ADVANCE TECHNICAL PROGRAMME
WWW.SPIE.ORG/OM15PROGRAMME

22–25 June 2015
Internationales Congress Center
Munich, Germany

- Optical Measurement Systems for Industrial Inspection
- Modeling Aspects in Optical Metrology
- O3A: Optics for Arts, Architecture, and Archaeology
- Videometrics, Range Imaging, and Applications
- Optical Methods for Inspection, Characterization, and Imaging of Biomaterials
- Automated Visual Inspection and Machine Vision

22nd International Congress on Photonics in Europe
Collocated with LASER 2015 World of PHOTONICS

WORLD OF PHOTONICS CONGRESS
www.photonics-congress.com
Welcome to Munich!

Take this opportunity to share your research at SPIE Optical Metrology 2015. Come to Munich to meet with users and researchers to discuss the latest inventions and applications in the field of optical metrology. The symposium will highlight new optical principles and systems for metrology, videometrics, and machine vision with applications in industrial design, production engineering, process monitoring, maintenance support, biotechnology, vehicle navigation, multimedia technology, architecture, archaeology, and arts. Special emphasis is directed to model-based, remote and active approaches, sensor fusion, robot guidance, image sequence processing and scene modelling, and biomaterials characterization, as well as to the preservation of our shared cultural heritage.

We invite engineers, scientists, researchers, trustees, and managers to attend this year’s meeting.

Co-located with Laser 2015 in Munich, Germany, this symposium will address the role of optics and lasers in the following areas:

- Optical Measurement Systems for Industrial Inspection
- Modeling Aspects in Optical Metrology
- Optical Methods for Inspection, Characterization and Imaging of Biomaterials
- Videometrics, Range Imaging and Applications
- Automated Visual Inspection and Machine Vision
- Optics for Arts, Architecture, and Archaeology

Take advantage of this unique opportunity to hear about the latest solutions to practical problems in industrial design and production engineering. Learn about recent advances in using optical technologies to preserve our shared cultural heritage. Find out about new approaches that push optical principles of measurement and testing at the macro, micro- and nanoscales to the forefront of metrology. Exchange new ideas, address your shared concerns, and get access to information not yet published in the mentioned topical areas. Share your research with other engineers, scientists, researchers, and managers. Presentations will be permanently archived in the SPIE Digital Library, and made available to others in the international scientific community who seek to learn, make discoveries, and innovate.

We invite you to join your colleagues and share the most recent developments and applications at SPIE Optical Metrology 2015.
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Registration Rates Increase
After 1 June 2015
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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 $3.4 million in support of education and outreach programs in 2014.
Monday June 22  Wednesday June 24
Conf. 9525: Optical Measurement Systems for Industrial Inspection (Lehmann)
Conf. 9526: Modeling Aspects in Optical Metrology (Bodermann)
Conf. 9528: Videometrics, Range Imaging, and Applications (Remondino, Shortis)
Conf. 9529: Optical Methods for Inspection, Characterization and Imaging of Biomaterials (Ferraro, Grilli, Ritsch-Marte, Stifter)
Conf. 9527: O3A: Optics for Arts, Architecture, and Archaeology (Pezzati, Targowski)
Conf. 9530: Automated Visual Inspection and Machine Vision (Beyerer, Puente-Leon)
POSTER SESSIONS:CONFERENCES
9525,9526, 9528, 9529, 9530
POSTER SESSION-CONFERENCE
9527
PLENARY SESSION
Extreme Computational Imaging: Photography, Health-tech and Displays (Raskar)
WELCOME RECEPTION

Welcome and Introduction

Presentation of the Dennis Gabor Award to Kazuyoshi Itoh, Osaka University Japan

Presentation of the Chandra S. Vikram Award in Optical Metrology to Guillermo H. Kaufmann, Instituto de Física Rosario (CONICET-UNR), Argentina Rosario

Extreme Computational Imaging: Photography, Health-tech and Displays

Ramesh Raskar, MIT Media Lab., United States

The Camera Culture Group at the MIT Media Lab aims to create a new class of imaging platforms. This talk will discuss three tracks of research: femto photography, retinal imaging, and 3D displays. Femto Photography consists of femtosecond laser illumination, picosecond-accurate detectors and mathematical reconstruction techniques allowing researchers to visualize propagation of light. Direct recording of reflected or scattered light at such a frame rate with sufficient brightness is nearly impossible. Using an indirect ‘stroboscopic’ method that records millions of repeated measurements by careful scanning in time and viewpoints we can rearrange the data to create a ‘movie’ of a nanosecond long event. Femto photography and a new generation of nano-photography (using ToF cameras) allow powerful inference with computer vision in presence of scattering.

EyeNetra is a mobile phone attachment that allows users to test their own eyesight. The device reveals corrective measures thus bringing vision to billions of people who would not have had access otherwise. Another project, eyeMITRA, is a mobile retinal imaging solution that brings retinal exams to the realm of routine care, by lowering the cost of the imaging device to a 1/10th of its current cost and integrating the device with image analysis software and predictive analytics. This provides early detection of Diabetic Retinopathy that can change the arc of growth of the world’s largest cause of blindness.

Finally the talk will describe novel lightfield cameras and lightfield displays that require a compressive optical architecture to deal with high bandwidth requirements of 4D signals.

Biography: Ramesh Raskar is an Associate Professor at MIT Media Lab. Ramesh Raskar joined the Media Lab from Mitsubishi Electric Research Laboratories in 2008 as head of the Lab’s Camera Culture research group. His research interests span the fields of computational photography, inverse problems in imaging and human-computer interaction. Recent projects and inventions include transient imaging to look around a corner, a next generation CAT-Scan machine, imperceptible markers for motion capture (Prakash), long distance barcodes (Bokode), touch+hover 3D interaction displays (BIDi screen), low-cost eye care devices (Netra,Catra), new theoretical models to augment light fields (HR3D).

In 2004, Raskar received the TR100 Award from Technology Review, which recognizes top young innovators under the age of 35, and in 2003, the Global Indus Technovator Award, instituted at MIT to recognize the top 20 Indian technology innovators worldwide. In 2009, he was awarded a Sloan Research Fellowship. In 2010, he received the DARPA Young Faculty Award. Other awards include Marr Prize honorable mention 2009, LAUNCH Health Innovation Award, presented by NASA, USAID, US State Dept and NIKE, 2010, Vodafone Wireless Innovation Project Award (first place), 2011. He holds over 50 US patents and has received four Mitsubishi Electric Invention Awards. He is currently co-authoring a book on Computational Photography. [Personal webpage http://raskar.info]

http://www.media.mit.edu/~raskar

THIS ADVANCE PROGRAMME IS CURRENT AS OF 19 MARCH 2015

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Student Chapter Leadership Workshop
Saturday 20 June 2015 .......................... 9:00 to 17:00
Open to SPIE Student Chapter members

Jean-luc Doumont, Principae

SPIE's successful Student Chapter Leadership Workshop is back in Europe for the fourth time!

During this highly interactive, all-day event facilitated by Dr. Jean-luc Doumont, you will discuss what being a leader is all about (and what it is not about), how to communicate across cultures, and how to go from ideas to achievements for your chapter. Join Student Chapter officers from around the world for a full day of professional development training and networking.

An engineer (Louvain) and PhD in applied physics (Stanford), Jean-luc is acclaimed worldwide for his no-nonsense approach, his highly applicable, often life-changing recommendations on a wide range of topics, and Trees, maps, and theorems, his book about "effective communication for rational minds." He is a visiting lecturer for SPIE. For more information about Jean-luc, please visit www.principiae.be.

All SPIE student chapter members are welcome to attend, but please RSVP to students@spie.org for confirmation.

How to Persuade Others
Sunday 21 June 2015 ............................. 13:30 to 16:30
Open to Students and Early Career Professionals

Being able to persuade others is an essential skill for a successful career: we must convince employers to hire us, persuade our boss to let us start a project, or get our coworkers to help us out for a given job. This workshop shows how to use personal/organizational power, how to deploy tactics, and how to harness social influences so we get other people to accede more easily to our requests. Please email students@spie.org to register.

Facilitator: Jean-luc Doumont, Principae

Students and SPIE Fellows Luncheon
Wednesday 24 June 2015 .......................... 12:30 to 14:00
Students: Advance sign-up required onsite; seating is limited.

Students and SPIE Fellows are invited to this engaging networking opportunity. This event gives students an opportunity to network with SPIE Fellows who will share their insights into career paths in optics and photonics. Lunch is complimentary, and students must sign up at the SPIE registration desk onsite.

Co-sponsored by LIGHT2015

Co-sponsored by

Career Choices Panel Discussion
Wednesday 24 June 2015 .......................... 15:00 to 16:00

What are the critical career choices and decisions that face new graduates in optics and photonics? What are some strategies for navigating the transition from student to professional? This event will feature a career choices discussion and a panel with professionals from a variety of fields in optics and photonics.

Surviving in Science: what they don't tell you about careers in research!
Prof. John Dudley, FEMTO-ST

Obtaining a PhD is an important and significant achievement in your life, but it is really only the start! A successful career in research requires not only a PhD but also many other skills in multiple areas: from writing and communication, to management and leadership. When starting out, the breadth of this required expertise can seem daunting, but the aim of this presentation will be to try to provide simple and practical advice to help early-career researchers to build and enjoy a long term career in photonics whether in academia or industry.

Co-sponsored by LIGHT2015

Welcome Reception
Wednesday, 24 June 2015 .......................... 19:00 to 21:30

This evening event will feature a light meal and beverages. All registered conference attendees are welcome. A guest may accompany a registered attendee for an additional charge (based on space available).
Effective Technical Presentations

**WS897**

*Course Level: Introductory*

CEU: 0.35 · Member Price: US$150/€135  
Non-member Price: US$210/€185  

*Sunday 21 June 2015 · 08:30 to 12:30*

**COURSE DETAILS**

Oral presentation skills are a key to success for researchers. This course proposes a five-step methodology that will take you from scratch to an effective technical presentation. It also offers tips on how to manage the nervousness associated with speaking in public.

**LEARNING OUTCOMES**

- plan your presentation efficiently  
- organize your material into an effective structure  
- create slides that get the message across  
- deliver your presentation effectively, both verbally and nonverbally  
- handle even the most difficult questions

**INTENDED AUDIENCE**

This material is intended for anyone who must prepare and deliver oral presentations. Both novice and experienced speakers can expect to learn much from it.

**INSTRUCTOR**

Jean-luc Doumont runs lectures, workshops, and training programs in oral, written, and graphical communication for engineers, scientists, and managers worldwide. He is an engineer from the University of Louvain and a doctor in applied physics from Stanford University. This course is based on his popular lecture on oral presentations at over 15 top-ranked engineering schools (MIT, Stanford U, UC Berkeley, Caltech, Harvard, etc.).

Note: This course is free to SPIE Student Members, but you must register to attend.

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Effective Scientific Papers

**WS908**

*Course Level: Introductory*

CEU: 0.35 · Member Price: US$150/€135  
Non-member Price: US$210/€185  

*Monday 22 June 2015 · 08:30 to 12:30*

**COURSE DETAILS**

Strong writing skills are a key to success for researchers. This course proposes a methodology that will take you from scratch to an effective scientific or technical document—a question of structure, not style. The approach is applicable across languages and for a wide range of document types beyond scientific papers, too.

**LEARNING OUTCOMES**

- plan your document efficiently  
- create an effective abstract, introduction, and conclusion  
- organize your material into an accessible structure  
- construct paragraphs that get the message across  
- write sentences that are easy to read

**INTENDED AUDIENCE**

This material is intended for anyone who must write or edit technical documents in general and scientific papers in particular. Both novice and experienced writers can expect to learn much from it.

**INSTRUCTOR**

Jean-luc Doumont runs lectures, workshops, and training programs in oral, written, and graphical communication for engineers, scientists, and managers worldwide. He is an engineer from the University of Louvain and a doctor in applied physics from Stanford University. This course is based on his lectures and workshops on scientific and technical writing at universities and research centers around the world (MIT, Shell, Johnson & Johnson, etc.).

Note: This course is free to SPIE Student Members, but you must register to attend.

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**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.

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**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.
MONDAY 22 JUNE

SESSION 1 ..................................... MON 11:10 TO 13:00
Resolution-enhanced Techniques

Ultra-precision optical metrology using highly controlled fiber-based frequency combs (Invited Paper), Kaoru Minoshima, The Univ. of Electro-Communications (Japan). .......................................................... [9525-1]

Deterministic phase retrieval employing spherical illumination, Juan Martinez-Carranza, Konstantinos Falaggis, Tomasz Kozacki, Warsaw Univ. of Technology (Poland) .......................................................... [9525-2]

Digital super-resolution microscopy using example-based algorithm, Shinji Ishikawa, Yoshiho Hayasaki, Utsunomiya Univ. (Japan) .......................................................... [9525-3]

3D shape metrology of 80 µm deep vias using TSOM method, Ravikiran Attota, HyeongGon Kang, Keana Scott, National Institute of Standards and Technology (United States); Carlos Belita, CEAE-LITI (France) .......................................................... [9525-4]

3D optical metrology and super-resolution microscopy with structured illumination based on QXGA (2048x1536) resolution, Henning Molsen, Forschungsdirektion Digitalisierter Lichteinfall (Germany) .......................................................... [9525-136]

Lunch Break ........................................... Mon 13:00 to 14:00

SESSION 2 ..................................... MON 14:00 TO 16:00
Interferometric Techniques

Dual spectrally-resolved interferometry to improve measurement range, Ki-Nam Joo, Yong Bum Seo, Byeong Kwon Kim, Chosun Univ. (Korea, Republic of) .......................................................... [9525-6]

Full-field and contactless topography of nanometric thin films based on multifrequency interferometry, Pascal Picart, Mokrane Matek, Univ. du Maine (France); Jorge Garcia-Sucregua, Univ. Nacional de Colombia sede Medellin (Colombia) and Univ. du Maine (France); Rahma Moalla, Mathieu Edely, Nicolas Delorme, Jean-François Bardeau, Univ. du Maine (France) .......................................................... [9525-7]

Novel dispersion-tolerant interferometry method for accurate measurements of displacement, Adrian Bralu, Michael Manu, Univ. of Kent (United Kingdom); Lasse Leck, NKT Photonics A/S (Denmark); Adrian G. Podoleuze, Univ. of Kent (United Kingdom) ........................................................................ [9525-8]

Phase sensitive computer tomographic measurement using a pixelated phase mask interferometry technique, David I. Serrano-Garcia, Yukitoshi Otani, Utsunomiya Univ. (Japan)........................................................................ [9525-9]

Spatial frequency analysis algorithm for in-situ measurement of wavefront, Qian Liu, China Academy of Engineering Physics (China) .......................................................... [9525-10]

Nonlinear interferometry and application for black background tomography, Kanel Mallat, Alain Cornet, Univ. Catholique de Louvain (Belgium); José Luis Fernández, Univ. de Vigo (Spain) .......................................................... [9525-11]

SESSION 3 ..................................... MON 16:30 TO 18:10
OCT and Fiber Sensors

Evaluation of polymer matrix homogeneity using functional optical coherence tomography techniques, Marcin R. Stankowski, Michal Trojanowski, Paulina Strakowska, Maciej Kraszewski, Gdansk Univ. of Technology (Poland) .......................................................... [9525-12]

The influence of speckle size in OCT for industrial applications, Guy Lamouche, Bruno Gautieri, Marc L. Dufour, National Research Council Canada (Canada) .......................................................... [9525-13]

