (USA); Jonas Zmuidzinas, Jet Propulsion Lab. (USA) and California Institute of Technology (USA) . . . . . [9153-124]

Thermal and optical characterization of POLARBEAR-2 receiver system, Yuki Inoue, The Graduate Univ. for Advanced Studies (Japan); Takayuki Tomaru, High Energy Accelerator Research Organization, KEK (Japan); Tomotake Matsumura, High Energy Accelerator Research Organization (Japan); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Yoshiki Akiba, The Graduate Univ. for Advanced Studies (Japan); Christopher Aleman, Kam S. Arnold, Darcy Barron, Univ. of California, San Diego (USA); Amy N. Bender, McGill Univ. (Canada); Julian Borrill, Lawrence Berkeley National Lab. (USA); Scott Chapman, Dalhousie Univ. (Canada); Yuji Chinone, High Energy Accelerator Research Organization (Japan); Ari Cukierman, Univ. of California, Berkeley (USA); Matthew A. Dobbs, McGill Univ. (Canada); Tucker Elleflot, Univ. of California, San Diego (USA); Josquin Errard, Lawrence Berkeley National Lab. (USA); Giulio Fabbian, Scuola Internazionale Superiore di Studi Avanzati (Italy); Guangyuan Feng, Univ. of California, San Diego (USA); Adam Gilbert, McGill Univ. (Canada); Nils W. Halverson, Univ. of Colorado at Boulder (USA); Masaya Hasegawa, Kaori Hattori, Masashi Hazumi, High Energy Accelerator Research Organization (Japan); William L. Holzapfel, Univ. of California, Berkeley (USA); Yasuto Hori, High Energy Accelerator Research Organization (Japan); Greg Jaehnig, Univ. of Colorado at Boulder (USA); Nobuhiko Katayama, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Brian G. Keating, Univ. of California, San Diego (USA); Zigmund D. Kermish, Princeton Univ. (USA); Reijo Keskitalo, Theodore S. Kisner, Lawrence Berkeley National Lab. (USA); Maude Le Jeune, AstroParticule et Cosmologie (France); Adrian T. Lee, Univ. of California, Berkeley (USA); Brandon Wilson, Frederick Matsuda, Univ. of California, San Diego (USA); Hideki Morii, High Energy Accelerator Research Organization (Japan); Michael J. Myers, Univ. of California, Berkeley (USA); Colin Ross, Dalhousie Univ. (Canada); Martin Navaroli, Univ. of California, San Diego (USA); Haruki Nishino, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Takahiro Okamura, High Energy Accelerator Research Organization (Japan); Julien Peloton, AstroParticule et Cosmologie (France); Christian Reichardt, Paul L. Richards, Univ. of California, Berkeley (USA); Kaja M. Rotermund, Dalhousie Univ. (Canada); Michael J. Sholl, Lawrence Berkeley National Lab. (USA); Praween Siritanasak, Univ. of California, San Diego (USA); Graeme M. Smecher, McGill Univ. (Canada); Nathan C. Stebor, Univ. of California, San Diego (USA); Bryan Steinbach, Univ. of California, Berkeley (USA); Radek Stompor, AstroParticule et Cosmologie (France); Aritoki Suzuki, Univ. of California, Berkeley (USA); Jun-ichi Suzuki, High Energy Accelerator Research Organization (Japan); Suguru Takada, National Institute for Fusion Science (Japan); Oliver Zahn, Lawrence Berkeley National Lab. (USA); Hiroshi Yamaguchi, High Energy Accelerator Research Organization (Japan) . . . . . [9153-125]

Keck array and BICEP3: spectral characterization of 5000+ detectors, Kirit S. Karkare, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9153-126]

Kilopixel backshort-under-grid arrays for the primordial inflation polarization explorer, Christine A. Jhabvala, Dominic J. Benford, Regis P. Brekosky, Meng-Ping Chang, Nicholas P. Costen, Aaron M. Datesman, NASA Goddard Space Flight Ctr. (USA); Gene C. Hilton, National Institute of Standards and Technology (USA); Kent D. Irwin, Stanford Univ. (USA); Justin Lazear, Johns Hopkins Univ. (USA); Edward S. Leong, ASRC Federal Space and Defense (USA); Timothy M. Miller, Samuel Harvey Moseley Jr., NASA Goddard Space Flight Ctr. (USA); Elmer H. Sharp III, Johannes G. Staguhn, Johns Hopkins Univ. (USA); Edward J. Wollack, NASA Goddard Space Flight Ctr. (USA) . . . . . [9153-127]

Photon counting technologies for future terahertz astronomy, Hiroshi Matsuo, National Astronomical Observatory of Japan (Japan) . . . . . [9153-129]

Novel concepts for ultrafast travelling-wave photomixers for terahertz generation, Ernest A. Michael, F. Patricio Mena, Claudio M. Barrientos, Jaime A. Alvarez, Victor Calle, Univ. de Chile (Chile) . . . . . [9153-130]

A vector network analyzer-based near field scanner for MM-wave and THz receivers, Kristina Davis, Christopher E. Groppi, Hamdi Mani, Caleb H. Wheeler, Arizona State Univ. (USA); Christopher K. Walker, The Univ. of Arizona (USA) . . . . . [9153-131]

Measurements of a 10-GHz orbital angular momentum beam from a spiral phase plate and commercial satellite dish, Peter Schemmel, Bruno Maffei, Giampaolo Pisano, The Univ. of Manchester (United Kingdom) . . . . . [9153-132]

Radio-transparent multi-layer insulation: a novel technology enhances cooling of radiowave receivers, Osamu Tajima, High Energy Accelerator Research Organization (Japan) and The Graduate Univ. for Advanced Studies (Japan); Jihoon Choi, Korea Univ. (Korea, Republic of); Hikaru Ishitsuka, The Graduate Univ. for Advanced Studies (Japan); Satoru Mima, RIKEN (Japan); Shugo Oguri, High Energy Accelerator Research Organization (Japan); Kenta Takahashi, RIKEN (Japan) and Tohoku Univ. (Japan) . . . . . [9153-133]

The segmented vortex telescope: a novel approach for exoplanet detection, Omar Lopez-Cruz, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Sabino Chávez-Cerda, Juan P. Treviño, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [9153-134]

CONFERENCE 9153 · LOCATION: ROOM 520A

FRIDAY 27 JUNE

SESSION 10

LOCATION: ROOM 520A . . . . . FRI 8:30 TO 10:10

CMB Instruments: New Developments I

Session Chair: **Wayne S. Holland,** UK Astronomy Technology Ctr. (United Kingdom)

8:30: **The Simons array: expanding POLARBEAR to three multi-chroic telescopes**, Kam S. Arnold, Univ. of California, San Diego (USA) and Polarbear Collaboration (USA) . . . . . [9153-51]

8:50: **POLARBEAR-2: a new instrument for CMB polarization measurements with Simons Array**, Masashi Hazumi, Takayuki Tomaru, High Energy Accelerator Research Organization (Japan); Adrian T. Lee, Univ. of California, Berkeley (USA); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Yoshiki Akiba, The Graduate Univ. for Advanced Studies (Japan); Christopher Aleman, Univ. of California, San Diego (USA); Kam S. Arnold, Univ. of California, Berkeley (USA); Darcy Barron, Univ. of California, San Diego (USA); Amy N. Bender, McGill Univ. (Canada); Julian Borrill, Lawrence Berkeley National Lab. (USA); Scott Chapman, Dalhousie Univ. (Canada); Yuji Chinone, High Energy Accelerator Research Organization (Japan); Ari Cukierman, Univ. of California, Berkeley (USA); Matthew A. Dobbs, McGill Univ. (Canada); Tucker Elleflot, Univ. of California, San Diego (USA); Josquin Errard, Lawrence Berkeley National Lab. (USA); Giulio Fabbian, Scuola Internazionale Superiore di Studi Avanzati (Italy); Guangyuan Feng, Univ. of California, San Diego (USA); Adam Gilbert, McGill Univ. (Canada); Nils W. Halverson, Univ. of Colorado at Boulder (USA); Masaya Hasegawa, Kaori Hattori, High Energy Accelerator Research Organization (Japan); William L. Holzapfel, Univ. of California, Berkeley (USA); Yasuto Hori, High Energy Accelerator Research Organization (Japan); Yuki Inoue, The Graduate Univ. for Advanced Studies (Japan); Greg Jaehnig, Univ. of Colorado at Boulder (USA); Nobuhiko Katayama, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Brian G. Keating, Univ. of California, San Diego (USA); Zigmund D. Kermish, Princeton Univ. (USA); Reijo Keskitalo, Theodore S. Kisner, Lawrence Berkeley National Lab. (USA); Maude Le Jeune, AstroParticule et Cosmologie (France); Frederick Matsuda, Univ. of California, San Diego (USA); Tomotake Matsumura, Hideki Morii, High Energy Accelerator Research Organization (Japan); Michael J. Myers, Univ. of California, Berkeley (USA); Martin Navaroli, Univ. of California, San Diego (USA); Haruki Nishino, Kavli Institute for the Physics and Mathematics of the Universe (Japan); Takahiro Okamura, High Energy Accelerator Research Organization (Japan); Julien Peloton, AstroParticule et Cosmologie (France); Christian Reichardt, Paul L. Richards, Univ. of California, Berkeley (USA); Colin Ross, Kaja M. Rotermund, Dalhousie Univ. (Canada); Michael J. Sholl, Lawrence Berkeley National Lab. (USA); Praween Siritanasak, Univ. of California, San Diego (USA); Graeme M. Smecher, Three-Speed Logic, Inc. (Canada); Nathan C. Stebor, Univ. of California, San Diego (USA); Bryan Steinbach, Univ. of California, Berkeley (USA); Radek Stompor, AstroParticule et Cosmologie (France); Aritoki Suzuki, Univ. of California, Berkeley (USA); Jun-ichi Suzuki, High Energy Accelerator Research Organization (Japan); Suguru Takada, National Institute for Fusion Science (Japan); Brandon Wilson, Univ. of California, San Diego (USA); Hiroshi Yamaguchi, High Energy Accelerator Research Organization (Japan); Oliver Zahn, Lawrence Berkeley National Lab. (USA) . . . . . [9153-52]

9:10: **PILOT: a balloon-borne experiment to measure the polarized FIR emission of dust grains in the interstellar medium**, Jean-Philippe Bernard, Institut de Recherche en Astrophysique et Planétologie (France); Ruka Misawa, Ctr. National de la Recherche Scientifique (France) . . . . . [9153-53]

9:30: **The cosmology large angular scale surveyor (CLASS)**, Thomas Essinger-Hileman, Aamir Ali, Johns Hopkins Univ. (USA); Mandana Amiri, The Univ. of British Columbia (Canada); John W. Appel, Johns Hopkins Univ. (USA); Derek Araujo, Columbia Univ. (USA); Charles L. Bennett, Fletcher Boone, Manwei Chan, Johns Hopkins Univ. (USA); Hsiao-Mei Cho, National Institute of Standards and Technology (USA); David T. Chuss, Felipe Colazo, Erik Crowe, Kevin L. Denis, NASA Goddard Space Flight Ctr. (USA); Rolando Dunner, Pontificia Univ. Católica de Chile (Chile); Joseph Eimer, Dominik Gothe, Johns Hopkins Univ. (USA); Mark Halpern, The Univ. of British Columbia (Canada); Kathleen Harrington, Johns Hopkins Univ. (USA); Gene C. Hilton, National Institute of Standards and Technology (USA); Gary F. Hinshaw, The Univ. of British Columbia (Canada); Caroline Huang, Johns Hopkins Univ. (USA); Kent D. Irwin, Stanford Univ. (USA); Glenn E. Jones, Columbia Univ. (USA); Alan J. Kogut, NASA Goddard Space Flight Ctr. (USA); David Larson, Johns Hopkins Univ. (USA); Michele Limon, Columbia Univ. (USA); Lindsay Lowry, Nicholas Mehrle, Johns Hopkins Univ. (USA); Amber Miller, Columbia Univ. (USA); Nathan J. Miller, Samuel Harvey Moseley Jr., NASA Goddard Space Flight Ctr. (USA); Giles Novak, Northwestern Univ. (USA); Carl D. Reintsema, National Institute of Standards and Technology (USA); Karwan Rostem, Thomas R. Stevenson, Deborah Towner, Kongpop U-Yen, NASA Goddard Space Flight Ctr. (USA); Emily Wagner, Duncan Watts, Johns Hopkins Univ. (USA); Edward J. Wollack, NASA Goddard Space Flight Ctr. (USA); Zhilei Xu, Johns Hopkins Univ. (USA); Lingzhen Zeng, Harvard-Smithsonian Ctr. for Astrophysics (USA); Tobias Marriage, Johns Hopkins Univ. (USA) . . . . . [9153-54]

9:50: **The cosmology large angular scale surveyor (CLASS): 40-GHz detector array of bolometric polarimeters**, John W. Appel, Aamir Ali, Johns Hopkins Univ. (USA); Mandana Amiri, The Univ. of British Columbia (Canada); Derek Araujo, Columbia Univ. (USA); Charles L. BennetT, Fletcher Boone, Manwei Chan, Johns Hopkins Univ. (USA); Hsiao-Mei Cho, National Institute of Standards and Technology (USA); David T. Chuss, Felipe Colazo, Erik Crowe, Kevin L. Denis, NASA Goddard Space Flight Ctr. (USA); Rolando Dunner, Pontificia Univ. Católica de Chile (Chile); Joseph Eimer, Thomas Essinger-Hileman, Dominik Gothe, Johns Hopkins Univ. (USA); Mark Halpern, The Univ. of British Columbia (Canada); Kathleen Harrington, Johns Hopkins Univ. (USA); Gene C. Hilton, National Institute of Standards and Technology (USA); Gary F. Hinshaw, The Univ. of British Columbia (Canada); Caroline Huang, Johns Hopkins Univ. (USA); Kent D. Irwin, Stanford Univ. (USA); Glenn E. Jones, Columbia Univ. (USA); John Krakula, Johns Hopkins Univ. (USA); Alan J. Kogut, NASA Goddard Space Flight Ctr. (USA); David Larson, Johns Hopkins Univ. (USA); Michele Limon, Columbia Univ. (USA); Lindsay Lowry, Tobias Marriage, Nicholas Mehrle, Johns Hopkins Univ. (USA); Amber Miller, Columbia Univ. (USA); Nathan J. Miller, Samuel Harvey Moseley Jr., NASA Goddard Space Flight Ctr. (USA); Giles Novak, Northwestern Univ. (USA); Carl D. Reintsema, National Institute of Standards and Technology (USA); Karwan Rostem, Thomas R. Stevenson, Deborah Towner, Kongpop U-Yen, NASA Goddard Space Flight Ctr. (USA); Emily Wagner, Duncan Watts, Johns Hopkins Univ. (USA); Edward J. Wollack, NASA Goddard Space Flight Ctr. (USA); Zhilei Xu, Johns Hopkins Univ. (USA); Lingzhen Zeng, Harvard-Smithsonian Ctr for Astrophysics (USA) . [9153-55]

