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Technologies
• Optical Design and Systems Engineering
• Photonic Devices and Applications
• Optics and Photonics for Sustainable Energy
• X-Ray, Gamma-Ray, and Particle Technologies
• Remote Sensing
• Atmospheric and Space Optical Systems

Special Program
• Optics Education and Outreach
• Key Lessons Learned
• Light in Nature

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**Program Chair:** José Sasián, College of Optical Sciences, The Univ. of Arizona (USA)

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**Program Chair:** Ruyan Guo, The Univ. of Texas at San Antonio (USA)

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Critical Dates

ABSTRACT DUE DATE
7 February 2018

AUTHOR NOTIFICATION
The contact author will be notified of abstract acceptance by email no later than 16 April 2018

MANUSCRIPT DUE DATE FOR ON-SITE PROCEEDINGS
27 June 2018 (conference OP312 only)

MANUSCRIPT DUE DATE
25 July 2018 (except conference OP312)

Please Note: Submissions imply the intent of at least one author to register, attend the symposium, present the paper as scheduled, where it is an oral or poster presentation, and submit a full manuscript by the deadline.
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Christian Morawe, ESRF - The European Synchrotron (France)

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We welcome your participation in the 2018 conference for Optical Engineering + Applications.

• Join your colleagues, share ideas
• Network with leaders in the field
• See applications of the future

This is a unique opportunity to share your research and build international recognition for your work.

CALL FOR PAPERS
The optics industry has seen many advances in technology and applications. Continued innovation and discovery is dependent on a stream of new researchers, engineers and technicians educated in optics. The optics community needs to play a role in understanding how these new knowledge workers are trained. As individuals, we can contribute to this process by sharing our passion for science with students of all ages.

Optical Education and Outreach brings to the optical community a forum to discuss, learn, and network for trends in education and enrichment. The conference is crafted to convey to the community a snapshot of the current state of primary and secondary education in the field of optics. It also brings together individuals working outside the formal educational community who inspire youth to pursue the study of science and optics.

The conference recognizes the roles of formal and informal education. Formal education comprises optics education at universities, colleges, community colleges, through accreditation, lifelong learning, optics in K12 curricula, assessment tools, pedagogy and didactic methodology. Informal education includes outreach activities of student chapters, optical societies, companies and individuals. Reports from all areas of formal and informal education are welcome. This conference will invite science and technology instructors to join the conversation to share their experiences and needs.

A special focus of this year’s conference is the reporting on events associated with the first International Day of Light. This annual day of celebration continues the efforts begun with the International Year of Light (IYL2015). Submissions on programs initiated or continued are encouraged.

Focus areas for paper submissions:
• International Day of Light 2017 programs encouraging youth pursuit of optics and science
• optics education at universities and community colleges
• programs focused on technicians
• optics and science enrichment programs for K-12
• science awareness programs for general audiences, from parents to government officials
• progress reports on NSF, Photonics 2020 and other international governmentally funded education initiatives
• outreach activities of student chapters, local optical societies and members
• research in active learning, problem based learning and pedagogy
• collaboration between industry, academia and government
• programs in innovation and entrepreneurship
• progress on accreditation, standards and certification
• assessment tools to measure learning outcomes, especially for informal education.
AN OPTICAL BELIEVE IT OR NOT: KEY LESSONS LEARNED V (OP302)

Conference Chairs: Mark A. Kahan, Synopsys, Inc. (USA)