Robust fiber optic flexure sensor exploiting mode coupling in few-mode fiber, Bryan Nelsen, Florian Rudek, Westfälische Hochschule Zwickau (Germany); Christopher Tauts, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany) and Technische Universit Universität Dresden (Germany); Tobias Baselt, Peter Hartmann, Westfälische Hochschule Zwickau (Germany) .......................................................... [9525-14]

Fibre optic pressure sensor using a microstructured POF, Oskar Arriagada, Gaizka Durana, Univ. del País Vasco (Spain) .......................................................... [9525-15]

Distributed fiber optic sensor employing phase generate carrier for disturbance detection and location, Hayou Xu, Min L. Hohai Univ. (China); Christian Rembe, Polytrec GmbH (Germany); Robert Schmitt, RWTH (Germany); Cristina Trillo, Univ. de Vigo (Spain); Rainer Tutsch, Technische Univ. Braunschweig (Germany); Eiko Watanabe, The Univ. of Electro-Communications (Japan) .......................................................... [9525-16]
SESSION 6  

**TUE 14:30 TO 15:30**

### Specle and Shearing Interferometry

**Robust speckle metrology for stress measurements outside the lab (Invited Paper)**, Matias R. Viotti, Armando Albertazzi Gonçalves Jr., Univ. Federal de Santa Catarina (Brazil)  
**Reduction of phase singularities in speckle-shearing interferometry by incoherent averaging of speckle patterns**, Klaus Mantel, Max-Planck-Institut für die Physik des Lichts (Germany); Martin Nolvi, Univ. of Helsinki (Finland); Ivan Kassamakov, Edward Hæggström, National Research Univ. of Defense Technology (Russian Federation)  
**Bending stress determination in pipes using a radial in-plane digital speckle pattern interferometer combined with instrumented indentation**, Filip Fontana, Armando Albertazzi Gonçalves Jr., Matias R. Viotti, Univ. Federal de Santa Catarina (Brazil)  
**Influence of error sources in speckle interferometry using only two speckle patterns**, Yasuhiko Arai, Kansai Univ. (Japan); Shunsuke Yokozeki, Yokoaku Applied Optics Lab. (Japan)  
**Maximum likelihood estimation used to calibrate self-referencing interferometer**, Chen Zhang, Sichuan Univ. (China)  

### SESSION 7  

**TUE 16:00 TO 17:20**

#### Confocal and WLI Techniques

**Multiplex acquisition approach for high speed 3D measurements with a chromatic confocal microscope**, Miro Taphanel, Fraunhofer-Institut für Ohonotechnik, Systemtechnik und Bildauswertung (Germany); Ralf Zink, Robert Bosch GmbH (Germany); Jürgen Beyerer, Fraunhofer-Institut für Ohonotechnik, Systemtechnik und Bildauswertung (Germany)  
**Multiscale roughness measurement of cementitious materials using different optical profilers and window resizing analysis**, Paul C. Montgomery, Fabien Salzenstein, Giano Gionato, Univ. de Strasbourg (France); Komila Apedo, ICube (France); Nicolas Serres, Institut National des Sciences Appliquées de Strasbourg (France); François Feugeas, Institut National des Sciences Appliquées de Strasbourg (France)  
**Calibration of z-axis linearity for arbitrary optical topography measuring instruments**, Matthias Effler, Jörg Seewig, Jan Herig, Georg von Freymann, Technische Univ. Kaiserslautern (Germany)  
**Surface topography measurement based on color images processing in white light interferometry**, Tong Guo, Tianjin Univ. (China)  

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**POSTER SESSION 6  

**TUE 17:20 TO 18:30**

Conference attendees are invited to attend the Optical Metrology Poster Session on Tuesday evening. Come visit the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to enter the poster session area. Please refer to the poster presentation guidelines and set-up instructions on page 3, and at http://spie.org/x6513. Posters will be available for viewing starting at 10:00 hrs on Tuesday through 12:00 hrs on Thursday.  

**Small angle X-ray saccatometry for overlap measurement**, Deh-Ming Shyu, Industrial Technology Research Institute (Taiwan); Joseph Kline, Daniel Chang, Yi-Sha Ku, Industrial Technology Research Institute (Taiwan); Vanderlei Tiche-Soares, Robert Lindt, Friedrich-Alexander-Universität Erlangen-Nürnberg (Germany)  
**Wafer warpage measurement with modified fringe reflection method**, Po-Yi Chang, Yi-Sha Kuehnhold, Lisa Zellmer, Angelika Brückner-Foit, Univ. Kassel (Germany)  
**Fully automated-low cost setup for fringe projection profilometry**, Uriel Rivera-Ortega, Joris Dirckx, Univ. Antwerpen (Belgium); Crucita Cunio, Univ. of Technology and Applied Sciences (Italy); Cristiano Botelho, State University of Rio de Janeiro (Brazil)  
**Application of high-accuracy Laser doppler velocimeter in self-contained navigation**, Gao Chunfeng, Xingxu Long, Wei Guo, National Univ. of Defense Technology (China)  
**Design of photonic crystal fiber sensors for biomedical applications**, Santosh Kumar, Anamika Kumari, DIT Univ. (India); Angela Amaphawun, Univ. Utara Malaysia (Malaysia); Fabio, Benemérita Univ. Autónoma de Puebla (Mexico)  

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**White-light interferometry optical fiber sensing for high-accuracy distance measurement in industrial applications**, Magnus Lindblom, Acroce Swedish ICT AB (Sweden); Håkan Dahlquist, System 3R International AB (Sweden)  
**Lunch Break**  

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This advance programme is current as of 19 March 2015.
Electrooptic converter to control linear displacements of the large structures of the buildings and facilities, Aleksandr S. Vasiliev, Igor A. Kordobov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Fedor V. Molev, OAO Avangard (Russian Federation); Oleg U. Lastmanov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9525-101]

High-speed and long-time FBG interrogation system using wavelength swept laser, Tatsuya Yamaguchi, Yukitaka Shinoda, Nihon Univ. (Japan) .................................................. [9525-102]

Electronic speckle pattern interferometry for fracture expansion in nuclear graphite based on PDE image processing methods, Chen Tang, Junjiang Zhang, Chen Sun, Yonggang Sun, Tianjun Wei, The Univ. of Hong Kong (Hong Kong, China) .................................................. [9525-103]

Oil film interferometry technique for skin friction measurement in subsonic and supersonic flows, Wei Wang, Chang Zhao, Yan Chen, Mengjie Yuan, Ke Wang, China Academy of Aerospace Aerodynamics (China) .................................................. [9525-104]

Design for measurement of the polarization state of light based on division of wave front, Hongwen Gao, Shaanxi Open Univ. (China) .................................................. [9525-105]

Robust phase-shifting holography with high spatial resolution, Igor A. Shevkunov, Nikolay V. Petrov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9525-106]

Influence of video compression on the measurement error of the television system, Aleksei S. Yarishew, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9525-107]


Fast inspection of bulk and surface defects of large-aperture optics in high-power lasers, Yuanan Zhao, Guohang Hu, Shijie Liu, Kui Yi, Jianda Shao, Shanghai Institute of Optics and Fine Mechanics (China) .................................................. [9525-109]

Enhanced adjustment methods for optical rotary encoders, Nikolai V. Sminov, Sujatoslav M. Latyev, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); René Theska, Technische Univ. Ilmenau (Germany) .................................................. [9525-110]

Study on measurement of mid-frequency wavefront error for large optics in high-power laser system, Shijie Liu, Chuanxin Jiang, Xue Zou, Zhihong Lai, Yuanan Zhao, Kui Yi, Jianda Shao, Shanghai Institute of Optics and Fine Mechanics (China) .................................................. [9525-111]

Phase disturbing speckle suppressing method in fiber laser meter under coherent illumination, Xumin Sun, Yunfeng Yan, Jing Wang, Hongyuan Fu, He Tian, Yongjun Liu, Harbin Engineering Univ. (China) .................................................. [9525-112]

Generalized phase-shifting algorithms: error analysis, Gastón A. Ayubi, Univ. de la República (Uruguay) .................................................. [9525-113]

Testing techniques for large aspheric primary mirrors in grinding, Yongqian Wu, Gaofeng Wu, Yundong Zhang, Institute of Optics and Electronics (China) .................................................. [9525-114]

Uncertainty reduction of light spot angular position estimation in optical measurement system based on quadratic photodiode, Kivlin V. Trifonov, Evgeni G. Ledbeko, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9525-115]

An approach to defect inspection for packing presswork with virtual orientation points and threshold template image, Xiangyang Huo, Songlin Liu, Zhao Fulai, Lixiang Jiang, Zhengzhou Institute of Surveying and Mapping (China) .................................................. [9525-116]

Short wavelengths active bichromatic pulsed pyrometer for solids and liquids designed for measurements in harsh environments, Loris Navello, Univ. Paris Ouest Nanterre La Défense (France); Jeremy Lebedinsky, Laser SARL (France); Julien Pierre Offret, Bruno Serro, Tanguy Davin, Univ. Paris Ouest Nanterre La Défense (France); Yannick Bailly, Univ. de Technologie de Belfort-Montbéliard (France); Philippe J. I., Harvi, Univ. Paris Ouest Nanterre La Défense (France) .................................................. [9525-117]

Sapphire fiber-optic sensor for hot flow temperature analysis, Wei Wang, Yuanning Wang, Mengjie Yuan, China Academy of Aerospace Aerodynamics (China) .................................................. [9525-118]

Determination of the refractive index of particles by using wavelength immersion matching technique, Igor O. Niskanen, Univ. of Oulu (Finland) .................................................. [9525-120]

Optical detection of microorganisms dispersed in pure water, Ayata Takami, Takeshi Ishiyama, Toyohashi Univ. of Technology (Japan) .................................................. [9525-120]

Integration of intensity-modulated optical fiber temperature sensor into corning glass fiber birefringence flame for spring size, Duo Yi, Univ. de Technologie de Belfort-Montbéliard (France); Pierre Pfeffer, Univ. de Strasbourg (France); Bruno Serro, Univ. Paris Ouest Nanterre La Défense (France); Sophie Costil, Univ. de Technologie de Belfort-Montbéliard (France) .................................................. [9525-121]

Measurement of concentration of sugar in solutions with speckle decorrelation, Swapnil Mahajan, Vismay Trivedi, Van K. Chhanvilai, The Maharaja Sayajirao Univ. of Baroda (India); Mahendrakumar P. Prasadpi, P D Pandya Mahila Commerce College (India); Zeel Zavelsky, Bar-Ilan Univ. (Israel); Bahram Javid, Univ. of Connecticut (United States); Arun Anand, The Maharaja Sayajirao Univ. of Baroda (India) .................................................. [9525-122]

Precise angular position measurement of a point source in an optoelectronic system with long range, Elena Zvezeva, Evgeny G. Lebedko, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9525-123]

Cost effective spectral sensor solutions for hand held field applications, Martin Correns, Edgar Reetz, Maik Schumann, Markus Berenger, Technische Univ. Garmisch-Partenkirchen (Germany); Gunther Notni, Technische Univ. Ilmenau (Germany) .................................................. [9525-124]

Integration of an autonomous optical sensor system in the machining area of milling centers, Marc Preiller, Mathias Schellhorn, Rolf Hoffmann, Gunther Notni, Technische Univ. Ilmenau (Germany) .................................................. [9525-125]

Quantifying height of ultra-precisely machined steps on oxygen-free electronic copper disk using Fourier domain short coherence interferometry, Risto Montonen, Helsinki Institute of Physics (Finland) and Univ. of Helsinki (Finland); Ivan Kassamakov, Edward Haeghtom, Univ. of Helsinki (Finland) .................................................. [9525-126]

The research of the nonexcluded air control error component using the optical-electronic system based on the dispersion method, Ivan S. Nekrylov, Alexandr N. Timofeev, Sergey N. Yarishew, Anton V. Nikulin, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9525-127]

The definition of the railway position control error in the plane and profile using the optical-electronic system, Anton V. Nikulin, Alexandr N. Timofeev, Anton V. Partyushin, Ivan S. Nekrylov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9525-128]

Aberration influence on accuracy of angle measurement by means of autocollimator, Yuri V. Filatov, Roman A. Lariche, Saint Petersburg Electrotechnical Univ. “LETI” (Russian Federation) .................................................. [9525-129]

Measurement of in-plane rotation angle by sampling Moiré technique, Soheila Javadianfaraji, Amirkarib Univ. of Technology (Iran, Islamic Republic of); Khosro Madanipour, Amirkarib Univ. of Technology (Iran, Islamic Republic of); Mahmood Mollahashi, Univ. of Science and Technology (Iran, Islamic Republic of) .................................................. [9525-130]

Monitoring of deep-sea industrial facilities using fiber optic cable, Valery V. Korotave, Victor M. Denisov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Joel J. P. C. Rodrigues, Instituto de Telecomunicações (Portugal) and Univ. of Beira Interior (Portugal); Mariya G. Serikova, Andrey V. Timofeev, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9525-131]

Wavelength dependency of the Total Integrated Scattering (TIS) method in surface roughness measurements, Sepehr Razi, Iran Univ. of Science and Technology (Iran, Islamic Republic of); Khosro Madanipour, Amirkarib Univ. of Technology (Iran, Islamic Republic of) ....... [9525-134]

The choice of marks for systems with noncontact position control, Valery V. Korotave, Aleksandr N. Timofeev, Maksim A. Kleshchenko, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9525-135]

Improving the resolution in phase-shifting Gabor holography by CCD shift, Vicente Micó, Luis Granero-Montagud, Univ. de València (Spain); Zeev Zalevsky, Technische Univ. Ilmenau (Germany) .................................................. [9525-137]

Fast detection of delamination areas in laminated structural elements by means of optically monitored strain solitons, Irina V. Semenova, Ioffe Physical-Technical Institute (Russian Federation); Alexander N. Timofeev, Ioffe Physical-Technical Institute (Russian Federation) and National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Galina V. Drieden, Alexander M. Samsonov, Ioffe Physical-Technical Institute (Russia) .................................................. [9525-138]

Diffusivity measurement using compact, low-cost, field-portable device based on light deflection, Van K. Chhanvilai, Swapnil Mahajan, Vismay Trivedi, Arun Anand, The Maharaja Sayajirao Univ. of Baroda (India) .................................................. [9525-139]

GPUs benchmarking in subpixel image registration algorithm, Vicente Micó, Martín Sanz, Javier Garcia, Univ. de València (Spain) .................................................. [9525-140]

Remote sensing of temperature and concentration profiles of a gas jet by coupling infrared emission spectroscopy and LIDAR for characterization of aircraft engine exhaust, Julien Pierre Offret, Univ. Paris Ouest Nanterre La Défense (France); Jeremy Lebedinsky, Laser SARL (France); Loris Navello, Vincenzo Micó, Bruno Serro, Univ. Paris Ouest Nanterre La Défense (France); Yannick Bailly, Univ. de Technologie de Belfort-Montbéliard (France); Philippe J. L. Hervé, Univ. Paris Ouest Nanterre La Défense (France). .................................................. [9525-141]
Experimental measurement of group velocity dispersion during operation in cladding-pumped large mode-area Yb-doped fibers, Tobias Baselt, Christopher Taudt, Peter Hartmann, Westfälische Hochschule zu Münster (Germany) ........................................... [9525-142]

Optic-electronic system for measuring the three-dimensional angular deformation of pipe sections at large constructions, Igor A. Konyakhin, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); V. V. Mikhalev, P. N. Demyanov, Van Phong Hoang, Renpu Li, Andrey A. Smekhov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) ............................................. [9525-143]