Coffee Break . . . . . Fri 10:10 to 10:40

SESSION 11

LOCATION: ROOM 520A . . . . . FRI 10:40 TO 12:40

CMB Instruments: New Developments II

Session Chair: **Gordon J. Stacey,** Cornell Univ. (USA)

10:40: **Advanced ACTPol**, Jeff McMahon, Univ. of Michigan (USA); Shawn W. Henderson, Michael D. Niemack, Cornell Univ. (USA) . . . . . [9153-56]

11:00: **The primordial inflation polarization explorer (PIPER)**, Justin Lazear, Johns Hopkins Univ. (USA); Peter A. R. Ade, Cardiff Univ. (United Kingdom); Dominic J. Benford, NASA Goddard Space Flight Ctr. (USA); Charles L. Bennett, Johns Hopkins Univ. (USA); David T. Chuss, NASA Goddard Space Flight Ctr. (USA); Jessie L. Dotson, NASA Ames Research Ctr. (USA); Joseph Eimer, Johns Hopkins Univ. (USA); Dale J. Fixsen, NASA Goddard Space Flight Ctr. (USA); Mark Halpern, The Univ. of British Columbia (Canada); Gene C. Hilton, National Institute of Standards and Technology (USA); James Hinderks, NASA Goddard Space Flight Ctr. (USA); Gary F. Hinshaw, The Univ. of British Columbia (Canada); Kent D. Irwin, Stanford Univ. (USA); Christine A. Jhabvala, Alan J. Kogut, NASA Goddard Space Flight Ctr. (USA); Luke Lowe, NASA Goddard Spaceflight Ctr. (USA); Timothy M. Miller, Paul Mirel, Samuel Harvey Moseley Jr., Samelys Rodriguez, Elmer H. Sharp III, Johannes G. Staguhn, Eric R. Switzer, NASA Goddard Space Flight Ctr. (USA); Carole E. Tucker, Cardiff Univ. (United Kingdom); Amy Weston, Edward J. Wollack, NASA Goddard Space Flight Ctr. (USA) . . . . . [9153-57]

11:20: **GroundBIRD: CMB polarization measurements at large angular scale by using MKIDs**, Satoru Mima, RIKEN (Japan); Osamu Tajima, Shugo Oguri, Masanori Kawai, Masashi Hazumi, Mitsuhiro Yoshida, High Energy Accelerator Research Organization (Japan); Kenta Takahashi, RIKEN (Japan) and Tohoku Univ. (Japan); Eunil Won, Jihoon Choi, Korea Univ. (Korea, Republic of); Hikaru Ishitsuka, The Graduate Univ. for Advanced Studies (Japan); Chiko Otani, RIKEN (Japan); Kenichi Karatsu, Yutaro Sekimoto, National Astronomical Observatory of Japan (Japan); Tom Nitta, Univ. of Tsukuba (Japan) and National Astronomical Observatory of Japan (NAOJ) (Japan) . . . . . [9153-58]

11:40: **BICEP3: a next-generation refractor for inflationary CMB polarization**, Zeeshan Ahmed, Stanford Univ. (USA) and for the BICEP3 collaboration (USA) . . . . . [9153-59]

12:00: **The BICEP-3 focal plane: a modular array of antenna-coupled TES bolometers**, Howard Hui, California Institute of Technology (USA) and for the BICEP3 Collaboration (USA); James J. Bock, Jet Propulsion Lab. (USA) and California Institute of Technology (USA); Jeffrey P. Filippini, Roger C. O'Brient, California Institute of Technology (USA) . . . . . [9153-60]

12:20: **SPT-3G: a next-generation cosmic microwave background polarization experiment on the South Pole telescope**, Bradford Benson, Ctr. for Particle Astrophysics (USA) and Fermi National Accelerator Lab. (USA) and On behalf of SPT Collaboration (USA); Jason E. Austermann, Univ. of Colorado at Boulder (USA) . . . . . [9153-61]

Lunch Break . . . . . Fri 12:40 to 13:40

SESSION 12

LOCATION: ROOM 520A . . . . . FRI 13:40 TO 15:20

Terahertz Technology

Session Chair: **Christopher K. Walker,** The Univ. of Arizona (USA)

13:40: **Development of the hot-electron THz bolometric mixer using thin MgB2 film**, Daniel P. Cunnane, Jet Propulsion Lab. (USA); Matthaeus A. Wolak, Teng Tan, Temple Univ. (USA); Jonathan H. Kawamura, Jet Propulsion Lab. (USA); Xioaxing X. Xi, Temple Univ. (USA); Boris S. Karasik, Jet Propulsion Lab. (USA) . . . . . [9153-62]

14:00: **A 4.7 THz heterodyne receiver for a balloon borne telescope**, Darren J. Hayton, SRON Netherlands Institute for Space Research (Netherlands); Jenna L. Kloosterman, The Univ. of Arizona (USA); Yuan Ren, Technische Univ. Delft (Netherlands); Tsung-Yu Kao, Massachusetts Institute of Technology (USA); Jian-Rong Gao, SRON Netherlands Institute for Space Research (Netherlands) and Technische Univ. Delft (Netherlands); Teunis Martien Klapwijk, Technische Univ. Delft (Netherlands); Qing Hu, Massachusetts Institute of Technology (USA); Chris Walker, The Univ. of Arizona (USA); John L. Reno, Sandia National Labs. (USA) . . . . . [9153-63]

14:20: **Wideband kinetic inductance parametric amplifiers for the millimeter and submillimeter-wave bands**, Peter K. Day, Byeong-Ho Eom, Henry G. LeDuc, Jet Propulsion Lab. (USA); Jonas Zmuidzinas, California Institute of Technology (USA); Christopher E. Groppi, Philip D. Mauskopf, Arizona State Univ. (USA); David P. Woody, James W. Lamb, California Institute of Technology (USA) . . . . [9153-64]

14:40: **Development of Ge BIB far-infrared image sensors with FD-SOI CMOS ROIC**, Takehiko Wada, Japan Aerospace Exploration Agency (Japan); Hidehiro Kaneda, Nagoya Univ. (Japan); Kentaroh Watanabe, The Univ. of Tokyo (Japan); Toyoaki Suzuki, SRON Netherlands Institute for Space Research (Netherlands); Yasuo Arai, High Energy Accelerator Research Organization (Japan); Hirokazu Ikeda, Japan Aerospace Exploration Agency (Japan); Hidehiko Nakaya, National Astronomical Observatory of Japan (Japan); Morifumi Ohno, National Institute of Advanced Industrial Science and Technology (Japan); Koichi Nagase, The Graduate Univ. for Advanced Studies (Japan); Yasuki Hattori, Koudai Kobata, Nagoya Univ. (Japan); Shunsuke Baba, Chihiro Kochi, The Univ. of Tokyo (Japan); Kotomi Tanaka, Misaki Hanaoka, Nagoya Univ. (Japan). . . . . [9153-65]

15:00: **CNES detector development from far-infrared to mm: status and roadmap**, Herve Geoffray, Alain Bardoux, Ctr. National d'Études Spatiales (France) . . . . . [9153-66]

Coffee Break . . . . . Fri 15:20 to 15:50

SESSION 13

LOCATION: ROOM 520A . . . . . FRI 15:50 TO 17:50

Emerging Concepts and New Instruments

Session Chair: **Jonas Zmuidzinas,** California Institute of Technology (USA)

15:50: **Instrumentation for single-dish observations with the Greenland telescope**, Paul K. Grimes, Smithsonian Astrophysical Observatory (USA); Keiichi Asada, Academia Sinica (Taiwan); Raymond Blundell, Roberto L. Burgos, Smithsonian Astrophysical Observatory (USA); Ming-Tang Chen, Institute of Astronomy and Astrophysics (Taiwan); David Goldie, Univ. of Cambridge (United Kingdom); Johnson Han, Institute of Astronomy and Astrophysics (Taiwan); Paul T. P. Ho, Academia Sinica (Taiwan) and Smithsonian Astrophysical Observatory (USA); Yau-De Huang, Institute of Astronomy and Astrophysics (Taiwan); Makoto Inoue, Academia Sinica (Taiwan); Derek Y. Kubo, Patrick M. Koch, Institute of Astronomy and Astrophysics (Taiwan); Jamie Leech, Univ. of Oxford (United Kingdom); Eloy de Lera Acedo, Univ. of Cambridge (United Kingdom); Pierre L. Martin-Cocher, Institute of Astronomy and Astrophysics (Taiwan); Hiroaki Nishioka, Masanori Nakamura, Satoki Matsushita, Academia Sinica (Taiwan); Scott N. Paine, Nimesh A. Patel, Harvard-Smithsonian Ctr. for Astrophysics (USA); Philippe Raffin, Institute of Astronomy and Astrophysics (Taiwan); William Snow, Academia Sinica (Taiwan); Tirupati K. Sridharan, Harvard-Smithsonian Ctr. for Astrophysics (USA); Christopher N. Thomas, Univ. of Cambridge (United Kingdom); Edward C. Tong, Harvard-Smithsonian Ctr. for Astrophysics (USA); Ming-jye Wang, Institute of Astronomy and Astrophysics (Taiwan); Stafford Withington, Univ. of Cambridge (United Kingdom); Ghassan Yassin, Univ. of Oxford (United Kingdom); Lingzhen Zeng, Harvard-Smithsonian Ctr. for Astrophysics (USA); Ranjani Srinivasan, Academia Sinica (Taiwan) . . . . . [9153-67]

16:10: **The TIME-Pilot intensity mapping experiment**, Zachary Staniszewski, James J. Bock, California Institute of Technology (USA); Charles M. Bradford, Jet Propulsion Lab. (USA); Justus A. Brevik, National Institute of Standards and Technology (USA); Tzu-Ching Chang, Institute of Astronomy and Astrophysics (Taiwan); Asantha R. Cooray, Univ. of California, Irvine (USA); Abigail T. Crites, California Institute of Technology (USA); Lionel Duband, Commissariat à l'Énergie Atomique (France); Yan Gong, Univ. of California, Irvine (USA); Steven Hailey-Dunsheath, Jonathon Hunacek, California Institute of Technology (USA); Patrick M. Koch, Chao-Te Li, Institute of Astronomy and Astrophysics (Taiwan); Roger C. O'Brient, Univ. of California, Berkeley (USA); Thomas Prouve, CEA Grenoble (France); Erik D. Shirokoff, California Institute of Technology (USA); Marta B. Silva, CENTRA (Portugal); Michael Zemcov, California Institute of Technology (USA) . . . . . [9153-68]

16:30: **Microspec: a compact integrated cryogenic spectrometer for submillimeter astronomy**, Samuel Harvey Moseley Jr., Emily M. Barrentine, Negar Ehsan, Wen-Ting Hseih, Omid Noroozian, Thomas R. Stevenson, Kongpop U-Yen, Edward J. Wollack, NASA Goddard Space Flight Ctr. (USA) . . . . . [9153-69]

16:50: **X-Spec: a multi-object trans-millimeter-wave spectrometer for CCAT**, Charles M. Bradford, Jet Propulsion Lab. (USA) and California Institute of Technology (USA); Steven Hailey-Dunsheath, Erik D. Shirokoff, Matthew I. Hollister, Christopher M. McKenney, California Institute of Technology (USA); Scott Chapman, Alexey Tikhomirov, Dalhousie Univ. (Canada); Thomas Nikola, Cornell Univ. (USA) . . . . . [9153-70]

17:10: **KPAF instrument concept: a K-band (18-26.5 GHz) phased array feed**, Lisa S. Locke, Univ. of Victoria (Canada); Stéphane M. X. Claude, NRC - Herzburg Institute of Astrophysics (Canada); Jens Bornemann, Univ. of Victoria (Canada); James Di Francesco, Dominic Garcia, Pat Niranjanan, Ivan Wevers, NRC - Herzburg Institute of Astrophysics (Canada) . . . . . [9153-71]

17:30: **A quasioptical steering system for the CCAT/XSPEC submillimeter multi-object spectrometer**, Scott Chapman, Alexey Tikhomirov, Dalhousie Univ. (Canada); Charles M. Bradford, Jet Propulsion Lab. (USA); Steven Hailey-Dunsheath, California Institute of Technology (USA); Philipp Heyne, Dalhousie Univ. (Canada) . . . . . [9153-135]

CONFERENCE 9154 · LOCATION: ROOM 519B

Sunday–Wednesday 22–25 June 2014 • Proceedings of SPIE Vol. 9154

High Energy, Optical, and Infrared Detectors for Astronomy VI


(Holland)


(Beletic)

Conference Chairs: **Andrew D. Holland,** e2v Ctr. for Electronic Imaging at The Open Univ. (United Kingdom); **James Beletic,** Teledyne Imaging Sensors (USA)

Program Committee: **Megan E. Eckart,** NASA Goddard Space Flight Ctr. (USA); **Gert Finger,** European Southern Observatory (Germany); **Paul Jorden,** e2v technologies plc (United Kingdom); **Didier D. Martin,** European Space Research and Technology Ctr. (Netherlands); **Satoshi Miyazaki,** National Astronomical Observatory of Japan (Japan); **Peter C. Moore,** National Optical Astronomy Observatory (USA); **S. Harvey Moseley,** NASA Goddard Space Flight Ctr. (USA); **Robert H. Philbrick,** Ball Aerospace & Technologies Corp. (USA); **Roger M. Smith,** California Institute of Technology (USA); **Lothar Strüder,** PNSensor GmbH (Germany); **Tadayuki Takahashi,** Japan Aerospace Exploration Agency (Japan); **Hiroshi Tsunemi,** Osaka Univ. (Japan)

SUNDAY 22 JUNE

SESSION 1

LOCATION: ROOM 519B . . . . . SUN 9:00 TO 10:20

Programs

Session Chair: **Andrew D. Holland,** The Open Univ. (United Kingdom)

9:00: **CNES detector development for scientific space missions: status and roadmap for visible and infrared detectors**, Herve Geoffray, Alain Bardoux, Ctr. National d'Études Spatiales (France) . . . . . [9154-1]

9:20: **European Space Agency detector development: present and future activities**, Ludovic Duvet, Nicholas Nelms, Yoanna-Reine Nowicki-Bringuier, Peter Verhoeve, Pierre-Elie Crouzet, Marcos Bavdaz, European Space Research and Technology Ctr. (Netherlands). . . . . [9154-100]