Program Committee: George Z. Angeli, GMTO Corp. (USA); Paul Atcheson, Patchwork Optical Consulting (USA); Steven J. Battel, Battel Engineering, Inc. (USA); Robert P. Breault, Breault Research Organization, Inc. (USA); James T. Carnevale, Raytheon Co. (USA); William J. Cassarly, Synopsys, Inc. (USA); Daniel R. Coulter, Jet Propulsion Lab. (USA); Charles D. Cox, UTC Aerospace Systems (USA); Marc T. Daigle, Optikos Corp. (USA); Alan E. DeCew Jr., MIT Lincoln Lab. (USA); Ronald G. Driggers, St. Johns Optical Systems (USA); Mark A. Ealey, Multiantix LLC (USA); David F. Everett, NASA Goddard Space Flight Ctr. (USA); James L. Fanson, GMTO Corp. (USA); G. Groot Gregory, Synopsys, Inc. (USA); Alson E. Hatheway, Alson E. Hatheway Inc. (USA); Joseph B. Houston Jr., Houston Research Associates (USA); Tony Hull, The Univ. of New Mexico (USA); Gary W. Matthews, Telescope Technologies LLC (USA); Catherine D. Merrill, The Univ. of Arizona (USA); Duncan T. Moore, Univ. of Rochester (USA); Harold Schall, The Boeing Co. (USA); Robert R. Shannon, College of Optical Sciences, The Univ. of Arizona (USA); Michael J. Sholl, Space Exploration Technologies Corp. (USA); H. Philip Stahl, NASA Marshall Space Flight Ctr. (USA); David A. Thomas, GMTO Corp. (USA); Linda C. Usher, Linda Usher Management Consultants (USA); James C. Wyant, College of Optical Sciences, The Univ. of Arizona (USA)

This conference is dedicated to the sharing of key optical lessons learned. Nearly all optical engineers, scientists, researchers, or managers have dealt with the unexpected. Many of these situations in hindsight are quite funny, and have buried within them key optical/managerial lessons learned. The problem with simply listing lesson learned is that as a simple listing, they are clearly hard to remember. Thus, history repeats itself much to our collective debit. This conference will help us all remember the important take-aways by presenting a collection of small stories, optical parables, and/or panel discussions. Each may involve embellishment by the authors (within editorial limits), and names, places, and dates may be changed to protect the guilty. However, all must (a) have a basis in truth as avowed by the authors (Devil’s Advocated if/as apropos), and (b) each must wind up with at least one, if not more than one, lesson learned that has serious optical/managerial content. Papers are specifically requested on past, current and/or evolving optically-related systems that:

• have been subject to surprises, anomalies, and/or unanticipated business factors which, in hindsight, are funny and/or which have a key project lesson-learned/take-away
• where (optically related) specifications and/or the assessment and management of risk went terribly wrong
• any aspect of the build-cycle may be included be it in conceptualization, design, development, fabrication (any somewhat optically related process), test, or end-use
• accidental successes and tragic mishaps
• any technical discipline may be included if/as it ties to optics and lessons learned, e.g. optical systems engineering, optical engineering/design, optomechanics, thermo-optics, coatings, stray light, electro-optics/detectors, optical-physics, etc.
• any managerial aspect may be included, e.g. program management, staffing, scheduling, costs/costing, and patent/legal/ethical issues
• any personnel problem may be included if/as it relates to an optical/managerial truth (this can include training or the lack thereof).

Of special interest are stories where, despite any humor, the optically and managerially related lessons learned are serious and will help to form a body of knowledge that can be used, as an evolving check-list for other ongoing or future optically-related adventures:

• any optically related piece-parts may be included, from raw materials to heat treats to coatings, to mechanisms, etc...
• any optical environment is acceptable, e.g. from underwater to outer-space to child-proof toys to shot-from-a-gun
• any size is acceptable, e.g. from nano, MEMS, to deployable multi-meter optics
• inter-company relationships and/or relationships with clients, suppliers, and or vendors can be included - if you dare, and you can sanitize your text to avoid liable (and as long as there is a key optically/managerially related take-away, though these may be in a business-based sense)
• management, legal, ethical and/or programmatic factors are especially encouraged, be they related to staffing, budgeting, costs, and assessing risks, to contending with launch delays, to name but a few of the aspects worth discussing.
In the field of optical science and engineering there are many aspects of light we take for granted; yet, do we truly understand and appreciate the nature of light in the world around us? In the natural world there are many fascinating and beautiful effects involving optics. Most of the time we take these effects for granted. Each day optical scientists and engineers discover more about the natural world when we see how new technologies such as photonic crystals mimic the natural world. Photonic crystal-like structures in peacock feathers give the plumes their color. Similar structures in butterfly wing scales provide their iridescent colors. Beyond these structures there are effects in the natural world such as the aurora borealis or things as everyday as rainbows and oil slicks. Polarization and color effects brighten up our world. When we look more closely we notice that plants glow and self-bioluminescence provides information about the state of health of organisms. We may even wonder why it is that parrots have a visual response much further into the ultraviolet than we do.