Parallelism measurement of plane glass at oblique incidence by interferometers, Yi Yang, Huan Ren, China Academy of Engineering Physics (China) ............................................ [9525-144]

Optical-electronic system for real-time position control of roof supporting structure, Sergey V. MIkeev, Igor A. Konakihin, Oleg Barsukov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) ........................................ [9525-145]

Autocollimating systems for pole angle measurement of large-scale object deformation, Tatiana Y. Turgaleva, Igor A. Konakihin, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) ........................................... [9525-146]

Analysis of Fourier-based digital microscopy holography systems for retrieval of phase objects, Alfonso Padilla-Vivanco, Martin Hernández-Romo, Carina Toxqui-Quitl, Univ. Politécnica de Tulancingo (Mexico) ......................... [9525-147]

Measurement of plasma parameters in Dielectric Barrier Discharge (DBD) by Moiré deflectometry technique, Fatemeh Salmi Mehdiahshahi, Mahfanzooy Co. (Iran, Islamic Republic of); Khosro Madanipour, AmirKabir Univ. of Technology (Iran, Islamic Republic of); Babak shokri, Shahid Beheshti Univ. (Iran, Islamic Republic of) ............................................. [9525-148]

Research and development objectives for the spectral coherence tomography, Dmitriy I. Yegorov, National Research Univ. of ITMO (Russian Federation) ........................................ [9525-149]

The TiO₂ nanoparticles concentration assessment in polymer matrix using OCT technique, Michal Trojanowski, Maciej Kraszewski, Marcin R. Strakowski, Paulina Strakowska, Gdansk Univ. of Technology (Poland) .................... [9525-150]

Application of Fresnel diffraction from a 2D array of reflective disks in optical profilometry of a flat surface, Ahmad Darudit, Pegah Asgari, Yousef Pourvai, Univ. of Zanjan (Iran, Islamic Republic of) ............................................. [9525-151]

Optical coherence tomography for ceramic tableware inspection, Maciej Kraszewski, Michal Trojanowski, Marcin R. Strakowski, Gdansk Univ. of Technology (Poland) ........................................... [9525-152]

Light scattering and transmission measurement using digital imaging for online analysis of constituents in milk, Pranav Jain, Sanjay E. Sarma, Massachusetts Institute of Technology (United States) .............................. [9525-154]

Applying of digital signal processing to optical equisignal zone system, Anton A. Maraev, Aleksandr N. Timofeev, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) ............................................. [9525-155]

System for deflection measurements of floating dry docks, Anton V. Pantyushin, Manjia G. Senikova, Valery V. Koroitseov, Alexei A. Timofeev, Alxeay A. Gorbatchev, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) ........................................ [9525-156]

360-degree three-dimensional shape measurement system: applications in oil industry, Carlos Ricardo Contreras Pico, Univ. Industrial de Santander (Colombia) and Univ. Santo Tomás (Colombia); Javier R. Arciniegas, Jaime Enrique Meneses Fonseca, Univ. Industrial de Santander (Colombia) ............................. [9525-157]

360-degree three-dimensional digitization of human torso by using multiplex projection-acquisition systems, Carlos Ricardo Contreras Pico, Univ. Industrial de Santander (Colombia) and Univ. Santo Tomás (Colombia); Jaime Enrique Meneses Fonseca, Univ. Industrial de Santander (Colombia) ............................. [9525-158]

Evaluation of focal length of a lens using the Lau effect, Mohammad Aboohassani, Arak Univ. (Iran, Islamic Republic of) ................................................ [9525-159]

Potential use of the characteristic Raman lines of toluene (CH₃) as a reference on the spectral analysis of fuel blends, Valentín Ortega Clavero, Andreas Weber, Dieter Hummel, Dan G. Anderson, and Univ. of Tokyo (Japan); Michihiko Yoshimura, Ricoh Elemex Corp. (Japan) .......................... [9525-43]

The vignetting field stop procedure: a new physical measurement principle for the Deflectometric acquisition of big Optical Surfaces - DaOS, Engbert Hofbauer, Hochschule Deggendorf (Germany); Rolf Rascher, Hochschule Deggendorf; Technologiecampus Teichach (Germany); Johannes Liebl, Felix Friedek M.D., Konrad Wühr, Thomas Stubenrauch, Technische Hochschule Deggendorf (Germany) .................................................. [9525-44]

Point-based deflectometry for measuring optical freeform topographies, Carsten Glasenapp, Carl Zeiss AG (Germany) ........................................ [9525-45]

Lunch Break ........................................................................ [9525-46]
SESSION 10 ........................................ WED 13:45 TO 15:30
Joint Session I: Measurement of Optical Components and Systems

Joint Session with EOS conference on Manufacturing and Testing of Optical Components

NEVERENDING struggles with mid-spatial frequencies (Invited Paper), Gregory W. Forbes, QED Optics (Australia) ........................................... [9525-47]

Calibration and control of wavefront errors in measurements of cylindrical optics, Florian Wolfrang, Jan-Peter Richters, Rainer Schuhmann, BERLINER GLAS KGaA Herbert Kubatz GmbH & Co. (Germany) ................ [9525-48]

Overview of characterization and metrology techniques for microlenses and microlenses arrays, Myun-Sik Kim, Lisa Allegre, Jonathan Sunarjo, Wilfried Noell, Reinhard Vökel, SÜSS MicroOptics SA (Switzerland) ........ [9525-49]

Wavefront calibration in 3D space, Johannes Schindler, Goran Baer, Christof Pruss, Wolfgang Osten, Univ. Stuttgart (Germany) ................ [9525-50]

SESSION 11 ........................................ WED 16:00 TO 18:10
Joint Session II: Measurement of Optical Components and Systems

Joint Session with EOS conference on Manufacturing and Testing of Optical Components

Traceability in interferometric form metrology, Michael Schulz, Gernot Blobel, Ines Fortmeier, Manuel Stavridis, Clemens Elster, Physikalisch-Technische Bundesanstalt (Germany) ...................... [9525-51]

New method for optical shape measurement of refractive surfaces, Mohamed Bichra, Florian Schurig, Stefan Sinzinger, Technische Univ. Ilmenau ........................................ [9525-52]

Through-focus OTF-based alignment testing of whole slide imaging systems, S. Mojtba Shakeri, Technical Univ. Delft (Netherlands); B. Hulsken, Philips Digital Pathology (Netherlands); L.J. van Vliet, S. Stallinga, Technical Univ. Delft (Netherlands) ................ [9525-53]

Unique characteristics of the fiber optic reference technique in absolute cylindrical alignment, Ayshah Alatawi, Patrick J. Reardon, The Univ. of Alabama in Huntsville (United States) ................................ [9525-54]

Measurement of aspheric and freeform optical surfaces with Diffractive Null Lenses with and without integrated Fizeau reference surface, Alexander G. Poteschuk, Institute of Automation and Electrometry (Russia); Jean-Michel Asfour, 2DOPITC GmbH (Germany); Victor P. Korolkov, Ruslan K. Nasaryov, Institute of Automation and Electrometry (Russia); Weidner Frank, 2DOPITC GmbH (Germany) ................ [9525-55]

Point diffraction interferometry based on the use of two pinholes, Nikolay B. Voznesensky, VTT-NTM ÖU (Estonia); Dongmei Ma, Chunshui Jin, Haitao Zhang, Jie Yu, Changchun Institute of Optics, Fine Mechanics and Physics (China); Maria Voznesenska, Tatiana Voznesenska, VTT-NTM ÖU (Estonia); Wesselingh, Jan of Optics, Fine Mechanics and Physics (China) ........................................... [9525-56]

THURSDAY 25 JUNE

SESSION 12 ........................................ THU 8:10 TO 10:00
3D Shape, Displacement, and Deformation Measurement

Specular speckle in the long-wave infrared for combining holography and thermography in a single sensor. Applications to nondestructive testing: the FANTOM project (Invited Paper), Marc-P. Georges, Univ. de Liège (Belgium) ........................................... [9525-57]

Measurements of shape and displacements of engineering objects in climate chambers with the use of 3D digital image correlation, Marcin Malesa, Malgorzata Kujawinska, Piotr Osiński, Warsaw Univ. of Technology (Poland) ................................................ [9525-58]

Objective speckle displacement resulting from the deformation of shaped objects, Thomas O. H. Charratt, Ralph P. Tatam, Cranfield Univ. (United Kingdom) ................................................ [9525-59]

System and method for the calibration and verification of correct axis positioning in medium-big sized milling boring machines, Lorenzo Cocola, Massimo Fedeli, Massimiliano Mocelin, Luca Poletto, CNR-IFN Lod Padova (Italy) ........................................... [9525-60]

Modified coherent gradient sensing method for slope measurement of reflective surfaces, Kang Ma, Huimin Xie, Tsinghua Univ. (China); Jiaoguo Zhu, Jiangsu Univ. (China) ........................................... [9525-61]

SESSION 13 ........................................ THU 10:30 TO 13:00
Nondestructive Testing and In-process Measurement

Profilometry and interferometry in life science applications (Invited Paper), Joris Dirxko, Univ. Antwerpen (Belgium) ........................................... [9525-62]

Optical detection of mixture ratios and impurities in viscous materials based on fluorescence imaging, Patrick J. Murr, Anton J. Tremmel, Michael Schardt, Alexander W. Koch, Technische Univ. München (Germany) ................ [9525-63]

Expanded beam spectrscopic ellipsometry for big area on-line monitoring, Miklos Fried, Csaba Major, Gyorgy Juhasz, Peter Petocz, Research Institute for Technical Physics and Materials Science (Hungary); Zoltan G. Horvath, MTA EK MFA (Hungary) ........................................... [9525-64]

Additive Manufacturing: a new approach for individualized optical shape metrology, Andreas Heinich, Philippe Maillard, Hochschule Aalen (Germany); Andrej Gresiak, Carl Zeiss Industrial Metrology (Germany); Uwe Berger, Hochschule Aalen (Germany) ................ [9525-65]

3D shape measurements with a single interferometric sensor for in-situ lathe monitoring, Robert Kuschniringer, Yongle Huang, Andreas Fischer, Jürgen W. Czarnecki, Technische Univ. Dresden (Germany); Stephan Metschke, Frank Löffler, Physikalisch-Technische Bundesanstalt (Germany) ................ [9525-66]

Ultrafast 2K line-scan sensor for industrial inspection applications, Christian Nitta, Benjamin Bechen, Fraunhofer-Institut für Mikroelektronische Schaltungen und Systeme (Germany); Ernst Bodnestorfer, Joerg Brodersen, Konrad J. Mayer, AT Technologie-Institut of Technology GmbH (Austria); Werner Brockherde, Olaf M. Schrey, Fraunhofer-Institut für Mikroelektronische Schaltungen und Systeme (Germany) ................ [9525-67]


Lunch Break ................................ Thu 13:00 to 13:50

SESSION 14 ........................................ THU 13:50 TO 15:30
Vibration Measurement

High-speed digital in-line holography as multipoint vibrometer to analyze vibrations of structures, Julien Polletvin, IRT Jules Verne (France); Pascal Picart, François Gautier, Charles Pézerat, Univ. du Maine (France) .... [9525-69]

Ultracompact vibrometry measurements with nanometric accuracy, Ajit Jha, Francisco J. Azzona Guerrero, Santiago Royo, Univ. Politècnica de Catalunya (Spain) ........................................... [9525-70]

Evaluation of the vibrational behaviour of a rotating disk by optical tip-clearance measurements, Iker Garcia, Joseba Zubia Zuballa, Univ. del Pais Vasco (Spain); Josu Beloki, Aeronautica Technologies Ctr (Spain); Jon Arue, Univ. del pais Vasco (Spain); Joel Villatoro, Univ. del pais Vasco (Spain) and IKERBASQUE. Basque Foundation for Science (Spain) ................ [9525-71]

Simultaneous laser vibrometry on multiple surfaces with a single beam system using range-resolved interferometry, Thomas Kissinger, Thomas O. H. Charratt, Stephen P. Tatam, Cranfield Univ. (United Kingdom) ........................................... [9525-72]

Multi-point laser coherent detection system and its application on vibration measurement, Yu Fu, Nanyang Technological Univ. (Singapore); Chong Yang, China Academy of Engineering Physics (China); Yingjun Xu, Southeast Univ. (China); Huan Liu, Keyu Yan, Guang Min, Nanyang Technological Univ. (Singapore) ........................................... [9525-73]

SESSION 15 ........................................ THU 16:00 TO 17:40
Defect Detection

Realistic simulation of camera images of local surface defects in the context of multisensor inspection systems, Halyae Yang, Univ. Stuttgart (Germany); Tobias Haist, Marc Gronie, Wolfgang Osten, Univ. of Stuttgart (Germany) ................ [9525-74]

Discrete modal decomposition for industrial surface appearance modelling and rendering, Giles Pitard, Univ. de Savoie (France) ........................................... [9525-75]

Subsurface damage detection by stray light analysis in a polished groove, Christian Vogt, Hochschule Deggendorf (Germany) and Technische Hochschule Deggendorf (Germany); Rolf Rascher, Hochschule Deggendorf Technologiecampus Teisnach (Germany); Oliver W. Faehnle, FISBA OPTIK AG (Switzerland) ................ [9525-76]

Using speckle images correlation for real-time inspection of fatigue crack initiation and propagation, Alexander P. Vladimirov, Ivan Kamantsev, Valeriya Nasyrov, Institute of Automation and Electrometry (Russia); Oliver W. Faehnle, FISBA OPTIK AG (Switzerland) ................ [9525-77]

Smart optical distance sensor for automatic welding detection, Stefan Rinner, Interstaatliche Hochschule für Technik Buchs NTB (Switzerland) ........................................... [9525-35]
CONFERENCE 9526

Tuesday - Thursday 23-25 June 2015 • Proceedings of SPIE Vol. 9526

Modeling Aspects in Optical Metrology V

Conference Chair: Bernd Bodermann, Physikalisch-Technische Bundesanstalt (Germany)

Conference Co-Chairs: Karsten Frenner, Institut für Technische Optik (Germany); Richard M. Silver, National Institute of Standards and Technology (United States)

Programme Committee: Markus Bär, Physikalisch-Technische Bundesanstalt (Germany); Jörg Bischoff, Osiris Optical Engineering (Germany); Harald Bosse, Physikalisch-Technische Bundesanstalt (Germany); Sven Burger, Konrad-Zuse-Zentrum für Informationstechnik (Germany); Peter Evanschitzky, Fraunhofer-Institut für Integrierte Systeme und Bauelemente (Germany); Christian Hafner, ETH Zürich (Switzerland); Wolfgang Holzapfel, DR. JOHANNES HEIDENHAIN GmbH (Germany); Bernd H. Kleemann, Carl Zeiss AG (Germany); Wolfgang Osten, Institut für Technische Optik (Germany); Andreas Rathsfeld, Weiterstrass-Institut für Angewandte Analyse und Stochastik (Germany); Thomas Scherübl, Carl Zeiss SMS GmbH (Germany); Patrick Schiavone, Aselta Nanographics (France); Irwan D. Setija, ASML Netherlands B.V. (Netherlands); Michael Totzeck, Carl Zeiss AG (Germany); Jari Turunen, Univ. of Eastern Finland (Finland); Frank Wyrowsky, Friedrich-Schiller-Universität Jena (Germany)

TUESDAY 23 JUNE

Opening Remarks ...........................................: 8:40 TO 8:50
Session Chair: Bernd Bodermann, Physikalisch-Technische Bundesanstalt (Germany)