9:40: **Detector developments at ESO to prepare for the E-ELT era**, Mark Downing, Gert Finger, Derek J. Ives, Olaf Iwert, Suzanne K. Ramsay, European Southern Observatory (Germany) . . . . . [9154-102]

10:00: **NASA Program Update**, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) . . . . . [9154-103]

Coffee Break . . . . . Sun 10:20 to 10:45

SESSION 2

LOCATION: ROOM 519B . . . . . SUN 10:45 TO 12:05

Radiation Damage

Session Chair: **Andrew D. Holland,** The Open Univ. (United Kingdom)

10:45: **The radiation environment at L2 as seen by Gaia**, Ralf Kohley, European Space Astronomy Ctr. (Spain); Philippe Garé, European Space Research and Technology Ctr. (Netherlands); Franc?ois Chassat, EADS Astrium (France); Alexander D. Short, European Space Research and Technology Ctr. (Netherlands); Cian M. Crowley, Juan Manuel Martin-Fleitas, Alcione Mora, Asier Abreu Aramburu, European Space Astronomy Ctr. (Spain); Thibaut Prod'homme, European Space Research and Technology Ctr. (Netherlands) . . . . . [9154-30]

11:05: **Characterising radiation damage effects in a CMOS APS destined for the hostile Jovian environment**, Matthew Soman, Andrew D. Holland, Konstantin D. Stefanov, Jason P. D. Gow, Mark Leese, The Open Univ. (United Kingdom) . . . . . [9154-31]

11:25: **In situ trap parameter studies in CCDs for space applications**, David J. Hall, Neil J. Murray, Jason P. D. Gow, Daniel Wood, Andrew D. Holland, The Open Univ. (United Kingdom) . . . . . [9154-32]

11:45: **A comparative study of charge transfer inefficiency value and trap parameter determination techniques making use of an irradiated ESA-Euclid prototype CCD**, Thibaut Prod'homme, Peter Verhoeve, Nathalie Boudin, European Space Agency (Netherlands); Ralf Kohley, European Space Agency (Spain); Alexander D. Short, European Space Agency (Netherlands) . . . . . [9154-33]

Lunch Break . . . . . Sun 12:05 to 13:15

SESSION 3

LOCATION: ROOM 519B . . . . . SUN 13:15 TO 15:15

EM-CCDs

Session Chair: **Satoshi Miyazaki,** National Astronomical Observatory of Japan (Japan)

13:15: **Development of a 4kx4k frame transfer electron multiplying CCD for scientific applications**, Jean-Luc Gach, Lab. d'Astrophysique de Marseille (France) and First Light Imaging (France); Claude Carignan, Univ. of Cape Town (South Africa) and Lab. d'Astrophysique Expérimentale (Canada); Olivier Hernandez, Observatoire du Mont Mégantic (Canada) and Ctr. de Recherche en Astrophysique du Québec (Canada); Paul R. Jorden, Douglas Jordan, e2v technologies plc (United Kingdom); Philippe Balard, Lab. d'Astrophysique de Marseille (France) and First Light Imaging (France). . . . . [9154-4]

13:35: **EMCCDs, ten MHz, and beyond**, Olivier Daigle, Nüvü Caméras Inc. (Canada); Oleg Djazovski, Canadian Space Agency (Canada); René Doyon, Univ. de Montréal (Canada); Denis G. Laurin, Canadian Space Agency (Canada); Philippe Richelet, Univ. de Montréal (Canada) and Nüvü Caméras Inc. (Canada) . . . [9154-5]

13:55: **Characterization of a photon counting CCD for space-based high contrast imaging spectroscopy of extrasolar planets**, Ashlee N. Wilkins, Univ. of Maryland, College Park (USA); Michael W. McElwain, NASA Goddard Space Flight Ctr. (USA); Timothy J. Norton, NASA Goddard Space Flight Ctr. (USA) and Univ. of Maryland (USA) and The Ctr. for Research and Exploration in Space Science and Technology (USA); Bernard J. Rauscher, Don J. Lindler, Bruce E. Woodgate, NASA Goddard Space Flight Ctr. (USA); George M. Hilton, NASA Goddard Space Flight Ctr. (USA) and Univ. of Maryland (USA) and The Ctr. for Research and Exploration in Space Science and Technology (USA); Carol A. Grady, NASA Goddard Space Flight Ctr. (USA) and Eureka Scientific, Inc. (USA) . . . . . [9154-6]

14:15: **Astronomical imaging with EMCCDs using long exposures**, Olivier Daigle, Nüvü Caméras Inc. (Canada); Oleg Djazovski, Canadian Space Agency (Canada); René Doyon, Univ. de Montréal (Canada); Jean Dupuis, Canadian Space Agency (Canada); Étienne Artigau, Univ. de Montréal (Canada). . . . . [9154-7]

14:35: **Developments in the EM-CCD camera for OGRE**, James H. Tutt, The Univ. of Iowa (United Kingdom); Randall L. McEntaffer, Casey T. DeRoo, Ted B. Schultz, The Univ. of Iowa (USA); Andrew D. Holland, Neil J. Murray, The Open Univ. (United Kingdom); Karen Holland, XCAM Ltd. (United Kingdom) . . . . [9154-8]

14:55: **Comparison of EMCCD post-processing methods for photon counting flux ranges**, Nassim Rousset, Villeneuve Jérémie, Jean-Hughes Fournier Lupien, Anis Attiaoui, Gabriel Taillon, Sébastien Francoeur, Ecole Polytechnique de Montréal (Canada); Olivier Daigle, Nüvü Caméras Inc. (Canada) . . . . . [9154-60]

Coffee Break . . . . . Sun 15:15 to 15:40

SESSION 4

LOCATION: ROOM 519B . . . . . SUN 15:40 TO 17:20

X-ray Detectors I

Session Chair: **Hiroshi Tsunemi,** Osaka Univ. (Japan)

15:40: **Development motivations and status of hybrid CMOS x-ray detectors**, Abraham D. Falcone, David N. Burrows, Zachary R. Prieskorn, Christopher V. Griffith, The Pennsylvania State Univ. (USA) . . . . . [9154-35]

16:00: **X-ray analysis of fully depleted thick CCDs with small pixel size**, Ivan V. Kotov, Brookhaven National Lab. (USA) . . . . . [9154-42]

16:20: **Dynamic range of fully depleted pnCCDs: modeling and experimental confirmation**, Lothar W. Strueder, Julia Schmidt, Jakob A. Soltau, Robert Hartmann, Peter Holl, Martin Huth, Heike Soltau, PNSensor GmbH (Germany) . . . . . [9154-29]

16:40: **Developing monolithic CMOS detectors as x-ray imaging spectrometers**, Almus T. Kenter, Ralph P. Kraft, Harvard-Smithsonian Ctr. for Astrophysics (USA); Stephen S. Murray, Johns Hopkins Univ. (USA); James R. Janesick, SRI International Sarnoff (USA); Thomas M. Gauron, William R. Forman, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9154-43]

17:00: **High resolution soft x-ray microcalorimeters using magnetic penetration thermometers**, Simon R. Bandler, NASA Goddard Space Flight Ctr. (USA) and Univ. of Maryland (USA); Manuel A. Balvin, Sarah E. Busch, Jan-Patrick Porst, John E. Sadleir, Stephen J. Smith, Thomas R. Stevenson, Peter C. Nagler, NASA Goddard Space Flight Ctr. (USA) . . . . . [9154-20]

SESSION 5

LOCATION: ROOM 519B . . . . . SUN 17:40 TO 18:00

IR Detectors I

17:40: **Asymmetry in the noise equivalent angle performance of the JWST fine guidance sensor**, Neil Rowlands, Gerry Warner, COM DEV Canada (Canada); Loïc Albert, Univ. de Montréal (Canada); Tim Hardy, National Research Council Canada (Canada); Judith L. Pipher, Univ. of Rochester (USA); John B. Hutchings, National Research Council Canada (Canada); René Doyon, Univ. de Montréal (Canada) . . . . . [9154-10]

MONDAY 23 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . MON 8:50 TO 10:00

Session Chair: **Luc Simard,** National Research Council of Canada - Herzberg Institute of Astrophysics (Canada)

08:50: **Welcome**

9:00: **James Webb Space Telescope: the road to first science observations** *(Plenary)*, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) [9143-501]

9:30: **The Square Kilometre Array: a physics machine for the 21st Century** *(Plenary)*, Philip Diamond, SKA Organisation (United Kingdom) . . [9143-502]

Coffee Break . . . . . Mon 10:00 to 10:30

SESSION 6

LOCATION: ROOM 519B . . . . . MON 10:30 TO 11:30

Manufacturer's Programs

Session Chair: **Didier D. Martin,** European Space Research and Technology Ctr. (Netherlands)

10:30: **e2v new CCD and CMOS technology developments for astronomical sensors**, Paul R. Jorden, e2v technologies (UK) Ltd. (United Kingdom); Douglas Jordan, Paul Jerram, Jerome Pratlong, Ian Swindells, e2v technologies plc (United Kingdom) . . . . . [9154-101]

10:50: **Teledyne imaging sensors: detector update**, Richard Blank, Selmer W. Anglin, Yibin Bai, James W. Beletic, Lalit Bhambhani, Craig Cabelli, Scott A. Cabelli, Jing Chen, Mark Farris, Lisa Fischer, Eric C. Piquette, Andre Wong, Min Xu, Majid Zandian, Teledyne Imaging Sensors (USA); Gerard A. Luppino, GL Scientific (USA) . . . . . [9154-9]

11:10: **Characterisation activities of new NIR to VLWIR detectors from Selex ES Ltd at the UKATC**, Naidu Bezawada, David C. Atkinson, UK Astronomy Technology Ctr. (United Kingdom); Nick Shorrocks, Les G. Hipwood, Harald J. Weller, SELEX ES Ltd. (United Kingdom); Ian Bryson, UK Astronomy Technology Ctr. (United Kingdom); Malcolm Jackson, Ray P. Davis, Keith Barnes, Ian M. Baker, SELEX ES Ltd. (United Kingdom) . . . . . [9154-12]

SESSION 7

LOCATION: ROOM 519B . . . . . MON 11:30 TO 12:10

CCD and CMOS Detectors

Session Chair: **Didier D. Martin,** European Space Research and Technology Ctr. (Netherlands)

11:30: **Assessment of the performance and radiation damage effects under cryogenic temperatures of a P-channel CCD204**, Neil J. Murray, Andrew D. Holland, Jason P. D. Gow, David J. Hall, Konstantin D. Stefanov, Simeon Barber, The Open Univ. (United Kingdom); David J. Burt, e2v technologies plc (United Kingdom) . . . . . [9154-99]

11:50: **LGSD/NGSD: high speed optical CMOS imagers for E-ELT adaptive optics**, Mark Downing, Johann Kolb, European Southern Observatory (Germany); Philippe Balard, Lab. d'Astrophysique de Marseille (France); Bart M. Dierickx, Arnaud Defernez, Caeleste (Belgium); Philippe Feautrier, Institut de Planétologie et d'Astrophysique de Grenoble (France); Gert Finger, European Southern Observatory (Germany); Martin Fryer, e2v technologies plc (United Kingdom); Jean-Luc Gach, Lab. d'Astrophysique de Marseille (France); Christian Guillaume, Observatoire de Haute-Provence (France); Norbert Hubin, European Southern Observatory (Germany); Paul Jerram, Paul R. Jorden, e2v technologies plc (United Kingdom); Manfred Meyer, European Southern Observatory (Germany); Andrew D. Payne, Andrew Pike, e2v technologies plc (United Kingdom); Javier Reyes, European Southern Observatory (Germany); Robert Simpson, e2v technologies plc (United Kingdom); Eric Stadler, Institut de Planétologie et d'Astrophysique de Grenoble (France); Benoit Dupont, Caeleste (Belgium). . . . . [9154-41]

Lunch Break . . . . . Mon 12:10 to 13:40

CONFERENCE 9154 · LOCATION: ROOM 519B

SESSION 8

LOCATION: ROOM 519B . . . . . .MON 13:40 TO 15:20

Missions and Cameras

Session Chair: **Megan E. Eckart,** NASA Goddard Space Flight Ctr. (USA)

13:40: **The Euclid VIS CCD detector design, development, and programme status**, Alexander D. Short, European Space Research and Technology Ctr. (Netherlands); David Barry, e2v technologies plc (United Kingdom); Michel Berthé, Commissariat à l'Énergie Atomique (France); Nathalie Boudin, European Space Research and Technology Ctr. (Netherlands); Olivier Boulade, Commissariat à l'Énergie Atomique (France); Richard E. Cole, Mark S. Cropper, Univ. College London (United Kingdom); Ludovic Duvet, European Space Research and Technology Ctr. (Netherlands); James Endicott, e2v technologies plc (United Kingdom); Luis Miguel Gaspar Venancio, European Space Research and Technology Ctr. (Netherlands); Jason P. D. Gow, The Open Univ. (United Kingdom); Phillip R. Guttridge, Univ. College London (United Kingdom); David J. Hall, Andrew D. Holland, The Open Univ. (United Kingdom); Holger Israel, Durham Univ. (United Kingdom); Ralf Kohley, European Space Astronomy Ctr. (Spain); René J. Laureijs, Jose Lorenzo Alvarez, European Space Research and Technology Ctr. (Netherlands); Jérôme Martignac, Commissariat à l'Énergie Atomique (France); James Maskell, e2v technologies plc (United Kingdom); Richard J. Massey, Durham Univ. (United Kingdom); Neil J. Murray, The Open Univ. (United Kingdom); Sami Niemi, Univ. College London (United Kingdom); Peter J. Pool, e2v technologies plc (United Kingdom); Sabrina Pottinger, Univ. College London (United Kingdom); Thibaut Prod'homme, Giuseppe D. Racca, Jean-Christophe Salvignol, European Space Research and Technology Ctr. (Netherlands); Wolfgang Suske, e2v technologies plc (United Kingdom); Magdalena B. Szafraniec, Univ. College London (United Kingdom); Peter Verhoeve, European Space Research and Technology Ctr. (Netherlands); David M. Walton, Univ. College London (United Kingdom); Ross Wheeler, e2v technologies plc (United Kingdom) . . . . . [9154-2]

14:00: **FACT: performance of a revolutionary camera in Cherenkov Astronomy using G-APD**, Thomas Bretz, ETH Zürich (Switzerland). . . . . [9154-94]

14:20: **New detectors for the JWST near-IR instruments**, Robert J. Hill, NASA Goddard Space Flight Ctr. (USA); Marcia J. Rieke, The Univ. of Arizona (USA); Bernard J. Rauscher, Matthew A. Greenhouse, Yiting Wen, Don J. Lindler, David B. Mott, NASA Goddard Space Flight Ctr. (USA) . . . . . [9154-13]