As optical scientists and engineers, most of us became fascinated with light at some point in our lives. We observe things in our everyday life that we don’t often explore or think about, yet there are researchers who spend their careers looking at these effects in nature. This conference invites papers having to do with light in the natural world and research involving practical and experimental aspects of optics in nature:

- the nature of light
- how to describe light in nature
- how to use light in nature
- optics in nature
- color in nature
- vision in nature
- bio-inspired optics
- atmospheric optics
- mechanisms behind beautiful effects in nature
- color effects
- polarization effects
- visual response in the natural world
- unusual means of creating and detecting light - such as sonoluminescence
- information transfer in the natural world via light and photons
- photonic crystal-like and similar structures in nature
- light in art and media
- light in biological systems
- self-bioluminescence and biophotonic effects in plants, insects, and animals
- do organisms communicate with light?
- what can we learn from the interaction of light in nature on all scales? - from the macro to the nano?
- what is present in the dark? - astronomical topics such as dark energy? dark matter?

We look forward to an opportunity to investigate these questions in a forum uniting all optical scientists and engineers.

Critical Dates

ABSTRACT DUE DATE
7 February 2018

AUTHOR NOTIFICATION
The contact author will be notified of abstract acceptance by email no later than 16 April 2018

MANUSCRIPT DUE DATE FOR ON-SITE PROCEEDINGS
27 June 2018 (conference OP312 only)

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25 July 2018 (except conference OP312)

Please Note: Submissions imply the intent of at least one author to register, attend the symposium, present the paper as scheduled, where it is an oral or poster presentation, and submit a full manuscript by the deadline.
OPTICAL MANUFACTURING AND TESTING XII (OP304)

Conference Chairs: Ray Williamson, Ray Williamson Consulting (USA); Dae Wook Kim, College of Optical Sciences, The Univ. of Arizona (USA); Rolf Rascher, Hochschule Deggendorf (Germany)

Program Committee: Haobo Cheng, Tsinghua Univ. (China); Olaf Dambon, Fraunhofer-Institut für Produktionstechnologie (Germany); Peter J. de Groot, Zygo Corporation (USA); Jessica Nelson, Optimax Systems, Inc. (USA); Oliver W. Fähnle, FISBA AG (Switzerland); Richard R. Freeman, Zeeko Ltd. (United Kingdom); Roland Geyl, Safran Reosc (France); John E. Greivenkamp, College of Optical Sciences, The Univ. of Arizona (USA); Stephen E. Kendrick, Kendrick Aerospace Consulting LLC (USA); Sugwhan Kim, Yonsei Univ. (Korea, Republic of); Sven R. Kiontke, asphericon GmbH (Germany); Gary W. Matthews, Telescope Technologies (USA); Robert E. Parks, Optical Perspectives Group, LLC (USA); Joseph L. Robichaud, L3 Technologies, Inc. (USA); Joanna Schmit, 4D Technology Corp. (USA); Sven Schröder, Fraunhofer-Institut für Angewandte Optik und Feinmechanik (Germany); Shai N. Shafrir, Harris Corp. (USA); Tayyab I. Suratwala, Lawrence Livermore National Lab. (USA); Flemming Tinker, Aperture Optical Sciences Inc. (USA); Martin J. Valente, Arizona Optical Systems, LLC (USA); David D. Walker, Univ. of Huddersfield (United Kingdom); Konrad Wegener, ETH Zürich (Switzerland); Christine Wünsche, Hochschule Deggendorf (Germany); Takashi Yatsui, Institute of Industrial Science, The Univ. of Tokyo (Japan); Xue-jun Zhang, Changchun Institute of Optics, Fine Mechanics and Physics (China)

This conference is dedicated to the technologies for manufacturing and testing optical surfaces and components. Papers should show developments in processes, technologies, or equipment used for optical fabrication or measurement. Contributions that share lessons learned from recent projects are particularly desired.