SESSION 1 ..................................................: TUE 8:50 TO 10:00
Scatterometry I
Gratings of deep and smooth profiles: enlarging applicability domain of the coordinate transformation method with piecewise linear parameterization (Invited Paper), XiHong Xu, LiFeng Li, Tsinghua Univ. (China) .... [9526-1]
Specialized scatterometry methods for two types of gratings with distinct groove profiles, Lin Yang, Lijiang Zeng, Tsinghua Univ. (China) ........ [9526-2]
Spatial mode projection for side-wall angle measurements, Luca Cisotto, Silvania F. Pereira, H. Paul Urbach, Technische Univ. Delft (Netherlands) [9526-3]

SESSION 2 ..................................................: TUE 10:30 TO 12:20
Interferometry I
Phase error analysis and compensation in fringe projection profilometry (Invited Paper), Christian Bräuer-Burchardt, Peter Kühnstedt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Gunther Notni, Technische Univ. Ilmenau (Germany) .... [9526-4]
Signal simulation method for homodyne multiple target interferometers using short coherence length laser sources, Maik Fox, Thorsten Beuth, Karlsruher Institut für Technologie (Germany); Andreas Streck, ELDVIS GmbH (Germany); Wilhelm Stork, Karlsruher Institut für Technologie (Germany) [9526-5]
Metrological characterisation of a Large Aperture Fizeau for x-ray mirrors measurement, Maurizio Vannoni, Idoia Freijo Martín, European XFEL GmbH (Germany) ........ [9526-6]
An application of compressed sensing for apple-core distortion in tomographic dohle holographic interferometry, Lin Chen Lin, Feng Chia Univ. (Taiwan) .... [9526-7]
Measuring the relationship between DM surface and wavefront aberrations in a beam rotate 90°laser system, Ping Yang, Institute of Optics and Electronics (China); Mingyu Ao, Univ. of Electronic Science and Technology of China (China); Shuai Wang, LiZhi Dong, Institute of Optics and Electronics (China) .... [9526-8]
Lunch Break .................................................: 12:20 to 14:00

SESSION 3 ..................................................: TUE 14:00 TO 15:30
Radiometry and Photometry
Optical detectors developed on base of thermo elastic effect (Invited Paper), Vladimir P. Chelibanov, JSC OPTEC (Russian Federation) .... [9526-9]
Radiometric uncertainty for spectrally broadbeam measurements of absolute mid-wave infrared radiance under variable ambient conditions, Thomas Svensson, Swedish Defence Research Agency (Sweden); Henrik Larsson, Linköping Univ. (Sweden); Johan Eriksson, Swedish Defence Research Agency (Sweden) .... [9526-10]
Numerical modeling and uncertainty analysis of light emitting diodes for photometric measurements, Mohammed Zia Ullah Khan, Mohammed T. Aabas, Luai Mohammed Al-Atakhami, King Fahd Univ. of Petroleum and Minerals (Saudi Arabia) .... [9526-11]
Measurements of UV-A radiation and hazard limits from some types of outdoor lamps, Essam Elmohazy, National Institute For Standards (Egypt) .... [9526-12]

SESSION 4 ..................................................: TUE 16:00 TO 18:00
Optical Systems
Horizontal geometrical reaction time model for two-beam nacelle LiDARs, Thorsten Beuth, Maik Fox, Wilhelm Stork, Karlsruher Institut für Technologie (Germany) .... [9526-13]
Investigation vignetting beams in optoelectronic autocollimation angle measurement system, Agayn Salikharyanova, Igor A. Konyakhin, Andrey A. Smechkov, National Research University Higher Education Technologies, Mechanics and Optics (Russian Federation) .... [9526-14]
Transferring the Rb+ hyperfine-structure stability to a Fabry-Perot resonator used as a frequency standard for astronomical spectrographs, Philipp Huke, Harri Holzhüter, Ansgar Reiners, Univ. Göttingen (Germany) .... [9526-15]
Fully-vectorial simulation and tolerancing of optical systems for wafer inspection by field tracing, Daniel Asobaru, Hagen Schweitzer, Christian Hellmann, Michael Kuhn, LightTrans Virtual Lab UG (Germany); Frank Wyrowsky, Friedrich-Schiller-Universität Jena (Germany) .... [9526-16]
Wide-aperture laser beam measurement using transmission diffuser: errors modeling, Ivan Matsak, S.P. Korolev Rocket and Space Corp. Energia (Russian Federation) .... [9526-17]

Conference attendees are invited to attend the Optical Metrology Poster Session on Tuesday afternoon. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions on page 3, at http://spie.org/6513.html. Posters will be available for viewing starting at 10:00 hrs on Tuesday through 12:00 hrs on Thursday.

A novel autocollimating method for measuring the focal distances, Alexandr G. Ershov, S.I. Vavilov State Optical Institute (Russian Federation) .... [9526-18]
Modelling of microcracks image treated with fluorescent dye, Victor Glebov, Oleg U. Larshmanov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .... [9526-19]
Modelling Fizeau interferometer based on ray tracing with Zemax, Yuwei He, Xi Hou, Qiang Chen, Yongqian Wu, Weihong Song, Haiyang Quan, Institute of Optics and Electronics (China) .... [9526-20]
High-angle light scattering to determine the optical fiber core, Grzegorz Swiaski, Wroclaw Univ. of Technology (Poland) .... [9526-21]
Research of the use of autofociliation scheme to measure the error of the optical elements in space telescope’s relative position, Ksenia Elshova, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Mindaugas Ugrievas, OAO Avangard (Russian Federation); Igor A. Konyakhin, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .... [9526-22]
Modeling and analysis of the solar concentrator in photovoltaic systems, Janusz Mroczka, Kamli Plachta, Wroclaw Univ. of Technology (Poland) .... [9526-23]
In situ estimate of duty cycle of surface-relief holographic gratings during development by measuring TE/TM diffraction efficiency ratio, Lijiang Zeng, Konyakhin, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .... [9526-24]
Investigation of a mathematical model of the system of electro-optical sensors for monitoring nonlinear surfaces, Andrey V. Petrochenko, Igor A. Konyakhin, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .... [9526-25]
Using quadrants to control assembly and adjustment mirror-prism optical systems, Ksenia Ezhova, Victor Zverev, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation). .................................................. [9526-56]

Absolute testing of flats in sub-stitching interferometer by rotation-shift method, Xin Jia, Fuchao Xu, Tingwen Xing, Institute of Optics and Electronics (China). .......................................................... [9526-57]

Scanning in the optical vortex microscope, Agnieszka Popiolek-Masajada, Lukasz Plocienniczak, Jan Masajada, Slawomir Drobczynski, Mateusz M. Szarnicki, Wroclaw Univ. of Technology (Poland). ........................................ [9526-58]

The maximum power point search method for photovoltaic panels that uses a light sensor in real shading and temperature conditions, Janusz Mroczka, Mariusz Ostrowski, Wroclaw Univ. of Technology (Poland) .......................................................... [9526-59]

The study of the structural stability of the spiral laser beams propagation through inhomogeneous phase medium, Alexander A. Zhichik, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation). .................................................. [9526-60]

Determination of refractive index of channel waveguides by a new method: Moiré deflectometry, Mohammad Ahmad, Khosro Madanipour, Soheila Javadianvarjovi, Amirkabir Univ. of Technology (Iran, Islamic Republic of) .................................................................................................................. [9526-61]

Simulation and analysis of lightweight space mirror design, Nadezhda D. Tolstoba, Polina A. Abdula, Mikhail Y. Neutov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................................................. [9526-62]

Propagation invariant laser beams for optical metrology applications, Michael G. Soksin, Rutgers, The State Univ. of New Jersey (United States); Yakov G. Soksin, DHCP Technologies (United States) .......................................................... [9526-63]

A Bohmian analysis of Afshar’s experiment, Juan David Navia, John H. Reina, Univ. del Valle (Colombia); Detlef D. Gehr, Ludwig-Maximilians-Univ. München (Germany) .......................................................... [9526-64]

**WEDNESDAY 24 JUNE**

**SESSION 5 ............................ WED 8:30 TO 10:00**

**Stochastic Scattering and Nanoparticles**

Simulating the coherent light propagation in a random scattering materials using the perturbation expansion (Invited Paper), Maciej Kraszewski, Michal Trojanowski, Marcin R. Strakowski, Jerzy Plucinski, Gdansk Univ. of Technology (Poland) ........................................................................................................... [9526-20]

The optical properties of tropospheric soot aggregates determined with the DDA (Discrete Dipole Approximation) method, Krzysztof Skorupski, Wroclaw Univ. of Technology (Poland) ........................................................................................................... [9526-21]

Detection of fast flying nanoparticles by light scattering over a large volume, Federico Pettazzi, Stefan M. Blaumer, Jacques C. J. van der Donck, Alex Deutz, TNO (Netherlands) ........................................................................................................... [9526-23]

Nanospherical nanoparticles characterization by partial depolarized dynamic light scattering, Alexander Levin, Ekaterina Shmaitkova, All-Russian Research Institute for Optical and Physical Measurement (Russian Federation) ........................................................................................................... [9526-22]

**PLENARY SESSION ............... WED 10:30 TO 11:25**

**Extreme Computational Imaging: Photography, Health-tech and Displays**

Ramesh Raskar, MIT Media Lab., United States

**SESSION 6 ............................ WED 11:30 TO 12:40**

**Optical Material Parameters and Thin Films**

Nondestructive measurement of two-dimensional refractive index profiles by deflectometry (Invited Paper), Di Lin, James R. Leger, Univ. of Minnesota, Twin Cities (United States) ........................................................................................................... [9526-24]

Problems in thin film thickness measurement resolved: improvements of the Fast Fourier Transform analysis and consideration of the numerical aperture of microscope headers and collimators, Michael Quinten, Faiza Houta, Thomas Fries, FRT, Fries Research & Technology GmbH (Germany) ........................................................................................................... [9526-25]

Determination of refractive index by Moiré deflectometry, Mohammad Ahmad, Khosro Madanipour, Soheila Javadianvarjovi, Amirkabir Univ. of Technology (Iran, Islamic Republic of) ........................................................................................................... [9526-26]

Lunch Break ........................................................................................................... Wed 12:40 to 14:00

**SESSION 7 ............................ WED 14:00 TO 15:30**

**Scatterometry II**

Methods for optical modeling and cross-checking in ellipsometry and scatterometry (Invited Paper), Peter Petrlik, Research Institute for Technical Physics and Materials Science (Hungary) and Univ. of Pannonia (Hungary); Balint Fodor, Research Institute for Technical Physics and Materials Science (Hungary) and Univ. of Pécs (Hungary); Emil Agocs, Research Institute for Technical Physics and Materials Science (Hungary); Nils-Kumar, Technische Univ. Delft (Netherlands); Johannes Endres, Physikalisch-Technische Bundesanstalt (Germany); Gyorgy Juhaszo, Csaba Major, Research Institute for Technical Physics and Materials Science (Hungary); Miklos Fried, Research Institute for Technical Physics and Materials Science (Hungary) ........................................................................................................... [9526-27]

Validation of advanced 3D modelling and data analysis for scatterometry, Sven Burger, Lin Zschiedrich, JCMwave GmbH (Germany); Frank Schmidt, Martin Weiser, Zuse Institute Berlin (Germany); Bernd Bodermann, Matthias Wurm, Victor Soltwisch, Physikalisch-Technische Bundesanstalt (Germany) ........................................................................................................... [9526-28]

The statistical inverse problem of scatterometry: evaluation of combined measurements, Sebastian Heidenreich, Matthias Wurm, Hermann A. Gross, Bernd Bodermann, Markus Bär, Physikalisch-Technische Bundesanstalt (Germany) ........................................................................................................... [9526-29]


**SESSION 8 ............................ WED 16:00 TO 18:00**

**Microscopy and Imaging**

Calculation of the Freedom of Movement and the Qualified Stereoscopic Viewing Space by determination of IPD dependent crosstalk, Ronny Netzbandt, Rene de la Barré, Roland Bartmann, Mathias Kuhlmyer, Fraunhofer-Institut für Nachrichtentechnik Heinrich-Hertz-Institut (Germany) ........................................................................................................... [9526-31]

High-accuracy 0°-axis holography based on sparse wavefront coding in the complex domain, Vladimir Y. Katkovnik, Tampere Univ. of Technology (Finland); Igor A. Shevkunov, Nikolai V. Petrov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Karen Egiazarian, Tampere Univ. of Technology (Finland) ........................................................................................................... [9526-32]

Simulation of light in-coupling through an aperture probe to investigate light propagation in a thin layer for opto-electronic application, Markus Ermes, Stephan Lehnen, Karsten Stittkau, Reinhard Carius, Forschungszentrum Jülich GmbH (Germany) ........................................................................................................... [9526-33]

Effect of wavefront aberrations on a focused plenoptic imaging system: a wave optics simulation approach, Massimo Turola, City Univ. London (United Kingdom); Chris J. Moxon, Richard J. Marshall, Ian B. Styles, The Univ. of Birmingham (United Kingdom); Stephen Gruppetta, City Univ. London (United Kingdom) ........................................................................................................... [9526-34]

Total variation iterative constraint algorithm for limited angle tomographic reconstruction of non-piecewise constant structures, Wojciech Krauze, Piotr L. Makowski, Maigorza Kujawska, Warsaw Univ. of Technology (Poland) ........................................................................................................... [9526-35]

A cascaded plasmonic superlensing system composed of coupled metasurfaces and planar plasmonic lens, Livet Fu, Univ. Stuttgart (Germany); Philipp Schau, Karsten Brenner, Wolfgang Osten, Institut für Technische Optik (Germany) ........................................................................................................... [9526-36]
THURSDAY 25 JUNE

SESSION 9 ........................... THU 8:10 TO 10:00

Interferometry and Phase II

Calibration for the amplitude scaling coefficient in interference microscopy by means of a wavelength standard (Invited Paper), Peter J. de Groot, Jake L. Beverly, Zygo Corporation (United States) ................ [9526-37]

In-line digital holography with a knife edge, Claudio N. Ramirez, Univ. Autónoma de Barcelona (Spain); Claudio C. Iemmi, Univ. de Buenos Aires (Argentina); Juan Campos, Univ. Autónoma de Barcelona (Spain). . . . . . [9526-38]

Fourier analysis of quadratic phase interferograms, Jesús Muñoz-Maciel, Miguel Mora-González, Francisco J. Casillas-Rodríguez, Francisco G. Peña-Lecona, Univ. de Guadalajara (Mexico). . . . . . . . . . . [9526-39]

Phase retrieval based on diffraction element array with single far field, Shuai Wang, Ping Yang, Lizi Dong, Bing Xu, Institute of Optics and Electronics (China); Mingyue Ao, Univ. of Electronic Science and Technology of China (China) .......................................................... [9526-40]


Phase retrieval based on diffraction element array with single far field, Shuai Wang, Ping Yang, Lizi Dong, Bing Xu, Institute of Optics and Electronics (China); Mingyue Ao, Univ. of Electronic Science and Technology of China (China) .......................................................... [9526-40]

SESSION 10 ........................... THU 10:30 TO 12:40

Mueller Polarimetry

Mueller matrix scatterometry: revisited from the viewpoint of computational metrology (Invited Paper), Shiyuan Liu, Xiuguo Chen, Chuanwei Zhang, Hao Jiang, Huazhong Univ. of Science and Technology (China) [9526-42]

Snapshot polarimeter based on the conical refraction phenomenon, Alba Peinado, Angel Lizana, Alejandro Turpín, Irene Estévez, Univ. Autónoma de Barcelona (Spain); Claudio C. Iemmi, Univ. de Buenos Aires (Argentina); Todor K. Kalkandjiev, Jordi Mompart, Juan Campos, Univ. Autónoma de Barcelona (Spain) .................................................. [9526-46]