14:40: **A gigapixel cryogenic focal plane array camera for the JPAS 2.5-m survey telescope**, Richard D. Harriss, Paul R. Jorden, Matthew Bastable, Andrew Pike, Mike Dryer, Roger Pittock, e2v technologies (UK) Ltd. (United Kingdom); Antonio Marin-Franch, Keith Taylor, Ctr. de Estudios de Física del Cosmos de Aragón (Spain); Ian Palmer, Patrick Wheeler, Ryan Renshaw, Graham Fenemore-Jones, Adam Taylor, Gordon Haddow, Ian Swindles, Maurice Barwick, e2v technologies (UK) Ltd. (United Kingdom) . . . . . [9154-28]

15:00: **Focal plane alignment and detector characterization for the Subaru Prime Focus Spectrograph**, Murdock Hart, Stephen A. Smee, Robert H. Barkhouser, Johns Hopkins Univ. (USA). . . . . [9154-17]

Coffee Break . . . . . Mon 15:20 to 15:50

SESSION 9

LOCATION: ROOM 519B . . . . . .MON 15:50 TO 17:30

X-ray Detectors II

Session Chair: **Megan E. Eckart,** NASA Goddard Space Flight Ctr. (USA)

15:50: **The speedster-EXD: a new event-triggered hybrid CMOS x-ray detector**, Christopher V. Griffith, Abraham D. Falcone, Zachary R. Prieskorn, David N. Burrows, The Pennsylvania State Univ. (USA) . . . . . [9154-38]

16:10: **A 3D CZT high resolution detector for x-and gamma-ray astronomy**, Irfan Kuvvetli, Carl Budtz-Jørgensen, DTU Space (Denmark); Andrea Zappettini, Nicola Zambelli, Istituto dei Materiali per l'Elettronica ed il Magnetismo (Italy); Giacomo Benassi, Istituto dei Materiali per l Elettronica ed il Magnetismo (Italy); John B. Stephen, Natalia Auricchio, Ezio Caroli, INAF - IASF Bologna (Italy); Emrah Kalemci, Sabanci Univ. (Turkey) . . . . . [9154-37]

16:30: **Caliste-SO: the x-ray spectrometer unit of the STIX instrument on board the Solar Orbiter space mission**, Aline Meuris, Olivier Limousin, Olivier Gevin, CEA-IRFU (France); Marie-Cécile Vassal, Fabrice Soufflet, 3D-Plus SAS (France); Martin Bednarzik, Paul Scherrer Institut (Switzerland); Nicolas Fiant, Frank Lemke, 3D-Plus SAS (France); Claire Blondel, Isabelle Le Mer, Duc-Dat Huynh, Frédéric Pinsard, Modeste Donati, CEA-IRFU (France); Oliver Grimm, ETH Zurich (Switzerland); Gordon J. Hurford, Space Sciences Lab. (USA); Säm Krucker, Fachhochschule NordWestschweiz (Switzerland) and Space Sciences Lab. (USA); François Gonzalez, Marc Billot, Ctr. National d'Études Spatiales (France) [9154-36]

16:50: **Development of a phonon-mediated MKID focal plane for hard x-ray/ soft Γ-ray astronomy**, Brett Cornell, Sunil R. Golwala, California Institute of Technology (USA); Bruce Bumble, Jet Propulsion Lab. (USA) . . . . . [9154-19]

17:10: **Soft x-ray quantum efficiency of silicon hybrid CMOS detectors**, Zachary R. Prieskorn, Christopher V. Griffith, Abraham D. Falcone, Jonathan Nikoleyczik, David N. Burrows, The Pennsylvania State Univ. (USA) . . . . . [9154-34]

POSTER SESSION–MONDAY

LOCATION: ROOM 516 . . . . . MON 17:30 TO 19:00

Authors should be prepared to display their poster at morning coffee break. Posters for this conference will be on display on Monday. The interactive poster session with authors in attendance will be Monday evening from 17:30 to 19:00. Authors should remove their posters at the end of the poster session. Posters left displayed will be considered unwanted and will be discarded. Poster presentation guidelines are available online.

The 1.03-gigaPixel KMTN camera system, Bruce Atwood, Thomas P. O'Brien, Mark O. Johnson, Daniel P. Pappalardo, The Ohio State Univ. (USA); Chistopher Colarosa, Worthington Industries (USA); Mark A. Derwent, The Ohio State Univ. (USA) . . . . . [9154-23]

Pocket pumped image analysis, Ivan V. Kotov, Brookhaven National Lab. (USA) . . . . . [9154-49]

Optimization and performance of H2RG detectors and SIDECAR ASICs for SWIMS, Soya Todo, Ken Tateuchi, Kentaro Motohara, Masahiro Konishi, Hidenori Takahashi, Yutaro Kitagawa, Natsuko M. Kato, The Univ. of Tokyo (Japan) . . . . . [9154-50]

ESO adaptive optics controller for the E-ELT, Javier Reyes, European Southern Observatory (Germany) . . . . . [9154-51]

High Event rate ROICs (HEROICs) for astronomical UV photon counting detectors, Alex Harwit, Steven Franka, Vic S. Argabright, Edward D. Freymiller, Dennis Ebbets, Ball Aerospace & Technologies Corp. (USA); Kevin France, Univ. of Colorado at Boulder (USA) . . . . . [9154-53]

Evaluation of InGaAs 640x512 detector array manufactured by Chunghwa Leading Photonics Tech, Takahiro Nagayama, Nami Takeuchi, Hidehiro Kaneda, Asa Yamanaka, Miho Nishiyama, Takuma Kokusho, Nagoya Univ. (Japan)[9154-54]

Driving a CCD with two ASICs: ASPIC and CABAC, Claire Juramy, Univ. Pierre et Marie Curie (France); Pierre E. Antilogus, Philippe Bailly, Sylvain Baumont, Marc Dhellot, Mowafak El Berni, Jimmy Jeglot, Institut National de Physique Nucléaire et de Physique des Particules (France); Hervé Lebbolo, Univ. Pierre et Marie Curie (France); David Martin, Aftab Qureshi, Stefano Russo, Diego Terront, Vanessa Tocut, Institut National de Physique Nucléaire et de Physique des Particules (France) . . . . . [9154-55]

Impact of noise covariance and nonlinearities in NIR H2RG detectors, Bogna Kubik, Institut de Physique Nucléaire de Lyon (France) and Univ. de Lyon (France); Remi Barbier, Eric Chabanat, Gérard Smadja, Sylvain Ferriol, Alain Castera, Institut de Physique Nucléaire de Lyon (France). . . . . [9154-57]

SiPM detectors for the ASTRI and CTA projects, Giovanni Bonanno, Massimiliano Belluso, Sergio Billotta, Alessandro Grillo, Davide Marano, Salvatore Garozzo, Giuseppe Marano, Maria Cristina Timpanaro, INAF - Osservatorio Astrofisico di Catania (Italy); Osvaldo Catalano, INAF - Osservatorio Astrofisico di Catania (Italy) and INAF - Istituto di Astrofisica e Planetologia Spaziali (Italy); Giovanni La Rosa, Giuseppe Sottile, Domenico Impiombato, Carmelo Gargano, Salavtore Giarrusso, Maria C. Maccarone, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy) . . . . . [9154-58]

A CCD system works in vacuum UV band, Qian Song, Zhaowang Zhao, Wei Wang, National Astronomical Observatories (China) . . . . . [9154-61]

A new method of CCD dark current correction via extracting the dark Information from scientific images, Bin Ma, National Astronomical Observatories (China); Zhaohui Shang, National Astronomical Observatories (China) and Tianjin Normal Univ. (China); Yi Hu, Qiang Liu, National Astronomical Observatories (China); Lifan Wang, Purple Mountain Observatory (China); Peng Wei, National Astronomical Observatories (China) . . . . . [9154-62]

The nonlinear photon transfer curve of CCDs and its effects on photometry, Bin Ma, National Astronomical Observatories (China); Zhaohui Shang, National Astronomical Observatories (China) and Tianjin Normal Univ. (China); Lifan Wang, Purple Mountain Observatory (China); Yi Hu, Qiang Liu, Peng Wei, National Astronomical Observatories (China) . . . . . [9154-63]

Reducing noise from a Stirling microcooler used with an InSb diode, Nicolas Bingham, Michael C. Ashley, The Univ. of New South Wales (Australia) . . [9154-64]

Measurement of pixel response functions of a fully depleted CCD, Yukiyasu Kobayashi, National Astronomical Observatory of Japan (Japan) and The Univ. of Tokyo (Japan) and The Graduate Univ. for Advanced Studies (Japan); Yoshito Niwa, National Astronomical Observatory of Japan (Japan) and The Univ. of Tokyo (Japan); Taihei Yano, Naoteru Gouda, National Astronomical Observatory of Japan (Japan); Takuji Hara, The Univ. of Tokyo (Japan); Yoshiyuki Yamada, Kyoto Univ. (Japan). . . . . [9154-65]

Characterization and optimization for detector systems of IGRINS, Ueejeong Jeong, Moo-Young Chun, Jae Sok Oh, Chan Park, In-Soo Yuk, Heeyoung Oh, Kang-Min Kim, Kyeong Yeon Ko, Korea Astronomy and Space Science Institute (Korea, Republic of); Michael D. Pavel, Daniel T. Jaffe, The Univ. of Texas at Austin (USA) . . . . . [9154-66]

A new technique of characterization of the intrapixel response of astronomical detectors, Christian C. K. Ketchazo, Commissariat à l'Énergie Atomique (France); Thibault Viale, ONERA (France); Olivier Boulade, Commissariat à l'Énergie Atomique (France); Guillaume Druart, ONERA (France); Vincent Moreau, CEA-Ctr. de SACLAY (France); Laurent Mugnier, ONERA (France); Didier Dubreuil, Commissariat à l'Énergie Atomique (France); Sophie Derelle, ONERA (France); Samuel Ronayette, Commissariat à l'Énergie Atomique (France); Nicolas Guérineau, ONERA (France); Michel Berthé, Commissariat à l'Énergie Atomique (France) . . . . . [9154-68]

A few phenomena on the fully depleted CCDs at the engineering observation, Yukiko Kamata, Hidehiko Nakaya, Satoshi Kawanomoto, Satoshi Miyazaki, National Astronomical Observatory of Japan (Japan) . . . . . [9154-69]

ASTRO-H CdTe detectors proton irradiation at PIF, Diana M. Renaud, Commissariat à l'Énergie Atomique (France); Benoît Horeau, Commissariat à l'Energie Atomique (France); Olivier Limousin, Commissariat à l'Énergie Atomique (France); Philippe Laurent, François Lebrun, Commissariat à l'Énergie Atomique (France) and AstroParticule et Cosmologie (France); Rémi Chipaux, Commissariat à l'Énergie Atomique (France); Cesar Boatella, European Space Research and Technology Ctr. (Netherlands); Radoslaw Marcinkowski, Paul Scherrer Institut (Switzerland); Madoka Kawaharada, Shin Watanabe, Masayuki Ohta, Goro Sato, Tadayuki Takahashi, Japan Aerospace Exploration Agency (Japan) and Institute of Space and Astronautical Science (Japan). . . . . [9154-70]

Development of an ASIC for the readout and control of near-infrared large array detectors, Jan Erik Ramstad, Dirk X. Meier, Hans Kristian O. Berge, Amir Hasanbegovic, Mehmet Akif Altan, Philip Paahlsson, Suleyman Azman, Gunnar Maehlum, Codin Gheorghe, Even Låte, Integrated Detector Electronics AS (Norway) . . . . . [9154-71]

Development of a stacked detector system for the x-ray range and its possible applications, Daniel Maier, Christoph Tenzer, Eberhard Karls Univ. Tübingen (Germany); Olivier Limousin, Aline Meuris, Commissariat à l'Énergie Atomique (France); Andrea E. Santangelo, Eberhard Karls Univ. Tübingen (Germany)[9154-72]

A CZT prototype for 3D spectroscopic imaging in hard x-ray astronomy, Natalia Auricchio, Ezio Caroli, Angelo Basili, Filomena Schiavone, John B. Stephen, INAF - IASF Bologna (Italy); Luciano Milano, Univ. degli Studi di Ferrara (Italy); Giacomo Benassi, Istituto dei Materiali per l Elettronica ed il Magnetismo (Italy); Nicola Zambelli, Istituto dei Materiali per l'Elettronica ed il Magnetismo (Italy); Andrea Zappettini, Istituto dei Materiali per l Elettronica ed il Magnetismo (Italy); Stefano Del Sordo, INAF - Istituto di Astrofisica Spaziale e Fisica Cosmica di Palermo (Italy); Francesco Moscatelli, Istituto per la Microelettronica e Microsistemi (Italy); Carl Budtz-Jørgensen, Irfan Kuvvetli, DTU Space (Denmark); Rui M. Curado da Silva, Univ. de Coimbra (Portugal) . . . . . [9154-74]

Design of the front end electronics for the infrared camera of JEM-EUSO, and manufacturing and verification of the prototype model, Oscar Maroto, Laura Diez-Merino, Jordi Carbonell, Albert Tomàs, NTE-SENER S.A. (Spain); Marcos Reyes Garcia-Talavera, Enrique Joven-Alvarez, Yolanda Martín-Hernando, Instituto de Astrofísica de Canarias (Spain) . . . . . [9154-75]

Finite-differences model to predict temperatures on cryogenic focal plane arrays: first laboratory results, Christian Dani Guzman Carmine, Rodrigo Bilbeny, Pontificia Univ. Católica de Chile (Chile); Andrew Szentgyorgyi, Timothy J. Norton, Harvard-Smithsonian Ctr. for Astrophysics (USA) . . . . . [9154-77]

SIDECAR ASIC firmware for astronomy applications, Jing Chen, Teledyne Imaging Sensors (USA); Markus Loose, Markury Scientific, Inc. (USA); Raphael Richardo, Lalit Bhambhani, Min Xu, Selmer W. Anglin, Michael Eads, Richard Blank, Teledyne Imaging Sensors (USA) . . . . . [9154-78]

System for photomultiplier tubes characterization and data acquisition for water Cherenkov detectors, Mauro J. Bonilla Rosales, Esperanza Carrasco, Ibrahim Torres, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico); Eduardo Moreno, Benemérita Univ. Autónoma de Puebla (Mexico); Alberto Carramiñana Alonso, Instituto Nacional de Astrofísica, Óptica y Electrónica (Mexico) . . . . . [9154-79]