Papers are specifically requested on:

CURRENT AND FUTURE APPLICATION REQUIREMENTS
- optics for lithography
- space and cryogenic optics
- freeform, steep, and conformal optics
- telescopes and large optics
- light-weight and flexible substrates
- deformable and active mirrors
- micro-optics
- high-power optics
- x-ray and synchrotron optics
- polarization optics.

ADVANCES IN MANUFACTURING MATERIALS, ABRASIVES, TOOLS, MACHINES, AND PROCESSES
- new materials for optics
- computer controlled processes, CCOS-computer controlled optical surfacing
- diamond turning
- ion/plasma/water-jet removal
- precision machining of optics
- mass production of optical components and systems grinding and polishing
- molding for glass or plastic, from mass production to high precision
- technologies for replicating optical surfaces
- additive manufacturing, 3D printing and material deposition
- coating
- assembling optical systems
- optical contacting/advanced bond methods
- advanced surfacing and finishing technologies
- IoT in optics production.

NEW DEVELOPMENTS AND TOPICS IN OPTICAL TESTING OF FIGURE/WAVEFRONT AND FINISH
- applied interferometry, holography, and speckle
- applications: phase-measuring, spatial heterodyne, and static fringe analysis
- absolute calibration: flats, spheres, windows, etc.
- measurement of aspheres
- diffractive null correctors
- geometric-ray tests
- wavefront sensors
- MTF and encircled energy
- figure, ripple, and roughness - power spectral density
- mid-spatial-frequency errors on surfaces: detection, characterization, effects, and mitigation
- high spatial resolution methods
- testing in adverse environments: vibration, atmosphere, cryogenic, vacuum, etc.
- subsurface damage: detection, characterization, effects, and mitigation
- surface profilometry: optical and scanning probe
- scatter and BRDF.
This conference is dedicated to the modeling of imaging and non-imaging optical systems and associated test-equipment and related predictions of performance over a broad range of active and passive optical systems and engineering disciplines. Unclassified papers are solicited from nano-scale systems through to components such as special fiber-optics, gratings, holographic systems, light sources and detectors, and on to large deployable telescopes. Environmental factors can range from HEL through cryogenic, configurations can span use in the laboratory to underwater and outer-space, and wavelengths can range from x-rays to THz, and on through micro and mm waves.

Papers and/or suggested panel discussions are specifically requested on current and evolving analytical techniques that address:

**OPTICAL MODELS, METHODS, AND PERFORMANCE ESTIMATES**

- geometrical and physical optics
- diffractive optics and holographic systems
- beam propagation
- metamaterials (including negative index, photonic crystals, cloaking)
- plasmonics and evanescent waves, thermal phonons, and topolaritons
- polarization
- adaptive optics
- radiometry
- fiber-optics and photonics
- interferometers and nullers
- image doubling
- illumination (including lasers, LEDs, OLEDs, solar)
- MTF, PSF, and EE
- stray light/ghosts and narcissus; contamination consequences and control
- quantum dots
- optimization
- phase/prescription retrieval
- tolerancing and probabilistic design.

**ELECTRO-OPTICAL MODELS INCLUDING RELATING FACTORS**

- detector quantum efficiency and rapid read-outs
- charge diffusion
- EMI/EMC influences on E-O performance.

**OPTICAL COATING PERFORMANCE**

- filters
- laser damage resistance.

**MEMS AND MOEMS**

- electrostatics; Casimir forces
- structures.