Measurement errors induced by axis tilt of biplates in dual-rotating compensator Mueller matrix ellipsometers, Honggang Gu, Chuanwei Zhang, Hao Jiang, Xiuguo Chen, Weiqi Li, Shiyuan Liu, Huazhong Univ. of Science and Technology (China) . . . . . . [9526-43]

Development of Mueller matrix imaging scatterometry for nanostructure metrology, Xiuguo Chen, Weichao Du, Chuanwei Zhang, Hao Jiang, Shiyuan Liu, Huazhong Univ. of Science and Technology (China) . . . . . . [9526-44]

Correction of depolarization effect in Mueller matrix ellipsometry with polar decomposition method, Weiqi Li, Chuanwei Zhang, Hao Jiang, Xiuguo Chen, Honggang Gu, Shiyuan Liu, Huazhong Univ. of Science and Technology (China) . . . . . . [9526-45]

Liquid crystal on silicon display-based optical setup to generate polarization spatial distributions, Angel Lizana, Xuejie Zheng, Alba Peinado, Claudio N. Ramirez, Univ. Autónoma de Barcelona (Spain); José Luis Martínez, Univ. Miguel Hernández de Elche (Spain); Irene Estévez, Univ. Autónoma de Barcelona (Spain); Andrés Márquez, Univ. de Alicante (Spain); Ignacio Moreno, Univ. Miguel Hernández de Elche (Spain); Juan Campos, Univ. Autónoma de Barcelona (Spain) .................................................. [9526-47]

CLOSING REMARKS ........................ 12:40 TO 12:50

Session Chair: Bernd Bodermann, Physikalisch-Technische Bundesanstalt (Germany)
WEDNESDAY 24 JUNE

SESSION 1 WED 8:30 TO 10:00
New Methods and Applications for Restoration
Session Chair: Bruno G. Brunetti, Univ. of Studi di Perugia (Italy)

- Nd:YVO4 nanosecond laser cleaning of liquenic colonization with a 355 nm laser, Roberto Chlipala, Tomasz Kozacki, Warsaw Univ. of Technology (Poland) [9527-11]
- Effectiveness of the cleaning of liquefied colonization with a 355 nm laser, Claudia Daffara, Univ. degli Studi di Verona (Italy) [9527-20]
- Effectiveness of the cleaning of liquefied colonization with a 355 nm laser, Claudia Daffara, Univ. degli Studi di Verona (Italy) [9527-20]
- Effectiveness of the cleaning of liquefied colonization with a 355 nm laser, Claudia Daffara, Univ. degli Studi di Verona (Italy) [9527-20]

WEDNESDAY 24 JUNE

SESSION 2 WED 13:50 TO 15:20
Stratigraphics and Depth-resolved Methods
Session Chair: Claudia Daffara, Univ. degli Studi di Verona (Italy)

- The influence of environment on corrosion of cast iron and carbon steel representing samples of outdoor metal technical heritage, Marek Strzelec, Jan A. Marczak, Wojciech Skr泽czenawski, Antoni Sarzya, Military Univ. of Technology (Poland) [9527-34]
- Surface reconstruction from photometric norms with reference height measurements, Lindsay W. MacDonald, Univ. College London (United Kingdom) [9527-8]
- Combined use of OCT and macro-XRF for examination of easel paintings, Magdalena A. Iwanicka, Bogumila J. Rouba, Justyna Olszewska-wietlik, Marcin Sylwestrzak, Piotr Targowski, Nicolaus Copernicus Univ. (Poland) [9527-7]
- Combined use of OCT and macro-XRF for examination of easel paintings, Magdalena A. Iwanicka, Bogumila J. Rouba, Justyna Olszewska-wietlik, Marcin Sylwestrzak, Piotr Targowski, Nicolaus Copernicus Univ. (Poland) [9527-7]
- Combined use of OCT and macro-XRF for examination of easel paintings, Magdalena A. Iwanicka, Bogumila J. Rouba, Justyna Olszewska-wietlik, Marcin Sylwestrzak, Piotr Targowski, Nicolaus Copernicus Univ. (Poland) [9527-7]

WEDNESDAY 24 JUNE

SESSION 3 WED 15:50 TO 18:00
3D Imaging, Scanning, Topography and Tomography
Session Chair: Marta Castillejo, Consejo Superior de Investigaciones Científicas (Spain)

- Cultural heritage applications of ultrafast pump-probe microscopy, Tana E. Villaffia, Martin C. Fischer, Duke Univ. (United States); William P. Brown, North Carolina Museum of Art (United States); John K. Delaney, Michael Palmer, National Gallery of Art (United States); Warren S. Warren, Duke Univ. (United States) [9527-25]
- Light calibration and quality assessment methods for reflection transformation imaging applied to artworks analysis, Claudia Daffara, Andrea Giacchetti, Carlo Reghinni, Univ. degli Studi di Verona (Italy) [9527-11]
- Test monitoring of the Centennial Hall’s dome, Wroclaw (Poland), Lukasz Jan Banderz, Jerzy Janiszewski, Dept. of Telecommunications Research Institute (Korea, Republic of) [9527-10]
- Test monitoring of the Centennial Hall’s dome, Wroclaw (Poland), Lukasz Jan Banderz, Jerzy Janiszewski, Dept. of Telecommunications Research Institute (Korea, Republic of) [9527-10]
- Test monitoring of the Centennial Hall’s dome, Wroclaw (Poland), Lukasz Jan Banderz, Jerzy Janiszewski, Dept. of Telecommunications Research Institute (Korea, Republic of) [9527-10]
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THURSDAY 25 JUNE

SESSION 4 .......................... THU 8:30 TO 10:00

Image Processing and Other Digital Data Processing Methods for Optics
Session Chair: Roger M. Groves, Technische Univ. Delft (Netherlands)

Design, construction and performance of a high-resolution near-infrared (1000-2500 nm) hyperspectral camera for paintings and works on paper (Invited Paper), John K. Delaney, National Gallery of Art (United States); Damon M. Conover, The George Washington University (United States); Kathryn Dooley, National Gallery of Art (United States) and The George Washington Univ. (United States); Suzanne Lomax, National Gallery of Art (United States); Murray H. Loew, The George Washington Univ. (United States). ........................................ [9527-15]

Automated analysis of large scale remote spectral imaging of paintings, Michela Radis, Politecnico di Torino (Italy); Chi Shing Cheung, Nottingham Trent Univ. (United Kingdom); Bomin Su, Dunhuang Academy (China); Haida Liang, Nottingham Trent Univ. (United Kingdom). ........ [9527-16]

The role of the masonry in paintings during a seismic event analyzed by infrared vision, Fernando López, Univ. Federal de Santa Catarina (Brazil); Costa, Univ. Laval; J. Bianca Jackson, The Univ. of Reading (United Kingdom); Iuav di Venezia (Italy); Carlo Beltrame, Univ. Ca’ Foscari di Venezia (Italy); Elisa Micheli, Luca Lombardi, Marco Malagodi, Tommaso Rovetta, Univ. degli Studi di Pavia (Italy). ........................................ [9527-17]

SESSION 5 .......................... THU 10:30 TO 12:40

Integrated Techniques and Case Studies
Session Chair: Vivi Tornari, Foundation for Research and Technology Hellas-FORTH (Greece)

Mid-infrared thermal imaging for an effective mapping of surface materials and sub-surface detachments in mural paintings: integration of thermography and thermal quasi-reflectography (Invited Paper), Claudia Daffara, Univ. degli Studi di Verona (Italy); Simone Parissiot, Univ. of Cambridge (United Kingdom); Paola Ilaria Mariotti, Opificio delle Pietre Dure (Italy). ........................................ [9527-19]

Optical characteristics and visual appearance for artwork materials, Chiara Aghemo, Politecnico di Torino (Italy); Michela Radis, Paola Iacomussi, Istituto Nazionale di Ricerche Metrologica (Italy); Teresa Corigliano, Istituto Nazionale di Ricerche Metrologica (Italy); Chiara Aghemo, Politecnico di Torino (Italy). ........................................ [9527-20]

Terahertz and hyperspectral imaging of a Tanda painting, J. Bianca Jackson, The Univ. of Reading (United Kingdom); Marcello Melis, Profilocolore Srl (Italy); Giovanni Daffara, Univ. degli Studi di Verona (Italy); Simone Parissiot, Univ. of Cambridge (United Kingdom); Paola Ilaria Mariotti, Opificio delle Pietre Dure (Italy). ........................................ [9527-21]

Case study of Sainte-Marie Chapel, Fontaine Chaalis (France): complementarity of different optical techniques, David Giovanacci, Vincent Detalle, Dominique Martos-Levif, Lab. de Recherche des Monuments Historiques (France); John H. Bowen, Gillian C. Walker, The Univ. of Reading (United Kingdom); Kamel Mouhoubi, Jean-Luc Bodnar, Univ. de Reims Champagne-Ardenne (France); Vivi Tornari, Eirini Bernikola, Kostas Hatzigiaianakis, Foundation for Research and Technology-Hellas (Greece). ........................................ [9527-22]

Photogrammetry in maritime and underwater archaeology: two marble wrecks from Sicily, Caterina Ballelli, Francesco Guerra, Paolo Vernier, Univ. Iuav di Venezia (Italy); Carlo Betrame, Univ. Ca’ Foscari di Venezia (Italy); Elisa Costa, Univ. Iuav di Venezia (Italy). ........................................ [9527-23]

Spectral characterization as a tool for parchment analysis, Michela Radis, Paola Iacomussi, Giuseppe Rossi, Istituto Nazionale di Ricerca Metroligica (Italy). ........................................ [9527-24]

Lunch Break ............................ Thu 12:40 to 14:00

SESSION 6 .......................... THU 14:00 TO 15:30

Imaging and Multimodal Imaging
Session Chair: Haida Liang, Nottingham Trent Univ. (United Kingdom)

Multiscale study of parchments and their degradation using nonlinear microscopy and AFM-IR (Invited Paper), Gailt Latour, Univ. Paris-Sud 11 (France); Laurianne Robinet, Museum national d’Histoire naturelle (France); Ariane Deniset-Besseau, Alexandre Dazzi, Univ. Paris-Sud 11 (France); Marie-Claire Schanne-Klein, Lab. d’Optique et Biosciences (France). ........................................ [9527-25]

Hyperspectral remote sensing techniques applied to the noninvasive investigation of mural paintings: a feasibility study carried out on a wall painting by Beato Angelico in Florence, Costanza Cucci, Marcello Piccillo, Istituto di Fisica Applicata Nelio Carrara (Italy); Leandro Chiarantini, Barbara Sereni, SELEX ES S.p.A. (Italy). ........................................ [9527-26]

Combination of topology and structural information for damages and deterioration analysis of artworks, Dominick Buchta, Univ. Stuttgart (Germany); Niclas Hein, Carolin Heinemann, Staatliche Akademie der Bildenden Künste Stuttgart (Germany); Giancarlo Pedrini, Univ. of Stuttgart (Germany); Christoph Krekel, Staatliche Akademie der Bildenden Künste Stuttgart (Germany); Wolfgang Osten, Univ. Stuttgart (Germany). ........................................ [9527-27]

Measuring environmental impact by real time laser differential displacement technique in simulated climate conditions, Eirini Bernikola, Vivi Tornari, Foundation for Research and Technology-Hellas (Greece); Nota Tsigarida, Ctr. for Research and Technology Hellas (Greece); Kostas Hatzigiaianakis, Foundation for Research and Technology-Hellas (Greece); Michalis Andrianakis, Ctr. for Research and Technology Hellas (Greece); Johanna Leissner, Fraunhofer ISC (Germany). ........................................ [9527-28]
**CONFERENCES 9528**

**Monday - Tuesday 22–23 June 2015 • Proceedings of SPIE Vol. 9528**

**Videometrics, Range Imaging, and Applications XIII**

Conference Chairs: Fabio Remondino, Fondazione Bruno Kessler (Italy); Mark R. Shortis, RMIT Univ. (Australia)

Programme Committee: Jean-Angelo Beraldin, National Research Council Canada (Canada); Jan Boehm, Univ. College London (United Kingdom); Werner Boesemann, AlCON 3D Systems GmbH (Germany); Simon Buckley, Ctr. for Integrated Petroleum Research (Norway); Takashi Fuse, The Univ. of Tokyo (Japan); Gabriele Guidi, Politecnico di Milano (Italy); Derek D. Lichti, Univ. of Calgary (Canada); Thomas Luhmann, Jade Hochschule (Germany); Hans-Gerd Maas, Technische Univ. Dresden (Germany); Jon P. Mills, Newcastle Univ. (United Kingdom); Norbert Pfeifer, Technische Univ. Wien (Austria); Stuart Robson, Univ. College London (United Kingdom); David Stoppa, Fondazione Bruno Kessler (Italy)

**MONDAY 22 JUNE**

**SESSION 1 .......................... MON 11:10 TO 12:50**

**Light Field Videometry: Point Cloud Analysis**

Session Chair: Fabio Remondino, Fondazione Bruno Kessler (Italy)

Light field-based videometry (Invited Paper), Bernd Jähne, Ruprecht-Karls-Univ. Heidelberg (Germany) ................ .......... [9528-1]

Light-field setup determination for high-accuracy depth estimation, Maximilian Diebold, Oliver Blum, Marcel Gutsche, Christoph S. Garbe, Harlyn Baker, Bernd Jähne, Heidelberg Collaboratory for Image Processing (Germany) ................................................ [9528-2]

Knowledge guided object detection and identification in 3D point clouds, Ashish Karmacharya, Frank Boocos, Burkhard Tietz, I3mainz (Germany) and Hochschule Mainz (Germany) ........................................... [9528-4]

Analysis of selected methods for TLS registration of architectonic objects, Irmina Kajdewicz, Jakub S. Markiewicz, Dorota Zawieska, Warsaw Univ. of Technology (Poland) .......................................................... [9528-5]

TBA

Lunch Break ........................... Mon 12:30 to 14:20

**SESSION 2 .......................... MON 14:20 TO 16:00**

**Structured Light and Fringe Analysis**

Session Chair: Takashi Fuse, The Univ. of Tokyo (Japan)

3D measurement with active triangulation for spectacle lens optimization and individualization, Peter C. Setz, Markus Tiemann, Rodenstock GmbH (Germany); Julia Gehmann, Hochschule für Angewandte Wissenschaften München (Germany) ........................ [9528-10]

Detection of defects in a transparent polymer with high resolution tomography using white light scanning interferometry and noise reduction, Audrey Leong-Hoi, Remy Claveau, Manuel Flury, Wilfried Uehring, Univ. de Strasbourg (France); Bruno Serio, Univ. Paris Ouest Nanterre La Defense (France); Paul C. Montgomery, Univ. de Strasbourg (France) .......................... [9528-11]

3D reconstruction with single image pairs and structured light projection for short-term ultra-high-speed applications, Christian Bräuer-Burchardt, Peter Kühnsmidt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Gunther Notni, Technische Univ. Ilmenau (Germany) .............................. [9528-12]

Handheld underwater 3D-sensor based on fringe projection technique, Christian Bräuer-Burchardt, Matthias Henze, Ingo Schmidt, Lichun Meng, Roland Ramm, Peter Kühnsmidt, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Gunther Notni, Technische Univ. Ilmenau (Germany) ........................ [9528-13]