Using dummy and pseudo-dummy amplifiers to correct for common mode CCD noise, Iain A. Steele, Christopher J. Mottram, Robert M. Barnsley, Robert J. Smith, Liverpool John Moores Univ. (United Kingdom) . . . . . [9154-80]

Theoretical analysis and experimental results for DCDS optimal coefficients calculation, Cristobal Alessandri, Christian Dani Guzman Carmine, Angel Abusleme, Diego Avila, Enrique Alvarez Fontecilla, Alexandra Gallyas, Christian Oberli, Marcelo Guarini, Pontificia Univ. Católica de Chile (Chile) . . . . . [9154-81]

Cosmic ray response of megapixel LWIR arrays from TIS, Julian Girard, Siena College (USA); Meghan L. Dorn, Craig W. McMurtry, Univ. of Rochester (USA); Amanda K. Mainzer, Jet Propulsion Lab. (USA); Judith L. Pipher, William J. Forrest, Univ. of Rochester (USA). . . . . [9154-82]

SIDECAR module (SMd) and SIDECAR acquisition module (SAM): capabilities of the newest members of the Teledyne SIDECAR ASIC product line, Scott A. Cabelli, Andre Wong, Lalit Bhambhani, Mark Farris, Jing Chen, John Edwards, Tusar Devgania, Lisa Fischer, Teledyne Imaging Sensors (USA); Gerard A. Luppino, Eric Moore, GL Scientific (USA); Selmer W. Anglin, Craig Cabelli, Richard Blank, Teledyne Imaging Sensors (USA) . . . . . [9154-83]

Candidate detector assessment for the CASTOR mission, Alan D. Scott, COM DEV International Ltd. (Canada); Patrick Cote, NRC - Herzburg Institute of Astrophysics (Canada); Neil Rowlands, COM DEV International Ltd. (Canada); Olivier Daigle, Nüvü Caméras Inc. (Canada) . . . . . [9154-84]

Intra-pixel response of the new JWST infrared detector arrays, Tim Hardy, John Pazder, National Research Council Canada (Canada) . . . . . [9154-85]

Performance characterization of the H4RG-15 infrared focal plane array, Andre Wong, Mark Farris, Jing Chen, Majid Zandian, Eric C. Piquette, Donald E. Cooper, Min Xu, Teledyne Imaging Sensors (USA); Gerard A. Luppino, GL Scientific (USA); Craig Cabelli, Richard Blank, Teledyne Imaging Sensors (USA). . . . . [9154-86]

Performance of SAPHIRA HgCdTe avalanche photodiode arrays, Tim Hardy, Gregory S. Burley, National Research Council Canada (Canada); Ian M. Baker, SELEX ES Ltd. (United Kingdom) . . . . . [9154-87]

CCD readout electronics for the Subaru Prime Focus Spectrograph, Stephen C. Hope, Johns Hopkins Univ. (USA); James E. Gunn, Princeton Univ. (USA); Roger E. Fitzgerald, FitzGerald Engineering (USA); Grant O. Peacock, Johns Hopkins Univ. (USA); Craig Loomis, Princeton Univ. (USA) . . . . . [9154-88]

Progress in development of H4RG-10 infrared focal plane arrays for WFIRST, Eric C. Piquette, William V. McLevige, John Auyeung, Teledyne Imaging Sensors (USA); Edward Cheng, Robert J. Hill, Conceptual Analytics, LLC (USA); Kevin Pedde, Kevin Grady, David A. Content, Augustyn Waczinski, NASA Goddard Space Flight Ctr. (USA). . . . . [9154-89]

Characteristic of e2v CMOS sensors for astronomical applications, Shiang-Yu Wang, Academia Sinica (Taiwan); John C. Geary, Harvard-Smithsonian Ctr. for Astrophysics (USA); Jerome Pratlong, Andrew Pike, Paul Jerram, e2v technologies plc (United Kingdom); Hung-Hsu Ling, Academia Sinica (Taiwan); Paul R. Jordan, e2v technologies plc (United Kingdom); Yen-Sang Hu, Academia Sinica (Taiwan); Stephen M. Amato, Harvard-Smithsonian Ctr. for Astrophysics (USA); Matthew J. Lehner, Academia Sinica (Taiwan) . . . . . [9154-90]

Electronics design for a high precision image stabilization system, Manuel Carmona, José María Gómez, David Roma, Univ. de Barcelona (Spain); Albert Casas, Univ. of Barcelona (Spain); Manel López, Univ. de Barcelona (Spain); José Bosch, Univ. de Barcelona (Spain); Atilà Herms, Josep Sabater, Univ. de Barcelona (Spain); Reiner Volkmer, Thorsten Maue, Eiji Nakai, Wolfgang Schmidt, Kiepenheuer-Institut für Sonnenphysik (Germany) . . . . . [9154-91]

On the calibration of a single channel cosmic ray particle detector, Abdullrahna Maghrabi, Abdullrahman Al Ghamdi, King Abdulaziz City for Science and Technology (Saudi Arabia); Rkan Alotaibi, King Saud Univ. (Saudi Arabia); Mohamed Al Moteri, King Abdulaziz City for Science and Technology (Saudi Arabia); Mohammed Garawi, King Saud Univ. (Saudi Arabia) . . . . . [9154-92]

Designing and constructing a two scintillator crystal rotatable telescope for muon flux variation studies, Abdullrahman Al Ghamdi, Abdullrahna Maghrabi, Mohammed Al Enizy, Mohamed Al Moteri, King Abdulaziz City for Science and Technology (Saudi Arabia) . . . . . [9154-93]

FACT: a revolutionary camera to reveal the origin of TeV variability, Daniela Dorner, Univ. Würzburg (Germany) . . . . . [9154-95]

NASA's Physics of the Cosmos and Cosmic Origins technology development programs, Thai Pham, Mark Clampin, NASA Goddard Space Flight Ctr. (USA) . . . . . [9154-96]

A calibration method for the measurement of IR detector spectral responses using a FTIR spectrometer equipped with a DTGS reference cell, Olivier Gravrand, Sylvette Bisotto, MINATEC (France). . . . . [9154-97]

Hybrid metal-mesh/membrane filters for cryogenic imaging spectrometers, Bruce M. Lairson, David A. Grove, Heidi C. Lopez, Travis Ayers, Luxel Corp. (USA); Junpeng Guo, The Univ. of Alabama in Huntsville (USA) . . . . . [9154-98]

CONFERENCE 9154 · LOCATION: ROOM 519B

TUESDAY 24 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . TUE 8:50 TO 10:00

Session Chair: **Gillian S. Wright,** UK Astronomy Technology Ctr. (United Kingdom)

8:50: **SPIE Fellows Awards** presented by H. Philip Stahl, President of SPIE. The following individuals will be recognized for their contributions to SPIE and the scientific community: **Mark Clampin,** NASA Goddard Space Flight Ctr. (United States); **Gary Matthews,** Exelis Inc. (United States); **Larry Stepp,** Thirty Meter Telescope Observatory Corp. (United States)

9:00: **Gaia: scientific in-orbit performance** *(Plenary),* Timo Prusti, European Space Agency (Netherlands) . . . . . [9143-503]

9:30: **ALMA Update** *(Plenary)*, Pierre Cox, Joint ALMA Observatory (Chile); Stuartt A. Corder, National Radio Astronomy Observatory (Chile) [9143-504]

Coffee Break . . . . . Tue 10:00 to 10:30

SESSION 10

LOCATION: ROOM 519B . . . . . TUE 10:30 TO 11:30

Back Illumination

Session Chair: **Roger M. Smith,** California Institute of Technology (USA)

10:30: **Silicon sensor quantum efficiency, reflectance, and calibration**, Michael P. Lesser, The Univ. of Arizona (USA) . . . . . [9154-18]

10:50: **Enhancing the far-UV sensitivity of silicon CMOS imaging arrays**, Kurt D. Retherford, Southwest Research Institute (USA); Yibin Bai, Teledyne Imaging Sensors (USA); James Gregory, Kevin K. Ryu, MIT Lincoln Lab. (USA); Michael W. Davis, Thomas K. Greathouse, Gregory S. Winters, Southwest Research Institute (USA); Vyshnavi Suntharalingam, MIT Lincoln Lab. (USA); James W. Beletic, Teledyne Imaging Sensors (USA) . . . . . [9154-40]

11:10: **Superlattice-doped silicon detectors: progress and prospects**, Michael E. Hoenk, Alexander G. Carver, Todd J. Jones, Matthew R. Dickie, Shouleh Nikzad, Jet Propulsion Lab. (USA); Joseph A. Sgro, Alacron, Inc. (USA); Shraga Tsur, Applied Materials, Inc. (Israel) . . . . . [9154-3]

SESSION 11

LOCATION: ROOM 519B . . . . . TUE 11:30 TO 12:10

Laboratory Simulation

Session Chair: **Roger M. Smith,** California Institute of Technology (USA)

11:30: **Laboratory simulation of Euclid-like sky images to study the impact of CCD radiation damage on weak gravitational lensing**, Thibaut Prod'homme, Peter Verhoeve, Tim Oosterbroek, Nathalie Boudin, Alexander D. Short, European Space Agency (Netherlands); Ralf Kohley, European Space Agency (Spain) . . . . . [9154-52]

11:50: **LSST optical beam simulator**, J. Anthony Tyson, Univ. of California, Davis (USA); Jose Sasian, College of Optical Sciences, The Univ. of Arizona (USA); David K. Gilmore, SLAC National Accelerator Lab. (USA); Charles F. Claver, LSST Corp. (USA); Matt Klint, Andrew K. Bradshaw, Elodie Resseguie, Univ. of California, Davis (USA) . . . . . [9154-67]

Lunch Break . . . . . Tue 12:10 to 13:40

SESSION 12

LOCATION: ROOM 519B . . . . . TUE 13:40 TO 15:20

Test and Characterization

Session Chair: **Satoshi Miyazaki,** National Astronomical Observatory of Japan (Japan)

13:40: **CCD characterisation for space missions at ESA**, Peter Verhoeve, Nathalie Boudin, Thibaut Prod'homme, Ludovic Duvet, European Space Research and Technology Ctr. (Netherlands) . . . . . [9154-15]

14:00: **Bad pixel mapping**, Roger M. Smith, David Hale, California Institute of Technology (USA) . . . . . [9154-16]

14:20: **Electro-optical testing of fully depleted CCD image sensors for the Large Synoptic Survey telescope camera**, Peter E. Doherty, Harvard Univ. (USA); Pierre E. Antilogus, Pierre Astier, Institut National de Physique Nucléaire et de Physique des Particules (France); James Chiang, David K. Gilmore, SLAC National Accelerator Lab. (USA); Dajun Huang, Brookhaven National Lab. (USA); Heather Kelly, SLAC National Accelerator Lab. (USA); Ivan V. Kotov, Brookhaven National Lab. (USA); Petr Kubánek, Institute of Physics of the ASCR, v.v.i. (Czech Republic); Andrei Nomerotsk, Paul O'Connor, Brookhaven National Lab. (USA); Andrew P. Rasmussen, SLAC National Accelerator Lab. (USA); Vincent J. Riot, Lawrence Livermore National Lab. (USA); Christopher W. Stubbs, Harvard Univ. (USA); Peter Z. Takacs, Brookhaven National Lab. (USA); J. Anthony Tyson, Univ. of California, Davis (USA); Kurt Vetter, Brookhaven National Lab. (USA). . . . . [9154-26]

14:40: **Characterization and applications of SAPHIRA HgCdTe APDs at the University of Hawai'i**, Dani E. Atkinson, Donald N. B. Hall, Univ. of Hawai'i (USA) . . . . . [9154-11]

15:00: **Modelling and testing the x-ray performance of CCD and CMOS active pixel sensor detectors using numerical finite element simulations**, Daniel P. Weatherill, Konstantin D. Stefanov, Thomas A. Greig, Andrew D. Holland, The Open Univ. (United Kingdom) . . . . . [9154-27]

Coffee Break . . . . . Tue 15:20 to 15:50

SESSION 13

LOCATION: ROOM 519B . . . . . TUE 15:50 TO 17:10

Electronics and Cameras

Session Chair: **Gert Finger,** European Southern Observatory (Germany)

15:50: **Impact of the common modes corrections and time sampling on the total noise of a H2RG near-IR detector**, Bogna Kubik, Remi Barbier, Eric Chabanat, Gérard Smadja, Sylvain Ferriol, Alain Castera, Institut de Physique Nucléaire de Lyon (France) . . . . . [9154-21]

16:10: **Performance of front-end mixed-signal ASIC for onboard CCD cameras**, Hiroshi Nakajima, Shota Inoue, Ryo Nagino, Naohisa Anabuki, Kiyoshi Hayashida, Hiroshi Tsunemi, Osaka Univ. (Japan); John P. Doty, Noqsi Aerospace, Ltd. (USA); Hirokazu Ikeda, Japan Aerospace Exploration Agency (Japan) . . . . . [9154-22]

16:30: **Status of the NectarCAM camera project**, Jean-François Glicenstein, Michel Fesquet, Frederic Louis, Emmanuel Moulin, Yassir Moudden, François Nunio, CEA-IRFU (France); Cédric Champion, Michael Punch, AstroParticule et Cosmologie (France); Jürgen Knödlseder, Institut de Recherche en Astrophysique et Planétologie (France); Eric Delagnes, CEA-IRFU (France); Karine Lacombe, Pierre Jean, Vincent Waegebert, Pascale Ramon, Institut de Recherche en Astrophysique et Planétologie (France); Jean-Paul Tavernet, Patrick Nayman, Julien Bolmont, Pascal Corona, Sonia Karkar, Vincent Voisin, François Toussenel, Institut National de Physique Nucléaire et de Physique des Particules (France); Oscar Ferreira, Stephen Fegan, Deirdre Horan, Berrie Giebels, Gérard Fontaine, Lab. Leprince-Ringuet (France); Jean-Pierre Ernenwein, Aix-Marseille Univ. (France) and Ctr. de Physique des Particules de Marseille (France); Dirk Hoffmann, Julien Houles, Ctr. de Physique des Particules de Marseille (France); Julie Prast, Jean-Luc Panazol, Thierry LeFlour, Eric Chabanne, Richard Hermel, Nadia Fouque, Sylvie Rosier-Lees, Giovanni Lamanna, Lab. d'Annecy-le-Vieux de Physique des Particules (France); François B. Hénault, Pierre-Olivier Petrucci, Lab. d'Astrophysique de l'Observatoire de Grenoble (France); Georges Vasileiadis, Univ. Montpellier 2 (France); Carlos Delgado, Gustavo Martinez, Ctr. de Investigaciones Energéticas, Medioambientales y Tecnológicas (Spain); Oscar Blanch Bigas, Miquel Barcelo, Joan Boix, Ruben Lopez-Coto, Institut de Física d'Altes Energies (Spain); Juan-Abel Barrio, Diego Herranz, Luis-Angel Tejedor, Univ. Complutense de Madrid (Spain); David Gascon, Andreu Sanuy, Marc Ribo, Javier Jose Sieiro, Univ. de Barcelona (Spain) [9154-24]