**STRUCTURAL AND OPTOMECHANICAL MODELING**

- ultra-lightweight optics, nano-laminates, membrane mirrors
- mounting stresses, G-Release, and/or launch and deployment
- high impact/shock and pressure loadings
- influence functions
- vibration and damping
- closely-coupled dynamic structure-controls-optics simulations
- micro-dynamics and influences of piece-part inertia; friction/stiction; pinning
- mechanical influences such as scanning deformations and special zoom/servo effects
- thermo-elastic effects
- stress birefringence
- fracture mechanics, micro-yield, and lifetime estimates
- proof testing models
- aspects such as lay-up anisotropy and material inhomogeneity/anisotropy
- nodal accuracy; meshing.
THERMAL AND THERMO-OPTICAL MODELING
• effects of energy absorption with depth in transmissive elements; heat flow within mirrors
• thermal run-away in IR elements
• aircraft/UAV/instrument windows, missiles, and domes; inspection tie-ins
• solar loading
• cryogenics, cooling electronics
• thermo-optical material characterizations over new wavelengths and/or temperatures
• system sterilization
• hole drilling, welding, and laser heat treating
• HEL effects including survivability and hardening
• recursive models where thermo-elastic changes in-turn impact heating
• effects of joint resistance on conduction changes; mounting to a S/C-deck
• effects on LEDs
• meshing.

INTEGRATED MODELS
• closely coupled thermal-structural-optical models
• optical control systems
• global optimizers
• acquisition, pointing, and tracking
• end-to-end simulations.

SPACE-BORNE (AND/OR MICROLITHOGRAPHIC/MEDICAL) CONTAMINATION, AND RADIATIVE FACTORS
• contamination control (especially for UV systems and large optics)
• particulate/NVR models
• photopolymerization
• radiative damage, atomic O2
• spacecraft charging
• micro-meteoroid modeling, including spalling.

AERO-OPTICS
• boundary layer and shock wave effects
• convective effects and air-path conditioning/self-induced turbulence.

MODELING OF VISION SYSTEMS
• HUDs
• HMDs.

APPLICATION-SPECIFIC UNIQUE OPTICAL MODELS AND PERFORMANCE PREDICTIONS
• adaptive optics
• bio and medical optics/sensing, vision
• hyperspectral imaging; spectroscopy
• image processing
• lasers/laser communication systems
• LEDs/solid state lighting
• machine vision
• MEMs/nano technology
• existing/evolving photonic devices and systems
• photonic devices
• solar technology.

OTHER
• cost models
• phenomenology
• reliability
• reticles: design and fabrication; performance
• rules of thumb and scale factors of use to individual disciplines
• shutters: design and fabrication; performance
• weight, power, cost, and schedule models for electro-optical systems.

Of special interest are new methods of analysis, and contributions to a body of work that will help provide various model “anchors” and parametric relationships that correlate results with predictions.
LASER BEAM SHAPING XVIII (OP306)

Conference Chairs: Angela Dudley, CSIR National Laser Ctr. (South Africa), Univ. of the Witwatersrand (South Africa); Alexander V. Laskin, AdiOptica Optical Systems GmbH (Germany)

Program Committee: Fred M. Dickey, FMD Consulting LLC (USA); Andrew Forbes, Univ. of the Witwatersrand (South Africa); Patrick Gretzki, Fraunhofer-Institut für Lasertechnik (Germany); Raul I. Hernandez-Aranda, Tecnológico de Monterrey (Mexico); Alexis V. Kudryashov, Active Optics Night N Ltd. (Russian Federation); Todd E. Lizotte, BOLD Laser Automation, Inc. (USA); Daryl Preece, Univ. of California, San Diego (USA); Gediminas Račiukaitis, Ctr. for Physical Sciences and Technology (Lithuania)

Many scientific experiments and industrial and medical applications require the shaping of the spatial and temporal profiles of laser beams. The previous Laser Beam Shaping conferences have been excellent venues to integrate the various facets of beam shaping theory, design, and application. Interest in laser beam shaping techniques and applications continues to grow.