Profilometry of discontinuous solids by means of co-phased demodulation of projected fringes with RGB encoding, Jose Moises Padilla, Manuel Servin, Guillermo Gamica, Ctr. de Investigaciones en Optica, A.C. (Mexico). (Invited Paper) ................................................................. [9528-14]

**SESSION 3 .......................... MON 16:30 TO 17:50**

**Calibration and Accuracy**

Session Chair: Mark R. Shortis, RMIT Univ. (Australia)

Development of orientation method with constraint conditions using vector data, Takashi Fuse, Keita Kamiya, The Univ. of Tokyo (Japan) .................... [9528-6]

Development, comparison and evaluation of software for radial distortion elimination, Alexandra I. Papadaki, Andreas Georgopoulos, National Technical Univ. of Athens (Greece) ........................................ [9528-7]

Relevance of the ellipse eccentricity for camera calibration, Waldemar Mordvinzew, Burkhard Tietz, Frank Booocs, Ilmainz (Germany) .......................... [9528-8]

Self-calibration of a structured light based scanner for use in archeological applications, Adam V. Jahraus, Derek D. Lichti, Peter Dawson, Univ. of Calgary (Canada) .................................................. [9528-9]

**TUESDAY 23 JUNE**

**SESSION 4 .......................... TUE 8:30 TO 10:10**

**Metrology Applications**

Session Chair: Mark R. Shortis, RMIT Univ. (Australia)

Optical metrology with low-cost camera systems for advanced manufacturing (Invited Paper), Stuart Robson, Univ. College London (United Kingdom) ........................................... [9528-15]

Assessment of the accuracy of 3D models obtained with DSLR camera and Kinect v2, Hélène Machier, Elise Lachat, Tania Landes, Pierre Grussenmeyer, Institut National des Sciences Appliquées de Strasbourg (France) ........................ [9528-16]

Dense image matching augmentation via vision metrology, Isabella Toschi, Fondazione Bruno Kessler (Italy); Mona Hess, Ben Sargeant, Lindsay W. MacDonald, Univ. College London (United Kingdom); Erica Nacerino, Fabio Menna, Fabio Remondino, Fondazione Bruno Kessler (Italy); Stuart Robson, Univ. College London (United Kingdom) ........................................... [9528-17]

Determining the coordinates of lamps in an illumination dome, Lindsay W. MacDonald, Univ. College London (United Kingdom); Ali H. Ahmadabadian, Univ. of Tehran (Iran, Islamic Republic of); Stuart Robson, Univ. College London (United Kingdom) ........................................... [9528-18]

**SESSION 5 .......................... TUE 10:30 TO 12:30**

**Image Sequences and Tracking: UAV Applications**

Session Chair: Thomas Luhmann, Jade Hochschule (Germany)

Real time tracking of deforming surfaces with color-depth cameras (Invited Paper), Reinhard Koch, Christian-Albrechts-Univ. zu Kiel (Germany). (Invited Paper) ............................................................. [9528-19]

Comparison between multi- and single-camera view videogrammetry for estimating 6DOF of a rigid body, Fabio Menna, Erica Nacerino, Fondazione Bruno Kessler (Italy); Salvatore Troisi, Univ. degli Studi di Napoli Parthenope (Italy) .................................................. [9528-20]


Investigating influence of UAV flight patterns in multi-stereo view DSM accuracy, Dimitrios P. Skarlatos, Marius Vlachos, Vasilieos F. Vamvakousis, Cyprus Univ. of Technology (Cyprus) .................................................. [9528-23]

TBA

Lunch Break ........................... Tue 12:30 to 14:10

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CONFERENCE 9528

SESSION 6  ............................. TUE 14:10 TO 15:30  Image Matching and Surface Models

Session Chair: Stuart Robson, Univ. College London (United Kingdom)

Multi-image semi-global matching in object space, Folkmar Bethmann, Thomas Luhrmann, Jade Hochschule (Germany) .................................................... [9528-24]

3D city models completion by fusing lidar and image data, Lazaros Grammatikopoulos, Ilia Kalisperakis, Elli Petsa, Technological Educational Institute of Athens (Greece); Christos Stentoumis, National Technical Univ. of Athens (Greece) .......................................................... [9528-25]

DTM generation from STC-SIMBIO-SYS images, Cristina Re, INAF - Osservatorio Astronomico di Padova (Italy); Emanuele E. S. Simon, CNR-Istituto di Fotonica e Nanotecnologie (Italy); Gabriele Cremonese, INAF - Osservatorio Astronomico di Padova (Italy); Vania Da Deppo, CNR-Istituto di Fotonica e Nanotecnologie (Italy) and INAF - Osservatorio Astronomico di Padova (Italy); Gianpietro Nalotto, Univ. degli Studi di Padova (Italy) and CNR-Istituto di Fotonica e Nanotecnologie (Italy) and INAF - Osservatorio Astronomico di Padova (Italy); Riccardo Roncetta, Gianfranco Forlani, Univ. degli Studi di Parma (Italy) .......................................................... [9528-26]

Stereo matching based on Census transformation of image gradients, Christos Stentoumis, National Technical Univ. of Athens (Greece); Lazaros Grammatikopoulos, Ilia Kalisperakis, Technological Educational Institute of Athens (Greece); George I. Karras, National Technical Univ. of Athens (Greece); Elli Petsa, Technological Educational Institute of Athens (Greece) .......................................................... [9528-27]

SESSION 7  ............................. TUE 16:00 TO 17:40  Range Imaging Modelling and Analysis

Session Chair: Fabio Remondino, Fondazione Bruno Kessler (Italy)

A comparison of single-plane versus three-plane methods for relative range error evaluation of medium-range 3D imaging systems, David K. MacKinnon, Luc Cournoyer, Jean-Angelo Beraldin, National Research Council Canada (Canada) .......................................................... [9528-28]

Extracting the MESA SR4000 calibrations, Sean A. Charleston, Adrian A. Dorrington, Lee Streeter, Michael J. Cree, The Univ. of Waikato (New Zealand) .................................................... [9528-29]

Noise squeezing in amplitude modulated continuous wave time-of-flight range imaging, Lee Streeter, Adrian A. Dorrington, The Univ. of Waikato (New Zealand) .......................................................... [9528-30]

Enhancing swimming-pool safety by the use of range imaging cameras, Dave Geerdyn, Sven Boulanger, Maarten Kuik, Vrije Univ. Brussel (Belgium) .......................................................... [9528-31]

Accurate 3D reconstruction of the top surface of a concrete beam subject to fatigue loading in laboratory conditions using multiple synchronized time-of-flight Cameras and a Terrestrial Laser Scanner, Herve D. Laharny, Derek D. Lichtl, Mamdouh El-Badry, Xiaojuan Qi, Ivan Detchev, Jeremy Steward, Mohammad Moravej, Univ. of Calgary (Canada) .......................................................... [9528-32]

POSTER SESSION  ...................... TUE 17:40 TO 18:30

Conference attendees are invited to attend the Optical Metrology Poster Session on Tuesday afternoon. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors: view poster presentation guidelines and set-up instructions on page 3, and at http://spie.org/x6511.xml. Posters will be available for viewing starting at 10:00 hrs on Tuesday through 12:00 hrs on Thursday.

Hand-eye calibration method based on Schur Decomposition, Jinbo Liu, National Univ. of Defense Technology (China) .......................................................... [9528-33]

Precise deformation measurement of prestressed concrete beam during a strain test using the combination of intersection photogrammetry and micro-network measurement, Rudolf Urban, Martin Stroner, Jaroslav Braun, Czech Technical Univ. in Prague (Czech Republic) .......................................................... [9528-34]

A simple and flexible calibration method of nonoverlapping camera rig, Guan B. Lei, Yang Shang, Qifeng Yu, Xiaohu Zhang, National Univ. of Defense Technology (China) .......................................................... [9528-35]

Performance of a 3D scanner based on structured light projection, Dalia N. Mahmoud, Abdallah M. Khalil, Mohammad A. Younes, Alexandria Univ. (Egypt) .......................................................... [9528-36]

The amplitude-phase correlation algorithm for stabilization video frames of capillary blood flow, Konstantin A. Karimov, Mikhail V. Volkov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .......................................................... [9528-37]

UAV video mosaic construction research based on SURF feature, Shaowen Ding, National Univ. of Defense Technology (China) .......................................................... [9528-38]

Efficient estimation of orthophoto image using visibility restriction, Hisaoki Miura, Aero Asahi Corp. (Japan); Hirofumi Chikatsu, Tokyo Denki Univ. (Japan) .......................................................... [9528-39]

Action cameras and low-cost aerial vehicles in archaeology, Martina Ballarin, Francesco Guerra, Caterina Baffetti, Univ. Iuav di Venezia (Italy) .......................................................... [9528-40]

Plenoptic camera with algorithm for food volume estimation, Yung Sung Lan, Chir-Wei Chang, Yen-Chang Wang, Industrial Technology Research Institute (Taiwan) .......................................................... [9528-41]

Improving depth estimation from a plenoptic camera by patterned illumination, Richard J. Marshall, Iain B. Styles, Chris J. Meah, The Univ. of Birmingham (United Kingdom); Massimo Turolla, City Univ. London (United Kingdom); Ela Ciergide, Kai Bongs, Alex P. G. Robinson, The Univ. of Birmingham (United Kingdom); Stephen Gruppetta, City Univ. London (United Kingdom) .......................................................... [9528-42]

Frequency-spatial cues based sea-surface salient target detection from UAV image, Xiaolang Sun, Xiaolin Liu, Qifeng Yu, Yan Liu, National Univ. of Defense Technology (China) .......................................................... [9528-43]
Monday - Wednesday 22-24 June 2015 • Proceedings of SPIE Vol. 9529

Optical Methods for Inspection, Characterization, and Imaging of Biomaterials II

Conference Chairs: Pietro Ferraro, Istituto di Cibernetica Edoardo Caianiello (Italy); Simonetta Grilli, Istituto Nazionale di Ottica (Italy); Monika Ritsch-Marte, Medizinische Univ. Innsbruck (Austria); David Stifter, Johannes Kepler Univ. Linz (Austria)

Programme Committee: Luigi Ambrosio, CNR (Italy); Jonathan M. Cooper, Univ. of Glasgow (United Kingdom); Diego di Bernardo, Telethon Institute of Genetics and Medicine (Italy); Alberto Diaspro, Istituto Italiano di Tecnologia (Italy); Frank Dubois, Univ. Libre de Bruxelles (Belgium); Wolfgang A. Ertmer, Leibniz Univ. Hannover (Germany); Roger Groves, Technische Univ. Delft (Netherlands); Jochen R. Guck, Technische Univ. Dresden (Germany); Theo Lasser, Ecole Polytechnique Federale de Lausanne (Switzerland); Fernando Mendoza Santoyo, Ctr. de Investigaciones en Optica, A.C. (Mexico); Luisa Miccio, Istituto Nazionale di Ottica (Italy); Serge Monneret, Institut Fresnel (France); Paolo A. Netti, Univ. degli Studi di Napoli Federico II (Italy); Fiorenzo Gabriele Omenetto, Tufts Univ. (United States); Pablo D. Ruiz, Loughborough Univ. (United Kingdom); David D. Sampson, The Univ. of Western Australia (Australia); Natan Tzvi Shaked, Tel Aviv Univ. (Israel); Claudia Tortiglione, Istituto di Cibernetica Edoardo Caianiello (Italy); Ruikang K. Wang, Univ. of Washington (United States); Zeev Zalevsky, Bar-Ilan Univ. (Israel)

MONDAY 22 JUNE

SESSION 1 ........................... MON 11:10 TO 13:10
Quantitative Phase Imaging
Continuous morphology and growth monitoring of different cell types in a single culture using quantitative phase microscopy, Björn Kemper, Jana Wibbeling, Lena Kast, Jürgen Schnenburger, Steffi Ketelhut, Westfälische Wilhelms-Univ. Münster (Germany). [9529-1]
Quantitative phase imaging by wide field lensless digital holographic microscope, Adamou Adinda-Ouaga, Ruhr-Univ. Bochum (Germany); Nektarios Koukounakis, Technische Univ. Dresden (Germany); Nils C. Gerhardt, Martin R. Hofmann, Behzad Kabir, Ruhr-Univ. Bochum (Germany). [9529-2]
Influence of sample preparation and reliability of automated numerical refocusing in stain-free analysis of dissected tissues with quantitative phase digital holographic microscopy, Björn Kemper, Westfälische Wilhelms-Univ. Münster (Germany); Philipp Lenz, Dornbirn Bettenworth, Westfälische Wilhelms-Univ. Münster (Germany). [9529-3]
Fourier Ptychography – Using computation to address physical optical challenges (Keynote Presentation), Changhuei Yang, California Institute of Technology (United States). [9529-4]
Spatial light interference microscopy (SLIM) for histopathology applications (Invited Paper), Gabriel Popescu, Univ. of Illinois at Urbana-Champaign (United States). [9529-5]
Lunch Break ............................. Mon 13:10 to 14:10

SESSION 2 ........................... MON 14:10 TO 16:10
Microscopy I
A new twist on light sheet imaging (Invited Paper), Kishan Dholakia, Univ. of St. Andrews (United Kingdom). [9529-10]
Optomechanical properties of cancer cells revealed by light-induced deformation and quantitative phase microscopy, Lena Kast, Björn Budde, Michael Isbach, Christina E. Rommel, Björn Kemper, Jürgen Schnenburger, Westfälische Wilhelms-Univ. Münster (Germany). [9529-11]
Monitoring cell morphology during necrosis and apoptosis by quantitative phase imaging (Invited Paper), Martina Mugnano, Alejandro Calabuig, Simonetta Grilli, Luisa Miccio, Pietro Ferraro, Consiglio Nazionale delle Ricerche (Italy). [9529-12]
Off-axis digital holographic microscopy by updating a regular upright microscope, Vicente Micó, Carlos Ferreira, Univ. de Valencia (Spain); Zeev Zalevsky, Bar-Ilan Univ. (Israel); Javier Garcia, Univ. de Valencia (Spain). [9529-13]
Multi-illumination Gabor holography recorded in a single camera snapshot for high-resolution phase retrieval in digital in-line holographic microscopy, Vicente Micó, Martin Sanz, Jose Angel Picazo-Bueno, Javier Garcia, Univ. de Valencia (Spain). [9529-14]

SESSION 3 ............................ MON 16:30 TO 18:00
Microscopy in Flow
Wavefronts matching: a novel paradigm for three-dimensional holographic particle tracking, Pasquale Memmolo, Istituto Italiano di Tecnologia (Italy); Luisa Miccio, Francesco Merola, Istituto di Cibernetica Edoardo Caianiello (Italy); Paolo A. Netti, Istituto Italiano di Tecnologia (Italy); Pietro Ferraro, Istituto di Cibernetica Edoardo Caianiello (Italy). [9529-6]
Cells characterization in microfluidic flows by small angle light scattering and 3D holographic technique, David Dannhauser, Istituto Italiano di Tecnologia (Italy); Pasquale Memmolo, Istituto Nazionale di Ottica (Italy) and Istituto Italiano di Tecnologia (Italy); Domenico Rossi, Istituto Italiano di Tecnologia (Italy); Francesco Merola, Luisa Miccio, Istituto Nazionale di Ottica (Italy); Filippo Causa, Univ. degli Studi di Napoli Federico II (Italy); Pietro Ferraro, Istituto Nazionale di Ottica (Italy); Paolo A. Netti, Univ. degli Studi di Napoli Federico II (Italy) and Istituto Italiano di Tecnologia (Italy). [9529-7]
Analysis of nanomaterial-cell interactions: flow cytometry and digital holographic microscopy, Jürgen Schnenburger, Jan Antunovic, Sarah Mues, Rainer Ossig, Björn Kemper, Westfälische Wilhelms-Univ. Münster (Germany). [9529-8]
Single image correlation for blood flow mapping in complex vessel networks (Invited Paper), Giuseppe Chirico, Laura Sironi, Univ. degli Studi di Milano-Bicocca (Italy); Margaux Bouzin, Univ. degli Studi di Milano Bicocca (Italy); Laura D’Alfonso, Maddalena Collini, Univ. degli Studi di Milano-Bicocca (Italy). [9529-9]