16:50: **Technology and device design enhancements for improved read noise performance in fully depleted CCDs**, Stephen E. Holland, Christopher Bebek, Sufia Haque, Julie S. Lee, Lawrence Berkeley National Lab. (USA); Robert Groulx, Raymond Frost, Teledyne DALSA Semiconductor (Canada) . . . . . [9154-25]

WEDNESDAY 25 JUNE

PLENARY SESSION

LOCATION: ROOM 517D . . . . . WED 9:00 TO 10:00

Session Chair: **Colin Cunningham,** UK Astronomy Technology Ctr. (United Kingdom)

9:00: **Highlights from the Multi Unit Spectroscopic Explorer (MUSE): a 2nd generation VLT instrument for the VLT** *(Plenary)*, Roland M. Bacon, Observatoire de Lyon (France). . . . . [9147-506]

9:30: **Canadian Space Astronomy: past, present and future** *(Plenary)*, John B. Hutchings, NRC - Herzberg Institute of Astrophysics (Canada) [9143-505]

Coffee Break . . . . . Wed 10:00 to 10:30

SESSION 14

LOCATION: ROOM 519B . . . . . WED 10:30 TO 12:10

IR Detectors II

Session Chair: **James W. Beletic,** Teledyne Imaging Sensors (USA)

10:30: **Near-infrared InGaAs detectors for background-limited imaging and photometry**, Peter W. Sullivan, Bryce J. Croll, Robert A. Simcoe, MIT Kavli Institute for Astrophysics and Space Research (USA) . . . . . [9154-76]

10:50: **HAWAII-2RG detector characterization at ESA/ESTEC**, Pierre-Elie Crouzet, Joerg Ter-haar, Fritz De Wit, Ludovic Duvet, European Space Research and Technology Ctr. (Netherlands) . . . . . [9154-45]

11:10: **Flexible focal plane array based on CMOS hybrid FPA for infrared wavelength**, Yann Gaeremynck, Emmanuel Hugot, Kévin Tekaya, Aurélie Vandeneynde, Manuel Fendler, David Henry, Commissariat à l'Énergie Atomique (France) . . . . . [9154-46]

11:30: **Optical to infrared photodetectors based on organic semiconductors for astronomy applications**, Jiangeng Xue, Jian Ge, Nathan T. Shewmon, Sidney L. Schofield, Scott Powell, Univ. of Florida (USA). . . . . [9154-47]

11:50: **AQUARIUS: the next generation mid-IR detector for ground-based astronomy, an update**, Derek J. Ives, Gert Finger, Leander H. Mehrgan, Joerg Stegmeier, European Southern Observatory (Germany). . . . . [9154-48]

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

B

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

C

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

D

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

E

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

F

G

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

H

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

I

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

J

K

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

L

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

M

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

P

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

Q

R

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

S

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

T

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

U

V

W

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

X

Y

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

Z

INDEX OF AUTHORS, CHAIRS, AND COMMITTEE MEMBERS

Bold = SPIE Member

REGISTRATION

Onsite Registration and Badge Pick-Up Hours

Level 5 - Lobby

Saturday 21 June · 16:00 to 19:00

Sunday 22 June · 07:00 to 16:00

Monday 23 June · 07:30 to 17:00

Tuesday 24 June · 07:30 to 17:00

Wednesday 25 June · 07:30 to 17:00

Thursday 26 June · 07:30 to 17:00

Friday 27 June · 07:45 to 17:00

CONFERENCE REGISTRATION

Includes admission to all conference sessions, plenaries, panels, and poster sessions, admission to the Exhibition, Welcome Reception, coffee breaks, and a choice of proceedings. Student pricing does not include proceedings.

COURSE AND WORKSHOP REGISTRATION

Courses and workshops are priced separately. Course-only registration includes your selected course(s), course notes, coffee breaks, and admittance to the exhibition. Course prices include applicable taxes. Onsite, please go to the Bookstore after you pick up your badge.

EXHIBITION REGISTRATION

Exhibition-Only visitor registration is complimentary.

SPIE MEMBER, SPIE STUDENT MEMBER, AND STUDENT PRICING

- SPIE Members receive conference and course registration discounts. Discounts are applied at the time of registration.
- SPIE Student Members receive a 50% discount on all courses.
- Student registration rates are available only to undergraduate and graduate students who are enrolled full time and have not yet received their Ph.D. Post-docs may not register as students. A student ID number or proof of student status is required with your registration.

PRESS REGISTRATION

For credentialed press and media representatives only. Please email contact information, title, and organization to media@spie.org.

SPIE Cashier

Registration Area

Open during registration hours

REGISTRATION PAYMENTS

If you are paying by cash or cheque as part of your onsite registration, wish to add a course, workshop, or special event requiring payment, or have questions regarding your registration, visit the SPIE Cashier.

RECEIPTS AND CERTIFICATE OF ATTENDANCE

Preregistered attendees who did not receive a receipt or attendees who need a Certificate of Attendance may obtain those from the SPIE Cashier.

BADGE CORRECTIONS

Badge corrections can be made by the SPIE Cashier. Please have your badge removed from the badge holder and marked with your changes before approaching the counter.

REFUND INFORMATION

There is a US$50 service charge for processing refunds. Requests for refunds must be received by 12 June 2014; all registration fees will be forfeited after this date. Membership dues, SPIE Digital Library subscriptions or Special Events purchased are not refundable.

U.S. GOVERNMENT CREDIT CARDS

U.S. Government credit card users: have your purchasing officer contact the credit card company and get prior authorization before attempting to register. Advise your purchasing agent that SPIE is considered a 5968 company for authorization purposes.

SPIE is the international society for optics and photonics, a not-for-profit organization founded in 1955 to advanced light-based technologies. The Society serves nearly 225,000 constituents from approximately 150 countries, offering conferences, continuing education, books, journals, and a digital library in support of interdisciplinary information exchange, professional growth, and patent precedent. SPIE provided over $3.2 million in support of education and outreach programs in 2013.

NOMINATE A COLLEAGUE

Honor your coworkers with an SPIE Award

The SPIE Awards Program is not only one of the most prestigious ways the Society recognizes excellence, but also one of the longest running SPIE Programs. Since 1959, SPIE has honored the best in optics and photonics for their significant achievements and contributions in advancing the science of light.

Gold Medal of the Society
Britton Chance Biomedical Optics Award
Biophotonics Technology Innovator Award
A.E. Conrady Award
Harold E. Edgerton Award
Dennis Gabor Award
George W. Goddard Award
Rudolf Kingslake Medal and Prize
G. G. Stokes Award
Chandra S. Vikram Award in Optical Metrology
Frits Zernike Award for Microlithography
Early Career Achievement Award
SPIE Educator Award
SPIE Technology Achievement Award
President's Award
Directors' Award
Joseph W. Goodman Book Writing Award

See **www. spie.org/awards** for details.

SPIE.

AUTHOR / PRESENTER INFORMATION

Speaker Check-In and Preview Station

Room 521 b–c

Sunday through Friday · 07:30 to 17:00

All conference rooms have a computer workstation, projector, screen, lapel microphone, and laser pointer. All presenters are requested to come to Speaker Check-In with their memory devices or laptops to confirm their presentation display settings.

Poster Setup Instructions

Room 516

Sunday 22 through Thursday 26 of June

Conference attendees are invited to attend the four poster sessions (Sunday, Monday, Wednesday, and Thursday). See conference program for a list of the posters in the session.

Each poster session will include a different set of conference poster presentations. Come view the posters, ask questions, and enjoy light refreshments. Authors of poster papers will be present during the Interactive Poster Session to answer questions concerning their papers.

As part of the technical program, poster sessions are for paid registrants only. Attendees are required to wear their conference registration badges to the poster sessions.

DAILY SCHEDULE

Poster Set Up - Beginning at 10:00

Extended Poster Viewing from 10:00 to 17:00

INTERACTIVE POSTER SESSIONS

Sunday from 18:00 to 20:00 (Conference 9143, 9147, 9148, 9152)

Monday from 17:30 to 19:00 (Conferences 9144, 9145, 9147, 9148, 9150, 9154) followed by the Welcome Reception

Wednesday from 18:00 to 20:00 (Conferences 9145, 9146, 9147, 9148, 9151, 9153)

Thursday from 18:00 to 20:00 (Conferences 9144, 9146, 9147, 9148, 9149, 9151, 9153)

POSTER AUTHOR SET-UP INSTRUCTIONS

- Paper numbers will be included on the poster boards in numerical order; please find your paper number and display your poster in the designated space.
- Authors are encouraged to display their posters early in the day for extended viewing.
- A poster author or coauthor is required to stand by the poster during the scheduled interactive poster session to answer questions from attendees.
- Presenters who have not displayed their posters on their assigned board at least one-half hour before the interactive poster session begins will be considered a "no show" and their manuscript will not be published.
- Posters not removed will be considered unwanted and will be discarded.
- SPIE assumes no responsibility for posters left up after the end of each poster session.

ONSITE SERVICES

Internet Access

Level 5 - Lobby

Level 5 and Level 1 – Free Wi-fi

Complimentary wired Internet access is available; attendees can hook up their laptops or use provided workstations. Complimentary wireless access is also available; instructions will be posted onsite.

SPIE Conference App

Free Conference App available for iPhone and Android phones.

SPIE Bookstore

Level 5 - Lobby

The SPIE Bookstore is your source for the latest SPIE Press Books, Proceedings, and Education and Professional Development materials. Become an SPIE member, explore the Digital Library, take home a free SPIE poster, or buy a souvenir (tie, t-shirt, educational toys, and more).

Luggage Check

Level 2 - Viger Hall

Only Thursday and Friday

Palais des congrès de Montréal will provide a luggage, package, and coat storage. Cost per article is $2 and cost per suitcase is $5. Please note hours; no late pickup available.

Business Centre and Information Desk

Level 2 - Viger Hall

Open during registration hours

The business centre mainly offers fax and photocopy services to convention delegates. If requested, the information agents will also be pleased to inform visitors about tourist attractions in the city. Maps and brochures are also available.

Child Care Services

- NannyServices.ca Tel: 888.369.8819
- Denise Miller Child Care Services, Tel: 514.365.1704, email denise.miller@videotron.ca
- Embassy Suites can arrange a sitter for hotel guests via concierge desk.

NOTE: SPIE does not imply an endorsement nor recommendation of these services. They are provided on an "information only" basis for your further analysis and decision. Other services may be available.

Urgent Message Line

An urgent message line is available during registration hours: +1 514-789-3400

Lost and Found

Cashier/Level 5 - Lobby

Open during registration hours

Found items will be kept at Cashier until registration closes each day. At the end of the meeting, all found items will be turned over to Palais des congrès de Montréal Facility Security, phone at 514 871-3141 or email securite@congresmtl.com.

GENERAL INFORMATION

FOOD AND BEVERAGE SERVICES

Coffee Breaks

Level 5 – Lobby · Sunday, Monday, Tuesday and Friday

Exhibition Hall – Room 517 · Wednesday and Thursday

Complimentary coffee will be served twice daily, at 10.00 and 15.00. Check individual conference listings for exact times.

Food & Refreshments for Purchase

Level 1 – Les Galeries du Palais

Hours vary by location

Tim Horton's, Sushi Shop, Terra Verde, Subway, Presse Café, Noobox, La Popessa, Café Bistro Van Houtte, and Basha Resto-Grill Hot and cold snacks, hot entrees, deli sandwiches, salads, and pastries are available for purchase. Cash and credit cards accepted.

TRAVEL/TRANSPORTATION

Flying to Montreal

Aeroport International Pierre-Elliot-Trudeau de Montréal (YUL) is located 20 kilometers from downtown Montréal. It serves the citizens of Montréal, Canada's second largest city, and Eastern Canada. Montréal-Trudeau has 32 air carriers with more than 130 direct flights to destinations in Canada and the US and is Canada's gateway to Europe.

The airport has one terminal with three branches:

- Zone Domestique - Canadian travelers.
- Zone Transfrontaliere USA - USA travelers
- Zone Internationale - International travelers

Bus, Walking, Subway, Taxi Information

Société de transport de Montréal website: www.STM.info

BUS SERVICE

The 747 bus line service runs 24 hours a day, 7 days a week between Montréal-Trudeau Airport (YUL) and the Central Bus Station (Gare d'autocars de Montéeal - Berri-UQAM metro station). Travel time varies between 45 to 60 minutes depending on traffic. The fare is $9 (subject to change) for unlimited travel throughout STM (Société de transport de Montréal) bus and metro networks during 24 consecutive hours. Fare cards can be purchased at YUL (automated dispensers on International arrivals level), the Central Bus Station, and in Metro stations. Cash is accepted on board the bus with exact change only in coins only (no bills accepted).

To reach your downtown hotel from YUL, take the 747 bus and get off at Jeanne-Mance stop (3 stops before Central Bus Station). For Le Nouvel Hotel & Spa, take the 747 bus and get off at Rene Levesque and Guy stop. Walk one block to the hotel.

METRO SUBWAY

Passengers arriving at YUL can take the 747 bus to Central Bus Station at Berri-UQAM Metro Station. From Berri-UQAM Station passengers can take the metro to the Palais des Congrès de Montréal, disembarking at the Place d'Armes station inside the convention center. From there it is a short walk to any of the contracted hotels.

TAXIS, LIMOUSINES

Directly outside baggage claim at YUL, proceed to the Lower Level roadway (Arrivals Level) to a taxi dispatcher. Fare is a flat rate $40 CAN, subject to change (Canadian cash only or major credit cards accepted).

Car Rental

Hertz Car Rental is the official car rental agency for SPIE Astronomical Telescopes & Instrumentation. To reserve a car, identify yourself as a conference attendee using the Hertz Meeting Code CV# 029B0019. When booking from International Hertz locations, the CV # must be entered with the letters CV before the number, i.e. CV029B0019.

- In the United States call 1-800-654-2240
- In Canada call 1-800-263-0600, or 1-416-620-9620 in Toronto
- In Europe and Asia call a Hertz Reservation Center or travel agent
- Outside of these areas call 1-405-749-4434
- In the United States call 1-800-654-2240
- In Canada call 1-800-263-0600, or 1-416-620-9620 in Toronto
- In Europe and Asia call a Hertz Reservation Center or travel agent
- Outside of these areas call 1-405-749-4434

Acceptance of Policies and Registration Conditions

The following Policies and Conditions apply to all SPIE Events. As a condition of registration, you will be required to acknowledge and accept the SPIE Registration Policies and Conditions contained herein.