The purpose of this conference is to continue to provide a forum for the interaction of engineers and scientists interested in the various aspects of laser beam shaping. Papers on all forms of laser beam shaping theory, design, and application are solicited. Papers presenting data on proven systems and real application examples are especially encouraged. In addition, the conference will consider papers involving the shaping of the radiation patterns of non-laser sources.

General laser beam shaping topics include, but are not limited to:

**THEORY AND DESIGN**
- Geometric and physical optics, geometrical beam shapes, vector diffraction theory, vortex and vector beams, optical orbital angular momentum, non-diffracting fields, structured light, mathematical & computational techniques, optimization-based design, intra-cavity beam shaping, diffractive and refractive beam shaping, multi-spot beam shaping, broadband beam shaping, pulse compression and pulse chirping, spatial and temporal beam profile shaping of short pulses, acousto-optics, spatial and temporal beam shaping, stokes polarimetry, beam shaping methods of image enhancement, interference lithography and high power beam shaping.

**FABRICATION AND TESTING**
- Refractive, diffractive, reflective and hybrid elements, digital holography, Spatial Light Modulators (SLMs), MOEMS and MEMS, grayscale lithography, thin film optics, and chemical etching technologies.

Application topics for laser beam shaping include but are not limited to:

**INDUSTRIAL AND COMMERCIAL APPLICATIONS**
- Material processing, high power beam shaping involving fiber coupled multimode lasers, laser displays, illumination applications, surface modification, microscopy, interferometry, holography, optical data storage, fiber injection systems, single and multimode fibers, photonic crystal fibers, and lidar.

**MICRO-OPTICS AND MICRO MANIPULATION APPLICATIONS**
- Beam shaping achieved via MOEMS/MEMS, and beam shaping applications in optical tweezing and trapping.

**MILITARY APPLICATIONS**
- Laser ranging, laser targeting, laser weapons and laser counter measurements (dazzling).

**MEDICAL AND BIOMEDICAL APPLICATIONS**
- Dermatology, surgery, opthalmology, fiber optic delivery methods, photodynamic therapy, dentistry, UV sterilization, and industrial and biomedical sterilization.

**QUANTUM OPTICS APPLICATIONS**
- Beam shaping applied in quantum optics such as quantum key distribution (QKD), quantum walks, ghost imaging, hyper-entanglement and higher-dimensional entanglement systems.

**OPTICAL COMMUNICATION APPLICATIONS**
- Beam shaping applied in laser communications and sensors/ detection techniques and applications, spatial division multiplexing and de-multiplexing, high-bandwidth communication, free-space and fiber based communication systems.

**ADAPTIVE OPTICS APPLICATIONS**
- Adaptive optics, SLMs, acousto-optical modulators, computer generated holograms, liquid lens technology, and propagation through turbulence.
POLYMER OPTICS AND MOLDED GLASS OPTICS: DESIGN, FABRICATION, AND MATERIALS 2018 (OP307)

Conference Chairs: David H. Krevor, SlipChip Inc. (USA); Michael P. Schaub, Oculus VR, LLC (USA); Alan Symmons, LightPath Technologies, Inc. (USA)

Program Committee: William Beich, GS Plastic Optics (USA); Nelson E. Claytor, Fresnel Technologies Inc. (USA); Ulf Geyer, Auer Lighting GmbH (Germany); Guido Pongs, Aixtooling GmbH (Germany)

This conference will address three areas:
- polymer optics (all areas: design, materials, performance, manufacture, etc.)
- molded glass optics
- design and manufacturing discriminators between plastic and glass optical systems.

Papers involving any of these areas will be considered for presentation.

Polymer optics can be found in many aspects of our daily lives. Modern applications are vast and include camera phones, near-to-eye displays, microprojection, panoramic capture systems, biometrics, endoscopy, automotive, and many others. Polymer optics have become increasingly prevalent due to continuously improving manufacturing tolerances, their ability to incorporate mechanical features directly into the optical parts, their ability to scale to high volumes, their low cost relative to that of other technologies and their low mass relative to glass.