TUESDAY 23 JUNE

SESSION 4 ............................ TUE 8:50 TO 10:00
Quantitative Imaging
Digital holographic metrology of nonradiative transitions in oxygen molecules, Irina V. Semenova, Ioffe Physical-Technical Institute (Russian Federation); Andrey V. Belashov, Ioffe Physico-Technical Institute (Russian Federation); Oleg S. Vasyutinski, Ioffe Physical-Technical Institute (Russian Federation); and National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Nikolay V. Petrov, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); and Saint-Petersburg State Polytechnical Univ. (Russian Federation). [9529-15]
Extended field of view space-time digital holograms for lab-on-a-chip microfluidic imaging, Vittorio Bianco, Melania Paturzo, Valentina Marchesano, Pietro Ferraro, Istituto Nazionale di Ottica (Italy). [9529-16]
Imaging with multimode fibers (Keynote Presentation), Demetri Psaltis, Ecole Polytechnique Federale de Lausanne (Switzerland). [9529-17]

SESSION 5 ............................ TUE 10:30 TO 12:40
Bioinspired Biomimetics and Nanobiomaterials
Photonics-enhanced polymer lab-on-chips : from high-tech prototyping platform to applications (Invited Paper), Hugo Thiengo, Vrije Univ. Brussel (Belgium). [9529-18]
Red blood cell three-dimensional morphometry by quantitative phase microscopy, Luisa Miccio, Francesco Merola, Istituto di Cibernetica Edoardo Caianiello (Italy); Pasquale Memmolo, Istituto Italiano di Tecnologia (Italy); Oriella Gennari, Martina Mugnano, Istituto di Cibernetica Edoardo Caianiello (Italy); Paolo A. Netti, Istituto Italiano di Tecnologia (Italy); Pietro Ferraro, Istituto di Cibernetica Edoardo Caianiello (Italy). [9529-19]
Imaging and characterization of surface relief gratings on azopolymer by digital holographic microscopy, Alejandro Calabuig, Istituto di Cibernetica - CNR (Italy); Department of Mechanical and Industrial Production Engineering, University of Naples (Italy) and Center for Advanced Biomaterials for Health Care@CRIB, Istituto Italiano di Tecnologia (Italy) and Interdisciplinary Research Center on Biomaterials, University of Naples Federico II (Italy); Vito Piliglione, Istituto di Cibernetica - CNR (Italy); Silvia Piazzolla, Istituto Italiano di Tecnologia (Italy); Maurizio Ventre, Department of Chemical, Materials and Industrial Production Engineering, University of Naples (Italy) and Center for Advanced Biomaterials for Health Care@CRIB, Istituto Italiano di Tecnologia (Italy) and Interdisciplinary Research Center on Biomaterials, University of Naples Federico II (Italy); Simonetta Grilli, Istituto di Cibernetica - CNR (Italy); Paolo Antonio Netti, Center for Advanced Biomaterials for Health Care@CRIB, Istituto Italiano di Tecnologia (Italy) and Interdisciplinary Research Center on Biomaterials, University of Naples Federico II (Italy); Roger M. Groves, Technische Univ. Delft (Netherlands).  

Optical characterisation of complex structures, from engineering composites to biomaterials (Invited Paper), Roger M. Groves, Technische Univ. Delft (Netherlands).  


Lunch Break.  

SESSION 6  TUE 13:40 TO 15:30  
Micro- and Nanomanipulation of Biological Sample  

Three-axis digital holographic microscopy for high-speed volumetric imaging of swimming cells (Invited Paper), Roberto Di Leonardo, National Research Council of Italy (CNR) (Italy) and Dipartimento di Fisica, Sapienza Università di Roma (Italy); Silvio Bianchi, Alessio Frigerio, Dipartimento di Fisica, Sapienza Università di Roma (Italy).  

Investigation on cytoskeleton dynamics for non-adherent cells under point-like stimuli, Lisa Miccio, Istituto Nazionale di Ottica (Italy); Pasquale Mermolo, Istituto Nazionale di Ottica (Italy); Francesco Merola, Istituto Nazionale di Ottica (Italy); Martina Mognano, Antonio Paciello, Sabato Fisco, Istituto Nazionale di Ottica (Italy); Pietro Ferraro, Istituto di Cibernetica Eduardo Caiianiello (Italy); Paolo A. Netti, Istituto Italiano di Tecnologia (Italy).  

Photovoltaic tweezers an emergent tool for applications in nano- and biotechnology (Invited Paper), Mercedes Carrascosa, Angel Garcia-Cabañas, Mariano Juberba, Iris Elvira, Héctor Burgos, José L. Bello, Fernando Agulló-Barrera, Iker Casacuberta, Univ. de Gipuzcoa (Spain) and Ircm (France); Floriana Hörner, Shrin Landeworth, Cornelia Denz, Westfälische Wilhelms-Univers, Münster (Germany).  

Controlling self-propelled nanobiorobots by optical micromanipulation (Invited Paper), Angeline Barroso, Univ. Paris-Sud 11 (France); Florian Hörner, Shrin Landeworth, Cornelia Denz, Westfälische Wilhelms-Univers, Münster (Germany).  

SESSION 7  TUE 16:00 TO 18:20  
Microscopy II  

3D phase imaging with computational illumination (Invited Paper), Laura Wailer, Lee Tian, Zachary F. Phillips, Univ. of California, Berkeley (United States); Chenguang Ma, Univ. of California, Berkeley (United States) and Tsinghua Univ. (China); Zili Liu, Univ. of California, Berkeley (United States) and Univ. of Electronic Science and Technology of China (China).  

Computational imaging with phase-structured illumination: application in scattering (Invited Paper), Enrique Tajuaherce, Lluís Martínez-Leon, University Jaume I (Spain); Yutaka Morisaka, Nagoya University (Japan); Pere Clemente, Vicent Climent, Jesús Luncis, University Jaume I (Spain).  

Label-free coherent microscopy through blood by digital holography. Vittorio Blanco, Melania Paturzo, Francesco Merola, Lisa Miccio, Istituto Nazionale di Ottica (Italy); Pasquale Mermolo, Istituto Italiano di Tecnologia (Italy); Oriella Gennari, Pietro Ferraro, Istituto Nazionale di Ottica (Italy).  

Superresolution imaging system on innovative localization microscopy technique with commonly using dyes and CMOS camera, Yuni N. Zakhavor, N.I. Lobachevsky State Univ. of Nizhni Novgorod (Russian Federation) and Harvard Univ. (United States); Varvara V. Dudenkova, N.I. Lobachevsky State Univ. of Nizhni Novgorod (Russian Federation).  

Multiple angle of incidence, spectroscopic, plasmon-enhanced, internal reflection ellipsometry for the characterization of solid-liquid interface processes. Peter Petrik, Research Institute for Technical Physics and Materials Science (Hungary) and Univ. of Pannonia (Hungary); Emil Agocs, Benjamin Kalas, Peter Kozma, Research Institute for Technical Physics and Materials Science (Hungary); Balint Fodor, Judit Nador, Research Institute for Technical Physics and Materials Science (Hungary) and Univ. of Pécs (Hungary); Csaba Major, Research Institute for Technical Physics and Materials Science (Hungary); Miklos Fried, Research Institute for Technical Physics and Materials Science (Hungary) and Univ. of Pécs (Hungary).  

Measurement of nanofluids absorption coefficient by Moiré deflectometry technique, Khosro Madanipour, Amirkabir Univ. of Technology (Iran, Islamic Republic of); Ataollah Koochian, Univ. of Tehran (Iran, Islamic Republic of); Shahrzad Shahrahi Farahani, Amirkabir Univ. of Technology (Iran, Islamic Republic of).  

POSTER SESSION  TUE 18:30 TO 18:30  
Conference attendees are invited to attend the Optical Metrology Poster Session on Tuesday afternoon. Come view the posters, enjoy light refreshments, ask questions, and network with colleagues in your field. Authors of poster papers will be present to answer questions concerning their papers. Attendees are required to wear their conference registration badges to the poster sessions. Poster authors, view poster presentation guidelines and set-up instructions on page 3, and at http://spie.org/x6513.xml. Posters will be available for viewing starting at 10:00 hrs on Tuesday through 12:00 hrs on Thursday.  


Study of optical waveguide sensor using metamaterial as buffer layer with non-linear cladding and substrate, Anamika Kumari, Santosh Kumar, Dir. Govt. Res. Laboratories, Ludhiana (India); Sanjeev K. Rathi, Dept. of Physics, Indian School of Mines (India).  

Application of speckle dynamics for studies of cell metabolism, Alexander P. Vladimirov, Ural Federal Univ. (Russian Federation); Alexey Baharev, Research Institute of Viral Infections (Russian Federation); Alexander Maligin, Julia Mikhailova, Irina Novoselova, Dmitry I. Yakin, Ural Federal Univ. (Russian Federation).  

Dynamic speckle-interferometer for intracellular processes analyses at high optical magnification, Irina Novoselova, Ural Federal Univ. (Russian Federation); Alexey Baharev, Research Institute of Viral Infections (Russian Federation); Alexander Maligin, Dmitry I. Yakin, Ural Federal Univ. (Russian Federation); Alexey Dzhuzhin, Institute of Metal Physics (Russian Federation).  

Scheme parameter optimization of phase microscope with Michelson interferometer as the spatial light modulator, Olga A. Izoitova, N.G. Chernyshevskiy Saratov State Univ. (Russian Federation); Vladimir P. Ryabukho, N.G. Chernyshevskiy Saratov State Univ. (Russian Federation) and Institute of Precision Mechanics and Control (Russian Federation).  

Simple method of microorganism detection by using optical transmission and scattering techniques, Takeshi Ishiyama, Ayaka Takami, Toyohashi Univ. of Technology (Japan).  

Investigation of surface irregularities of laser-treated metallic biomaterials based on light scattering measurement, Sepehr Razl, Mahmoud Mollabashi, Ir. Iran. Inst. of Science and Technology (Iran, Islamic Republic of); Khosro Madanipour, Amirkabir Univ. of Technology (Iran, Islamic Republic of).  

Manual wavefront holoscopy for inspection and visualization of engraved marks in progressive addition lenses, Beatriz Peruchoto, José Angel Picazo-Bueno, Carlos Ferreira, Vicente Micó, Univ. de Valencia (Spain).  

Low-cost digital holographic microscopy using webcam sensor and laser pointer, Arun Anand, The Maharaja Sayajirao Univ. of Baroda (India); Prachi Shah, Sardar Vallabhbhai National Institute of Technology (India); Swapnil Mahajan, Vismay Trivedi, Vani K. Chhianwali, The Maharaja Sayajirao Univ. of Baroda (India); Bavah Javid, Univ. of Connecticut (United States).  

Design of rigid GRIN-endoscope with sapphire window and improved image quality, Anna Voznesenskaya, Alexey Bakhodin, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Grzegorz V. Fluder, Warsaw Univ. of Technology (Poland) and National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation).
SESSION 9 ........................... WED 16:00 TO 17:30


SESSION 10 .............................. WED 14:00 TO 15:30


SESSION 11 ........................... WED 16:00 TO 17:30


WEDNESDAY 24 JUNE

SESSION 8 ............................ WED 8:20 TO 10:00

Microscopy III
Dynamic speckle interferometry of intracellular processes: theory and features of application. Alexander P. Vladimirov, Ural Federal Univ. (Russian Federation) and Research Institute of Virus Infections (Russian Federation) .......................................................... [9529-33]

In situ quantitation of collagen fibrils diameter using absolute measurements of second harmonic generation signals, Stéphane Bancelin, Ecole Polytechnique (France) and Ctr. National de la Recherche Scientifique (France) and INSERM (France); Carole Aimé, UPMC Sorbonne Univ. (France) and Ctr. National de la Recherche Scientifique (France); Ivan Gusachenko, Ecole Polytechnique (France) and Ctr. National de la Recherche Scientifique (France) and INSERM (France); Thibaud Coradin, UPMC Sorbonne Univ. (France) and Univ. Pierre et Marie Curie (France) and Ctr. National de la Recherche Scientifique (France); Marie-Claire Scharne-Klein, Ecole Polytechnique (France) and Ctr. National de la Recherche Scientifique (France) and INSERM (France) ............................................. [9529-34]

Time domain diffuse optical spectroscopy: in-vivo quantification of collagen in breast tissue (Keynote Presentation). Paola Taroni, Antonio Pifferi, Giovanna Quarto, Andrea Farina, Politecnico di Milano (Italy); Francesca Ieva, Università degli Studi (Italy); Anna Maria Paganoni, Politecnico di Milano (Italy); Francesca Abbate, Enrico Cassano, European Institute of Oncology (Italy); Rinaldo Cubeddu, Politecnico di Milano (Italy) .......................................................... [9529-35]

Measuring the biological cell by means of 4D(x,y,z,t) super-resolved fluorescence microscopy (Invited Paper), Alberto Diaspro, Istituto Italiano di Tecnologia (Italy) and Department of Physics, University of Genoa (Italy) and Nikon Imaging Center, Istituto Italiano di Tecnologia (Italy); Paolo Bianchini, Francesca Cella Zanascia, Marti Ducastella, Istituto Italiano di Tecnologia (Italy); Lauretta Galeno, Nikon Imaging Center, Istituto Italiano di Tecnologia (Italy) and Istituto Italiano di Tecnologia (Italy); Luca Lanzanò, Colin J.R. Sheppard, Giuseppe Vicidomini, Istituto Italiano di Tecnologia (Italy) ................................................ [9529-36]

PLENARY SESSION .............. WED 10:30 TO 11:25

Extreme Computing Imagery:
Photography, Health-tech and Displays
Ramesh Raskar, MIT Media Lab., United States

SESSION 10 .............................. WED 14:00 TO 15:30

Optical Methods for Cell Characterization
Raman spectroscopy in the diagnosis of acute leukemia. Stefano Marangò, National Research Council (Italy); Anna Chiara De Luca, Carmen Valente, Consiglio Nazionale delle Ricerche (Italy); Peppino Mirabelli, Istituto di Ricerca Diagnostica e Nucleare ........................................ [9529-40]

Spermatozoa quality assessment: a combined holographic and Raman microscopy approach. Annalisa De Angelis, Maria Antonietta Ferrara, National Council of Research (Italy); Giuseppe Di Caprio, The Rowland Institute at Harvard (United States); Stefano Marangò, National Research Council (Italy); Luigi Sireto, Giuseppe Coppola, Anna Chiara De Luca, National Council of Research (Italy) .................................................. [9529-41]

Design and validation of a multimodal low-budget Raman microscope for liquid and solid phase applications. Hanna Koch, Kristina Noack, Stefan Will, Lehrstuhl für Technische Thermodynamik (Germany) and Erlangen Graduate School in Advanced Optical Technologies (Germany) ........................ [9529-42]

Multiscale mechanical characterization of biological materials (Invited Paper), Luciano Lambertini, Politecnico di Bari (Italy) ................................................ [9529-43]