Granting Attendee Registration and Admission

SPIE, or their officially designated event management, in their sole discretion, reserves the right to accept or decline an individual's registration for an event. Further, SPIE, or event management, reserves the right to prohibit entry or remove any individual whether registered or not, be they attendees, exhibitors, representatives, or vendors, who in their sole opinion are not, or whose conduct is not, in keeping with the character and purpose of the event. Without limiting the foregoing, SPIE and event management reserve the right to remove or refuse entry to any attendee, exhibitor, representative, or vendor who has registered or gained access under false pretenses, provided false information, or for any other reason whatsoever that they deem is cause under the circumstances.

Misconduct Policy

SPIE is a professional, not-for-profit society committed to providing valuable conference and exhibition experiences. SPIE is dedicated to equal opportunity and treatment for all its members and meeting attendees. Attendees are expected to be respectful to other attendees, SPIE staff, and contractors. Harassment and other misconduct will not be tolerated; violators will be asked to leave the event.

Identification

To verify registered participants and provide a measure of security, SPIE will ask attendees to present a government-issued Photo ID at registration to collect registration materials.

Individuals are not allowed to pick up badges for attendees other than themselves. Further, attendees may not have some other person participate in their place at any conference-related activity. Such other individuals will be required to register on their own behalf to participate.

Capture and Use of a Person's Image

By registering for this event, I grant full permission to SPIE to capture, store, use, and/or reproduce my image or likeness by any audio and/or visual recording technique (including electronic/digital photographs or videos), and create derivative works of these images and recordings in any SPIE media now known or later developed, for any legitimate SPIE marketing or promotional purpose.

By registering for this event, I waive any right to inspect or approve the use of the images or recordings or of any written copy. I also waive any right to royalties or other compensation arising from or related to the use of the images, recordings, or materials. By registering, I release, defend, indemnify and hold harmless SPIE from and against any claims, damages or liability arising from or related to the use of the images, recordings or materials, including but not limited to claims of defamation, invasion of privacy, or rights of publicity or copyright infringement, or any misuse, distortion, blurring, alteration, optical illusion or use in composite form that may occur or be produced in taking, processing, reduction or production of the finished product, its publication or distribution.

Payment Method

Registrants for paid elements of the event, who do not provide a method of payment, will not be able to complete their registration. Individuals with incomplete registrations will not be able to attend the conference until payment has been made. SPIE accepts VISA, MasterCard, American Express, Discover, Diner's Club, checks and wire transfers. Onsite registrations can also pay with Cash.

Authors/Coauthors

By submitting an abstract, you agree to the following conditions:

An author or coauthor (including keynote, invited, and solicited speakers) will register at the author registration rate, attend the meeting, and make the presentation as scheduled.

A full-length manuscript (6-page minimum) for any accepted oral or poster presentation will be submitted for publication in the SPIE Digital Library, printed conference Proceedings, and CD. (Some SPIE events have other requirements that the author is made aware of at the time of submission.)

Only papers presented at the conference and received according to publication guidelines and timelines will be published in the conference Proceedings and SPIE Digital Library (or via the requirements of that event).

Audio, Video, Digital Recording Policy

Conferences, courses, and poster sessions: For copyright reasons, recordings of any kind are prohibited without prior written consent of the presenter or instructor. Attendees may not capture or use the materials presented in any meeting/course room, or in course notes on display without written permission. Consent forms for material presented in meeting rooms are available at Speaker Check-In. Individuals not complying with this policy will be asked to leave a given session and/or asked to surrender their recording media.

Exhibition Hall: For security and courtesy reasons, recordings of any kind are prohibited unless one has explicit permission from on-site company representatives. Individuals not complying with this policy will be asked to surrender their recording media and to leave the exhibition hall.

Your registration signifies your agreement to be photographed or videotaped by SPIE in the course of normal business. Such photos and video may be used in SPIE marketing materials or other SPIE promotional items.

Laser Pointer Safety Information/Policy

SPIE supplies tested and safety-approved laser pointers for all conference meeting rooms. For safety reasons, SPIE requests that presenters use provided laser pointers.

Use of a personal laser pointer represents user's acceptance of liability for use of a non-SPIE-supplied laser pointer. If you choose to use your own laser pointer, it must be tested to ensure <5 mW power output. Laser pointers in Class II and IIIa (<5 mW) are eye safe if power output is correct, but output must be verified because manufacturer labeling may not match actual output. Come to Speaker Check-In and test your laser pointer on our power meter. You are required to sign a waiver releasing SPIE of any liability for use of potentially non-safe, personal laser pointers. Misuse of any laser pointer can lead to eye damage.

Access to Technical and Networking Events

Persons under the age of 18 including babies, carried or in strollers, and toddlers are not allowed in technical or networking events. Anyone 18 or older must register as an attendee. All technical and networking events require a valid conference badge for admission.

Underage Persons on Exhibition Floor Policy

For safety and insurance reasons:

- No persons under the age of 18 will be allowed in the exhibition area during move-in and move-out.
- Children 14 and older, accompanied by an adult, will be allowed in the exhibition area during open exhibition hours only
- All children younger than 14, including babies in strollers and toddlers, are not allowed in the exhibition area at any time.

Unauthorized Solicitation Policy

Unauthorized solicitation in the Exhibition Hall is prohibited. Any non-exhibiting manufacturer or supplier observed to be distributing information or soliciting business in the aisles, or in another company's booth, will be asked to leave immediately.

Unsecured Items Policy

Personal belongings should not be left unattended in meeting rooms or public areas. Unattended items are subject to removal by security. SPIE is not responsible for items left unattended.

Wireless Internet Service Policy

At SPIE events where wireless is included with your registration, SPIE provides wireless access for attendees during the conference and exhibition but cannot guarantee full coverage in all locations, all of the time. Please be respectful of your time and usage so that all attendees are able to access the internet.

Excessive usage (e.g., streaming video, gaming, multiple devices) reduces bandwidth and increases cost for all attendees. No routers may be attached to the network. Properly secure your computer before accessing the public wireless network. Failure to do so may allow unauthorized access to your laptop as well as potentially introduce viruses to your computer and/or presentation. SPIE is not responsible for computer viruses or other computer damage.

Mobile Phones and Related Devices Policy

Mobile phones, tablets, laptops, pagers, and any similar electronic devices should be silenced during conference sessions. Please exit the conference room before answering or beginning a phone conversation.

Smoking

For the health and consideration of all attendees, smoking, including e-cigarettes, is not permitted at any event elements, such as but not limited to: plenaries, conferences, workshops, courses, poster sessions, hosted meal functions, receptions, and in the exhibit hall. Most facilities also prohibit smoking and e-cigarettes in all or specific areas. Attendees should obey any signs preventing or authorizing smoking in specified locations.

Hold Harmless

Attendee agrees to release and hold harmless SPIE from any and all claims, demands, and causes of action arising out of or relating to your participation in the event you are registering to participate in and use of any associated facilities or hotels.

Event Cancellation

If for some unforeseen reason SPIE should have to cancel the event, registration fees processed will be refunded to registrants. Registrants will be responsible for cancellation of travel arrangements or housing reservations and the applicable fees.

Confidential Reporting of Unethical or Inappropriate Behavior

SPIE is an organization with strong values of responsibility and integrity. Our Ethics Statement and Code of Professional Conduct contain general guidelines for conducting business with the highest standards of ethics. SPIE has established a confidential reporting system for staff & other stakeholders to raise concerns about possible unethical or inappropriate behavior within our community. Complaints may be filed by phone or through the website, and, if preferred, may be made anonymously. The web address is www.SPIE.ethicspoint.com and the toll free hotline number is 1-888-818-6898.

SPIE Corporate Member

THE INTERNATIONAL SOCIETY FOR OPTICS AND PHOTONICS

Through collaboration, companies large and small, steer the latest innovations toward practical relevance in the global marketplace.

SPIE Corporate Membership increases your visibility, adds individual benefits, and provides significant discounts on:

SPIE exhibitions* | SPIE Digital Library subscriptions
Advertising rates | Mailing lists | Recruitment services

*Corporate Members receive a 15% discount on exhibit space at SPIE Exhibitions.

3SAE Technologies, Inc.
3SPGroup
4AD Enterprises, Inc.
4D Technology Corp.
A*STAR National Metrology Ctr.
ABB Analytical Measurement
Abet Technologies, Inc.
ABTech, Inc.
Access Laser Co.
Acktar Ltd.
Acuphase Inc.
Adimec Electronic Imaging, Inc.
AdlOptica Optical Systems GmbH
Adsys Controls, Inc.
AdTech Ceramics
AdTech Optics, Inc.
AdValue Photonics, Inc.
Advanced Cooling Technologies, Inc.
Advanced Microoptic Systems GmbH
Advanced Optowave Corp.
Advanced Photonix, Inc.
Advanced Research Corp.
Advanced Thin Films
Advantest America, Inc.
Aerotech, Inc.
AFL
Agilent Technologies, Inc.
Airoptic Sp z.o.o.
Alazar Technologies Inc.
ALIO Industries
AllMotion Inc.
Alnair Labs Corp.
ALPAO S.A.S.
Alpine Research Optics, LLC
Alson E. Hatheway Inc.
Altos Photonics, Inc.
American Beryllia Inc.
AMETEK Precitech, Inc.
Amigo Optima Software Solutions Ltd.
Ampex Data Systems Corp.
Amplitude Laser
Andor Technology Ltd.
Andover Corp.
Angstrom Precision Optics Inc.
Aperture Optical Sciences Inc.
Apollo Instruments, Inc.
Applied Image, Inc.
Applied Photonics Inc.
Applied Physics & Electronics, Inc.
Applied Surface Technologies
Applied Technology Associates
Archer OpTx, Inc.
Arden Photonics Ltd.
Arrow Thin Films, Inc.
Arroyo Instruments, LLC
Artifex-Engineering e.K.
ASA Astrosysteme GmbH
Asahi Spectra USA Inc.
Ascentta, Inc.
ASE Optics
ASML
ASML US, Inc.
asphericon GmbH
ASTRODESIGN, Inc.
attocube systems Inc.
Avantes, Inc.
Avo Photonics, Inc.
Ayase America Inc.
B&W Tek, Inc.
Base Optics, Inc.
BaySpec, Inc.
Beamtech Optronics Co. Ltd.
Beijing Bodian Optical Tech. Co., Ltd.
Beijing Scitlion Technology Co., Ltd.
Berliner Glas KGaA Herbert Kubatz GmbH & Co.
BigC Dino-Lite Digital Microscope
Block Engineering, LLC
Blue Ridge Optics, LLC
Bodkin Design & Engineering, LLC
Boston Electronics Corp.
Boston Micromachines Corp.
Boulder Nonlinear Systems
BoXin Photoelectric Co., Ltd.
Brandywine Photonics, LLC
Breault Research Organization, Inc.
Brewer Science, Inc.
Brimrose Corp. of America
Brimrose Technology Corp.
Brion Technologies, Inc.
Bristol Instruments, Inc.
Brolis Semiconductors UAB
BWT Beijing Ltd.
Calmar Laser
Cambridge Technology, Inc.
Carl Zeiss, Inc.
Cascade Laser Corp.
Cascade Optical Corp.
CASTECH Inc.
CASTON Inc.
CeramOptec Industries, Inc.
Changchun New Industries Optoelectronics Technology Co., Ltd.
China Daheng Group, Inc.
China Germanium Co., Ltd.
Chroma Technology Corp.
CI Systems, Inc.
Cimcoop Holding Ltd.
Clear Align
CMOSIS nv
Coastal Connections
Coherent, Inc.
Continuum
CorActive High-Tech Inc.
CPG Optics, Inc.
CREOL, The College of Optics and Photonics, Univ. of Central Florida
Cristal Laser S.A.
Cryslaser Inc.
Crystal IS, Inc.
CVI Laser Optics
Cybel LLC
DataRay Inc.
Daylight Solutions Inc.
DELTA
Deltronic Crystal Industries, Inc.
Deposition Sciences, Inc.
Diamond USA Inc.
DIAS Infrared Corp
DiCon Fiberoptics, Inc.
DILAS Diode Laser, Inc.
DILAS Diodenlaser GmbH
Directed Light, Inc.
Diverse Optics Inc.
Docter Optics, Inc.
DRS Technologies, Inc.
DST Control AB
E.R. Precision Optical Corp.
e2v Aerospace and Defense, Inc.
Edmund Optics GmbH
Edmund Optics Inc.
Electro Optical Components, Inc.
Electro Optical Industries, Inc.
Electro-Optical Imaging, Inc.
Electro-Optics Technology, Inc.
Elite Optoelectronics Co., Ltd.
Elliot Scientific Ltd.
EMD Chemicals Performance Materials
EMF Corp.
Eminess Technologies, Inc.
Empire Precision Plastics
Empire West, Inc.
Energetiq Technology, Inc.
Engineering Synthesis Design, Inc.
EPIR Technologies, Inc.
EPIX, Inc.
Epner Technology Inc.
Esterline CMC Electronics, Inc.
Eutecus Inc.
Evaporated Coatings, Inc.
Exalos AG
Excelitas Technologies Corp.
Exciton, Inc.
Fairfield Crystal Technology, LLC
Femtochrome Research, Inc.
FEMTOLASERS, Inc.
Fianium Inc.
Fiber Optic Solution Sdn Bhd
Fiber Optic Valley AB
FiberCryst
Fiberguide Industries, Inc.
Fibertech Optica Inc.
First Light Imaging S.A.S.
First Sensor, Inc.
FiveFocal LLC
FJW Optical Systems, Inc.
Flexible Optical B.V.
FLIR Advanced Imaging Systems
FLIR Systems, Inc.
FluxData, Inc.
FOCtek Photonics, Inc.
Foreal Spectrum, Inc.
Fotofab
Frankfurt Laser Co.
Fraunhofer-Institut für Photonische Mikrosysteme
Fresnel Technologies Inc.
Fuzhou Alpha Optics Co., Ltd.
G-S Plastic Optics
G5 Infrared, LLC
GAMDAN Optics
GE Global Research
GE Intelligent Platforms
General Dynamics-Global Imaging Technologies
General Ruby & Sapphire Co.
Gentec Electro-Optics Inc.
Georgia Tech Research Institute
GfE Materials Technology, Inc.
GL Optic Lichtmesstechnik GmbH
Glass Fab, Inc.
Glyndwr Innovation Ltd.
Gooch & Housego plc
GPD Optoelectronics Corp.
Greenlight Optics, LLC
Greenpak Development, Inc.
Grintech GmbH
GTI Technologies, Inc.
Gulf Photonics, Inc.
Haas Laser Technologies, Inc.
Halocarbon Products
Hamamatsu Corp.
Haphit Ltd.
Hardin Optical Co.
HawkEye Technologies, LLC
HC Photonics Corp.
Headwall Photonics Inc.
Heidelberg Instruments Inc.
Hellma USA, Inc.
Heracle GmbH
Heraeus Quartz America LLC
Hinds Instruments, Inc.
Hitachi High Technologies America, Inc.
Hofstadter Analytical Services, LLC