SESSION 11 ........................... WED 16:00 TO 17:30

Sensing and Detection
Microgels for multiplex and direct fluorescence detection (Invited Paper), Filippo Causa, Univ. degli Studi di Napoli Federico II (Italy); Anna Alberti, Angela Cusano, Edomondo Battista, Istituto Italiano di Tecnologia (Italy); Paolo A. Netti, Univ. degli Studi di Napoli Federico II (Italy) .......................................................... [9529-44]

All optical indentation probe for endoscopic diagnosis of osteoarthritis. Gabriele Marchi, Michael Jost, Albrecht Steinkopf, Hochschule für Angewandte Wissenschaften München (Germany); Carina Prein, Hochschule für angewandte Wissenschaften (Germany); Attila Aszodi, Ludwig-Maximillians-Univers. München (Germany); Hauke Claußen-Schaumann, Johannes Rothls, Hochschule für Angewandte Wissenschaften München (Germany) ........................................ [9529-45]


Feasibility test of line sensors for optical tissue thickness estimation. Patrick Stueber, Tobias Wissel, Benjamin Wagner, Achim Schweikard, Floris Ernst, Univ. zu Lübeck (Germany) .......................................................... [9529-47]
CONFERENCE 9530
Wednesday 24–26 June 2015 • Proceedings of SPIE Vol. 9530

Automated Visual Inspection and Machine Vision

Conference Chairs: Jürgen Beyerer, Fraunhofer-Institut für Opttronik, Systemtechnik und Bildauswertung (Germany); Fernando Puente León, Karlsruher Institut für Technologie (Germany)

Programme Committee: Christian Frese, Fraunhofer-Institut für Opttronik, Systemtechnik und Bildauswertung (Germany); Andreas Heinrich, Hochschule Aalen (Germany); Michael Heizmann, Fraunhofer-Institut für Opttronik, Systemtechnik und Bildauswertung (Germany); Bernd Jähne, Ruprecht-Karls-Univ. Heidelberg (Germany); Thomas Länge, Fraunhofer-Institut für Opttronik, Systemtechnik und Bildauswertung (Germany); Markus Maurer, VITRONIC Dr.-Ing. Stein Bildverarbeitungssysteme GmbH (Germany); Wolfgang Osten, Univ. Stuttgart (Germany); Felix Salazar, Univ. Politécnica de Madrid (Spain); Robert Schmitt, Fraunhofer-Institut für Produktionstechnologie (Germany); Hugo Thiendonk, Vrije Univ. Brussel (Belgium); Stefan Werling, Fraunhofer-Institut für Opttronik, Systemtechnik und Bildauswertung (Germany); Ernst Wiedemann, ALMESS Products GmbH (Germany); Volker Willert, Technische Univ. Darmstadt (Germany)

TUESDAY 23 JUNE

POSTER SESSION .................................................. TUE 17:30 TO 18:30

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Modeling and analysis of the two-dimensional polystyrene aggregation process, Krzysztof Skorupski, Wroclaw Univ. of Technology (Poland); Imre Horváth, Maria Forrás Ferenc, Károly Bányai Institute (Hungary) .................................................. [9530-14]

Fast interference transformation with local binary patterns, Boris V. Vishnyakov, Vladimir S. Gorbatsevich, Sergey V. Sidyakin, Ivan K. Malin, GosNIIAS (Russian Federation) .................................................. [9530-19]

Algorithm for generation of panoramic images for omnidirectional cameras, Vasily P. Lazareno, Sergey V. Yarishiev, Valery V. Korotaev, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9530-20]

Automatic online laser resonator alignment based on phase correlation, Lühi Ditto, Peter Pfeilsticker, Ottmar Sauer, Fraunhofer-Institut für Technologie (Germany) .................................................. [9530-21]

The system for monitoring position of objects in space, Ivan Maruev, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9530-22]

A novel regularization method for optical flow-based head pose estimation, Sebastian Vater, Guillermo Mann, Fernando Puente León, Karlsruher Institut für Technologie (Germany) .................................................. [9530-23]

Accurate invariant pattern recognition for perspective camera model, Mariya G. Serikova, Anton V. Pantyushin, Vadim V. Zyuzyin, Valery V. Korotaev, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Joel J. P. C. Rodrigues, Instituto de Telecomunicações (Portugal) and National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9530-24]

Stereo sequences analysis for dynamic scene understanding in a driver assistance system, Boris V. Vishnyakov, Yury V. Vizilter, Vladimir A. Knyaz, Ivan K. Malin, Sergey Y. Zheltov, Oleg V. Vvygolov, GosNIIAS (Russian Federation) .................................................. [9530-25]

Image restoration using aberation taken by a Hartmann wavefront sensor on extended object, towards real-time deconvolution, Ahmad Darudi, Hadi Bakhshi, Reza Asgari, Univ. of Zanjan (Iran, Islamic Republic of) .................................................. [9530-26]

A FragTrack algorithm enhancement for total occlusion management in virtual object tracking, Francesco Adamo, Pier L. Mazzeo, Paolo Spagnolo, Cosimo Distante, Consiglio Nazionale delle Ricerche (Italy) .................................................. [9530-27]

WEDNESDAY 24 JUNE

SESSION 1 .......................................................... WED 8:10 TO 10:00

Measurement

Camera series and parallel networks for deformation measurements of large scale structures (Invited Paper), Qifeng Yu, National Univ. of Defense Technology (China) .................................................. [9530-1]

Extending critical emission measurement and optical microlithography with robust SEM image contours, Francois Weisbuch, GLOBALFOUNDRIES Dresden Module Two, Gmbh & Co. KG (Germany) .................................................. [9530-2]

Towards one trillion positions, Tobias Haist, Marc Gorne, Frederik Schaal, Duc Anh Bui, Christof Pruss, Wolfgang Osten, Institut für Technische Optik (Germany) .................................................. [9530-3]

Application of a reflectance model to the sensor planning system, Tomáš Koutecký, David Paloušek, Jan Brandejs, Bmo Univ. of Technology (Czech Republic) .................................................. [9530-4]

Application of vision measurement in aerodynamic testing combined with speckle correlation, Ding Chen, China Academy of Aerospace Aerodynamics (China) .................................................. [9530-5]

PLENARY SESSION ............... WED 10:30 TO 11:25

Extreme Computational Imaging: Photography, Health-tech and Displays

Ramesh Raskar, MIT Media Lab., United States

SESSION 2 .................................................. WED 11:30 TO 12:40

Multispectral Inspection

Research on the fusion methods of the multispectral optoelectronic systems images (Invited Paper), Aleksandr Z. Vasilev, Valery V. Korotaev, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9530-6]

A new indicator in early drought diagnosis of cucumber with chlorophyll fluorescence imaging, Heng Wang, Haifeng Li, Liang Xu, Xu Liu, Zhengliang Univ. (China) .................................................. [9530-7]

Simulation of multielement multispectral UV radiation source for optical-electronic system of mineral luminance analysis, Vladimir S. Peretiali, Artem A. Alekhin, Aleksandr N. Chertov, Elena V. Gorbunova, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9530-8]

Lunch Break .................................................. Wed 12:40 to 14:00

SESSION 3 .................................................. WED 14:00 TO 15:30

Optical Sorting

Spatial regularization for the unmixing of hyperspectral images (Invited Paper), Sebastian Bauer, Florian Neumann, Fernando Puente León, Karlsruher Institut für Technologie (Germany) .................................................. [9530-9]

Identification and sorting of regular textures according to their similarity, Pilar Hernandez Mesa, Johan Bosmans, Leonardo H. Spenne, Fernando Puente León, Karlsruher Institut für Technologie (Germany) .................................................. [9530-10]

New opportunities of Karelian feldspar enrichment by optical sorting, Aleksandr N. Chertov, Elena V. Gorbunova, Artem A. Alekhin, Valery V. Korotaev, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Lyubov S. Skamnitskaya, Tatiana P. Bubnova, Institute of Geology (Russia) .................................................. [9530-11]

The influence of the design features on optical sorter effectiveness, Nikita A. Pavlenko, Aleksandr N. Chertov, Valery V. Korotaev, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation) .................................................. [9530-12]

SESSION 4 .................................................. WED 16:00 TO 17:40

Inspection, Monitoring and Detection

Investigation into the use of smartphone as a machine vision device for engineering metrology and flaw detection, with focus on drilling, Vikram Razdan, Brunel Univ. (United Kingdom) .................................................. [9530-13]

Range imaging behind semitransparent surfaces by high-speed modulated light, Dave Geerardyn, Hans Ingelberts, Robin Deleener, Maarten Kuijk, Vrije Univ. Brussel (Belgium) .................................................. [9530-15]

Retroreflective microprismatic materials in image-based control applications, Mariya G. Serikova, Anton V. Pantyushin, Elena V. Gorbunova, National Research Univ. of Information Technologies, Mechanics and Optics (Russian Federation); Andrei G. Anisimov, Technische Univ. Delft (Netherlands) .................................................. [9530-16]

Object recognition in 3D point clouds with maximum likelihood estimation, Harshana G. Dantanarayana, Jonathan M. Huntley, Loughborough Univ. (United Kingdom) .................................................. [9530-17]

A study on automatic detection system of shaft part surface defect based on machine vision, Xiangyang Yao, Lixing Jiang, Zhengzhou Institute of Surveying and Mapping (China) .................................................. [9530-18]
REGISTRATION

Onsite Registration and Badge Pick-Up Hours
ICM Foyer West
Sunday 21 June 2015 ............................ 10:00 to 17:00 hrs.
Monday 22 June 2015 ............................ 7:30 to 17:00 hrs.
Tuesday 23 June 2015 ............................ 8:00 to 17:00 hrs.
Wednesday 24 June 2015 ........................ 8:30 to 17:00 hrs.
Thursday 25 June 2015 .......................... 8:30 to 16:00 hrs.

Conference Registration
Includes admission to all conference sessions, plenaries, panels, and poster sessions, admission to the World of Photonics Exhibition, Welcome Reception, coffee breaks, and a choice of publication. Student pricing does not include proceedings.

Exhibition Registration
Exhibition-Only visitor registration is complimentary.

Early Registration Pricing and Dates
Conference registration prices increase by €80 after 1 June 2015. The online form will automatically display the increased prices.

SPIE Member, SPIE Student Member, and Student Pricing
• SPIE Members receive conference registration discounts. Discounts are applied at the time of registration.
• 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.

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ICM Foyer West
Open during registration hours

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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.

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Preregistered attendees who did not receive a receipt or attendees who need a Certificate of Attendance may obtain those from the SPIE Cashier.

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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.

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There is a €40 service charge for processing refunds. Requests for refunds must be received by 10 June 2015; all registration fees will be forfeited after this date. Membership dues, SPIE Digital Library subscriptions, or Special Events purchased are not refundable.

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AUTHOR/PRESENTER INFORMATION

Speaker Check-In and Preview Station
ICM Foyer
Monday through Thursday .......................... Open during registration hours

Poster Setup Instructions
Tuesday 25 June 2015 .............................. 17:20 to 18:30
Wednesday 24 June ................................. 11:30 to 12:30

All conference rooms have a computer workstation, projector, screen, lapel microphone, and laser pointer. All presenters are requested to come to their conference room during the breaks with their memory devices or laptops to confirm their presentation display settings.

Poster Session. Poster authors should be at their papers on Monday and Tuesday in the Conference Area and present them during Tuesday and Wednesday Poster Sessions. Any papers left on the boards following 12:00 hrs on Thursday 25 June will be considered unwanted and will be discarded.

SPIE assumes no responsibility for posters left up after the end of the Poster Session. Poster authors should be at their posters on Monday and Wednesday to answer questions from attendees. For specific times, please see the individual conference programs. Attendees are requested to wear their conference registration badges to the poster sessions.

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Coffee Breaks
ICM Foyers / Novotel Foyer
Complimentary coffee will be served twice daily, in the Conference Foyer Areas at the times indicated in the programme. Please refer to the individual conference programmes for timings for coffee and lunch breaks.

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The ICM has three permanent food-service operations in the foyer area – the ICM Bistro, ICM Bar and ICM Café where guests can purchase food. There is also the “Am See” restaurant, located on the 1st floor above the registration area of the ICM. Lunch at the Novotel is also available to those who are not staying at the hotel.

There are also a number of bars and restaurants located in the “Riem Arkaden” shopping centre on the other side of the underground station for the ICM, “Messestadt West”.  

GENERAL INFORMATION

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GENERAL INFORMATION

ONSITE SERVICES

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Complimentary Internet will be available. Connection speeds will depend on the number of users. Please read the SPIE Wireless Internet Service Policy.

SPIE Conference App
Download the free SPIE Conference App, available for iPhone and Android phones. Search and browse the programme, special events, participants, exhibitors, and more.

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The Business Centre
ICM Foyer
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Use this service to print your boarding pass at a charge.

HOTELS

For information about hotel bookings, please use the World of Photonics hotel booking service. Check the website for more information: http://www.photonics-congress.com/travel-stay/accommodations-stay/accommodations/.

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Call the Hertz International Reservation Center at 1-800-654-3001 in the USA or your local Hertz Reservations Center to receive a special discount for SPIE. Reservations may also be placed on-line at www.hertz.com. You will receive 15% off qualifying Affordable rates at participating locations in Munich.

Be sure to identify yourself as a SPIE attendee. The PC#137480 must be on your advance reservation to receive this special offer. You must present this coupon at the time of rental in order to receive this discount. This special offer is available for rentals from June 15-30, 2015.

TRAVEL

About Munich
Munich, “the city with a heart,” is the capital of Bavaria, and has established itself as Germany’s high-tech hub (Silicon Bavaria) and is one of the most important industrial and economic centers in the European community. It boasts of such high-tech corporations as BMW and Daimler-Chrysler Aerospace. In addition to being the country’s leading university center and hub for insurance, banking, electronic, and mechanical engineering, Munich offers its visitors shopping, music, art, gourmet restaurants, beer gardens, outdoor cafés, ethnic restaurants, popular night-spots, grand cathedrals, and opulent palaces. For more information on Munich and the surrounding area, please refer to the official website for the city of Munich.

Airport Information
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Transportation from the Airport
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Cross-Country Bus Transport
National cross-country bus services have operated in Germany since 2013. For more information on routes and tariffs, visit www.FlixBus.com.

Shuttles, Public Transportation & How to reach the Internationales Congress Center Munich
At Munich Central Station take the underground U2. The journey to the trade fair grounds takes about 17 minutes. http://www.messe-muenchen.de/en/meta/anreise/anreise_2_contentmaster.php.

Driving Directions and Parking

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Passport and Visa: Nationals of all Western European countries can visit the Federal Republic of Germany without a visa; US, Canadian, and Australian passport holders can stay up to 90 days without a visa. For additional details and specific visa requirements, please visit the German Foreign Office website or contact the German Embassy in your country.

NOTE: We recommend that you secure your travel visa before registering for the conference as cancellations after the preregistration cutoff may result in a cancellation fee.

Visa service for the World of Photonics Congress/Optical Metrology speakers:
You can request a visa invitation letter for the World of Photonics Congress 2015 online.

HOTELS

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Full paid registration includes your choice of Proceedings of SPIE (excluding student registrations). See the attached list for product order numbers for proceedings options from this meeting. You will need a product order number when you make your proceedings choice on the registration form.

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- **Printed Proceedings Volume**—a printed book of a single proceedings volume. Available 6 weeks after the meeting.
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- Go to [https://spiedigitallibrary.org](https://spiedigitallibrary.org) and sign in with your SPIE account credentials. If you do not have an SPIE account, create one using the email address you used to register for the conference.
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