SPIE CORPORATE MEMBERS

HOLO/OR Ltd.
HOLOEYE Photonics AG
Holographix LLC
Hong Kong Productivity Council
HORIBA Instruments Inc.
HOYA Corp. USA
HTA Photomask
Huanic Corp.
Ibsen Photonics A/S
Ibss Group, Inc.
Ideal Aerosmith, Inc.
IDEX Optics & Photonics
Illinois Tool Works Inc.
Imagine Optic Inc.
Imaging Solutions Group
IMEC
IMPERX Inc.
IMRA America, Inc.
Incom Inc.
Infinite Optics Inc.
Infrared Systems Development Corp.
Infratec Infrared LLC
INGENERIC GmbH
Innolume GmbH
Innovation Photonics
Innovations in Optics, Inc.
Innovative Photonic Solutions
INO
InPhenix, Inc.
InPhoTech Ltd.
Inrad Optics
Insight Photonic Solutions, Inc.
Inspectrology LLC
Intane Optics
Intevac Photonics, Inc.
Intlvac
IntraAction Corp.
Intrinsic Crystal Technology Co., Ltd.
IO Industries, Inc.
IPG Photonics Corp.
IRCAM GmbH
IRCameras, LLC
IRD Glass
IRflex Corporation
Iris AO, Inc.
IRIS SPAIN
IRTronix, Inc.
Isomet Corp.
ISP Optics Corp.
Isuzu Glass, Inc.
ITF Labs.
Janos Technology, LLC
Jasper Display Corp.
JAYCO Cleaning Technologies
JDSU
JenLab GmbH
JENOPTIK Optical Systems
JENOPTIK Optical Systems GmbH
JEOL USA Inc.
Jinan Jingzheng Electronics Co., Ltd.
JSR Micro, Inc.
JULABO USA, Inc.
Kappa optronics Inc.
Kapteyn-Murnane Labs., Inc.
Kentek Corp.
Keopsys Inc.
Keting Optical Technology Inc.
Kigre, Inc.
KiloLambda Technologies, Ltd.
Kinetic Systems, Inc.
Kiyohara Optics USA
Kopp Glass, Inc.
KrellTech
Kugler of America Ltd.
Kunming Yunzhe High-Tech Co., Ltd.
L-3 Communications
L-3 Communications Cincinnati Electronics
L-3 Communications Tinsley Labs. Inc.
Labsphere, Inc.
LaCroix Optical Co.
Lambda Research Corp.
Lambda Research Optics, Inc.
Lanmark Controls Inc.
Laser Components GmbH
Laser Components USA, Inc.
Laser Focus World
Laser Institute of America
Laser Operations LLC / QPC Lasers
Laser Quantum USA
Laser S.O.S. USA, Inc.
Laser-Compact Co. Ltd.
Lasertel, Inc.
Laservision USA
LASORB
LASOS Lasertechnik GmbH
Lattice Electro Optics, Inc.
LEONI Fiber Optics, Inc.
Leybold Optics USA, Inc.
Light Age, Inc.
Light Tec
LightComm Technology Co., Ltd.
LightMachinery Inc.
Lincoln Laser Co.
Litron Lasers Ltd.
Lockheed Martin Aculight
LT Ultra Precision Optics, LLC
Lumencor, Inc.
Luvantix SSCP
Luxel Corp.
M Squared Lasers
M3 Measurement Solutions
Mach8 Lasers BV
Mad City Labs., Inc.
Market Tech, Inc.
Marktech Optoelectronics
Marubeni America Corp.
Materion Barr Precision Optics & Thin Film Coatings
Max Levy Autograph, Inc.
MaxEmil Photonics Corp.
Meadowlark Optics, Inc.
MegaWatt Lasers, Inc.
Melles Griot
Mentor Graphics Corp.
Mesa Photonics, LLC
Micro Laser Systems, Inc.
MICRONIX USA, LLC
Micronor Inc.
Microtech Instruments, Inc.
Mightex Systems
Mildex, Inc.
Mindrum Precision, Inc.
Minus K Technology Inc.
Mirrorcle Technologies, Inc.
ML Optic Corp.
MLD Technologies, LLC
Molecular Imprints, Inc.
MONTFORT Laser GmbH
MOXTEK, Inc.
MPA Crystal Corp.
MPB Communications Inc.
Multi IR Optoelectronics Co., Ltd.
Multisorb Technologies, Inc.
MWTechnologies, Lda
Naked Optics Corp.
NAMICS North American R&D Ctr. - Diemat, Inc.
Nano-Optic Devices
nanoplus GmbH
nanosystec GmbH
Nanotronics Imaging
National Aperture, Inc.
National Defense Industrial Association
National Institute of Standards and Technology
Natsume Optical Corp.
Navitar Inc.
New England Optical Systems
New England Photoconductor Corp.
New Mexico Optics Industry Association
Newport Corp.
Newport Thin Film Lab., Inc.
NiCoForm, Inc.
NKT Photonics A/S
NKT Photonics France
NKT Photonics GmbH
NKT Photonics Inc.
nLIGHT Corp.
Noren Products Inc.
Norland Products Inc.
NorPix Inc.
Northrop Grumman Cutting Edge Optronics
Novotech, Inc.
nPoint, Inc.
Nufern
Nutfield Technology, Inc.
Ocean Optics B.V.
Ocean Optics, Inc.
Oclaro, Inc.
OEwaves, Inc.
OFS
Ohara Corp.
Ondax, Inc.
Onefive GmbH
Ontar Corporation
OPCO Laboratory, Inc.
Open Photonics, Inc.
Ophir-Spiricon, LLC
Optec S.p.A.
Opti Temp, Inc.
Optical Filter Source, LLC
Optical Support, Inc.
Optics Balzers
Optics Technology, Inc.
Optiforms
OptiGrate Corp.
Optikos Corp.
Optimax Systems, Inc.
OptiPro Systems
OptiSource, LLC
Optiwave Systems Inc.
OptiWorks, Inc.
Opto Diode Corp.
Opto-Alignment Technology, Inc.
Opto-Knowledge Systems, Inc.
OptoElectronic Components
Optofluidics
Optonetic LLC
OptoSigma Corp.
Optotune AG
OSELA Inc.
OZ Optics Ltd.
Pacific Laser Equipment
PANalytical
Pangolin Laser Systems, Inc.
Pavilion Integration Corp.
PCO-TECH Inc.
PD-LD, Inc.
PFG Precision Optics, Inc.
PHASICS Corp.
Photon Design
Photon Engineering LLC
Photon etc. Inc.
Photonic Cleaning Technologies
Photonics Industries International, Inc.
Photonics Media/Laurin Publishing
PHOTONIS USA
Photop Technologies, Inc.
PI (Physik Instrumente) L.P.
PicoQuant Photonics North America, Inc.
piezosystem jena, Inc.
Pixelteq, Inc.
Plasma-Therm LLC
PLC Connections, LLC
Poco Graphite, an Entegris Co.
PolarOnyx Laser Inc.
Polymicro Technologies, A Subsidiary of Molex Incorporated
Povolzhskiy State Univ. of Telecommunications and Informatics
Power Technology, Inc.
Precision Asphere, Inc.
Precision Glass & Optics
Precision Optical
Princeton Instruments
Princeton Lightwave, Inc.
Prizmatix Ltd.
Profilocolore Srl
Proto Labs, Inc.
PVP Advanced EO Systems, Inc.
Pynco, Inc.
QD Laser, Inc.
QED Technologies, Inc.
Qioptiq S.A.S.
Qioptiq, Inc.
Quantel USA
R'AIN Optics
Radiantis
Raicol Crystals Ltd.
Rainbow Research Optics, Inc.
Raptor Photonics Ltd.
Redfern Integrated Optics, Inc.
Redondo Optics, Inc.
Research Electro-Optics, Inc.
Reynard Corp.
Richardson Gratingsô, a Newport Corp. Brand
RICOR USA, Inc.
Riegl USA Inc.
RMT Ltd.
Rochester Precision Optics, LLC
Rocky Mountain Instrument Co.
Ross Optical Industries
RPC Photonics, Inc.
RPMC Lasers, Inc.
Rubicon Technology Inc.
Rutherford Appleton Lab.
Sacher Lasertechnik GmbH
Sage Design Automation, Inc.
Salem Distributing Co., Inc.
Santa Barbara Infrared, Inc.
Satisloh North America Inc.
Savvy Optics Corp.
SCANLAB America, Inc.
ScannerMAX
SCD SemiConductor Devices
SCD.USA, LLC
Schneider Optical Machines Inc.
Schneider Optics, Inc.
SCHOTT AG
SCHOTT DiamondView Armor Products, LLC
SCHOTT North America, Inc.
Scientific Materials Corp.
SCONTEL
SemiNex Corp.
Semrock, Inc.
SensL
Shanghai Optics Inc.
Shasta Crystals
Sheaumann Laser, Inc.
Sierra Precision Optics
Sigmadyne, Inc.
Sill Optics GmbH & Co. KG
Simphotek Inc.
Siskiyou Corporation
SlicingTech
SmarAct GmbH
Space Optics Research Labs., LLC (SORL)
Special Optics, Inc.
Specim Spectral Imaging Ltd.
Spectral Evolution, Inc.
Spectral Instruments, Inc.
Spectrogon AB
Spectrogon UK Ltd.
Spectrogon US, Inc.
Spectrum Scientific, Inc.
Spectrum Thin Films Corp.
Spica Technologies, Inc.
SRI International Sarnoff
SRICO Inc.
Stanford Computer Optics, Inc.
StellarNet, Inc.

SPIE CORPORATE MEMBERS

Stemmerich, Inc.
Sunny Technology
Sutter Instrument Corp.
Swamp Optics, LLC
Swarovski Optik KG
SwissLitho AG
Sydor Optics, Inc.
Synopsys, Inc.
TAG Optics, Inc.
tec5USA, Inc.
Techmetals, Inc.
Technische Informationsbibliothek und Univ. Hannover
TecOptics, Inc.
Tecport Optics, Inc.
Teledyne Judson Technologies
Telops
Tempo Plastic Co.
Tempotec Optics Co., Ltd.
Texas Instruments Inc.
TFO, LLC
The Hong Kong Polytechnic Univ.
The Univ. of Arizona
The Univ. of New Mexico
Thermo Fisher Scientific Inc.
Thorlabs GmbH
Thorlabs Inc.
TLC International World Headquarters
Tokyo Ohka Kogyo America, Inc.
TopGaN Ltd.
TOPTICA Photonics Inc.
Tornado Spectral Systems
Tower Optical Corp.
Traycer Systems, Inc.
TRIOPTICS GmbH
TRUMPF Inc.
TwinStar Optics, Coatings & Crystals, Inc.
Tydex
Umicore Optical Materials USA, Inc.
UniClean Cleanroom Services
United Lens Co., Inc.
Universal Photonics Inc.
UTC Aerospace Systems
Valtech Corp.
Varioptic-A BU of Parrot SA
Vermont Photonics Technologies Corp.
VisiMax Technologies, Inc.
Vision Components GmbH
Visualant, Inc.
Vixar Inc.
Wacom Corp.
Wasatch Photonics, Inc.
Wavelength Electronics, Inc.
Wavelength Opto-Electronic (S) Pte. Ltd.
World Star Tech
Wuhan Huaray Precision Laser Co., Ltd.
Wuhan Yangtze Soton Laser Co., Ltd.
WZW-Optic AG
XEI Scientific, Inc.
Xenics NV
Xonox Technology GmbH
XYALIS
Y&M Technologies, Inc.
Yenista Optics Inc.
Yenista Optics S.A.
Z & Z Optoelectronics Tech. Co., Ltd.
Z-LASER Optoelektronik GmbH
ZC Optoelectronic Technologies, Ltd.
Zemax, LLC
Zeta Instruments
Zomega Terahertz Corp.
Zurich Instruments AG
Zygo Corporation

2016 ASTRONOMICAL TELESCOPES + INSTRUMENTATION.

Participate in the most prestigious event addressing advanced technologies for ground- and space-based telescopes

Make plans to attend in 2016

www.spie.org/as

Location
Edinburgh, United Kingdom

Conferences & Courses: 26 June–1 July 2016

Exhibition: 29–30 June 2016

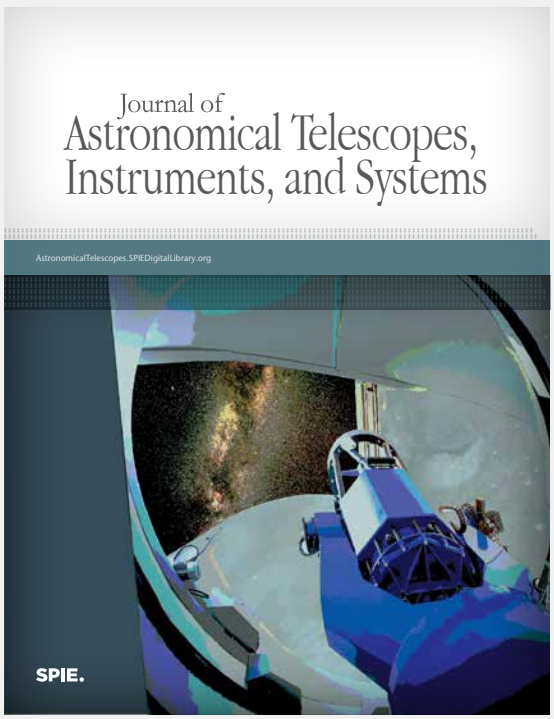
SPIE. ASTRONOMICAL TELESCOPES + INSTRUMENTATION

Call for Papers

NEW

Journal of Astronomical Telescopes, Instruments, and Systems

Mark Clampin
NASA Goddard
Space Flight Center
Editor-in-Chief



Journal scope:

- Ground and space-based telescopes and instrumentation
- Observatory design and operations
- Control systems
- Active optics, adaptive optics, and interferometry
- Detector systems
- Cameras and spectrographs
- Optical design and manufacturing
- System engineering
- Innovative technologies and materials
- Data analysis techniques

Free access through 2015

www.spie.org/JATIS