Molded glass optics has advanced greatly in the last decade, both to improve quality and to adopt the low-cost manufacturability that had previously been conceded to injection molded polymer optics.

This conference will be dedicated to both polymer optics and molded glass optics, including plastic/glass hybrid optics, with special emphasis on recent developments in the field.

We welcome papers describing advances in any aspect of polymer optics, particularly within the following areas:
- developments that exemplify the strengths of polymer optics, such as extreme asphericity, low cost, low weight, high volume production, integration of functional mechanical features, tolerance to impact and strain, freeform surfaces, etc.
- developments that challenge the traditional roadblocks for polymer optics, such as thermal instability, structural instability, birefringence, haze, difficulty in broad spectrum color correction, etc.
- advances in ultra-precision diamond turning, molding, mold-making and tooling, coating, or assembly
- additive manufacturing of polymer optics
- advances in polymer optics materials
- advances in metrology (surface, part, or system)
- advances/applications of unique surface geometries (i.e., aspheres, toroids, freeform optics, microstructures, etc.)
- advanced tolerancing for unique surface geometries and high volumes
- novel applications of polymers, including applications outside the visible waveband (SWIR/NIR)
- business/market trends for polymer optics.

We also welcome papers describing advances in any aspect of molded glass optics, particularly including:
- developments that highlight the strengths of glass optics, such as thermal tolerance, CTE, birefringence, high compressive strength, range of optical properties, etc.
- advances in new molding materials and processes
- novel applications of molded glass optics such as freeform surfaces
- business/market trends for molded optics and feedstocks.

Critical Dates

ABSTRACT DUE DATE
7 February 2018

AUTHOR NOTIFICATION
The contact author will be notified of abstract acceptance by email no later than 16 April 2018

MANUSCRIPT DUE DATE FOR ON-SITE PROCEEDINGS
27 June 2018 (conference OP312 only)

MANUSCRIPT DUE DATE
25 July 2018 (except conference OP312)

Please Note: Submissions imply the intent of at least one author to register, attend the symposium, present the paper as scheduled, where it is an oral or poster presentation, and submit a full manuscript by the deadline.
Optical design is a fascinating activity, ranging as it does from lens design and modeling with the help of the immensely powerful design software currently available, to the semi-intuitive art of creating the conceptual design, which underlies any successful optical system. The ‘art’ depends on a wide-ranging knowledge of many of the sub-disciplines that make up optical engineering, which in turn encompasses the interaction between optics and all the activities that turn an optical design into an operational instrument. Beyond ray tracing, the optical designer may employ the tools of radiative transfer, electromagnetic theory for detailed diffraction or polarization modeling, principles of scattering for stray light analysis and control, and other appropriate modeling tools and techniques for deriving suitable performance metrics rising from such fields as spectroscopy, astronomy, vision, or microscopy. Beyond optical design, the optical engineer is concerned with the fabrication of components, assembly and alignment techniques, metrology and calibration, as well as the interaction with other engineering disciplines such as mechanical, thermal, electronic, and software. The Current Developments conference serves the multi-faceted discipline that is lens design and optical engineering, and the multi-talented individuals that dedicate themselves to this field. This perennial conference, held since 1984 under a number of slightly varied titles, will continue to spotlight the hot topics in lens design and optical engineering while still covering the breadth of this field. Beyond ray tracing, the optical designer may employ the tools of radiative transfer, electromagnetic theory for detailed diffraction or polarization modeling, principles of scattering for stray light analysis and control, and other appropriate modeling tools and techniques for deriving suitable performance metrics arising from such fields as spectroscopy, astronomy, vision, or microscopy. Beyond optical design, the optical engineer is concerned with the fabrication of components, assembly and alignment techniques, metrology and calibration, as well as the interaction with other engineering disciplines such as mechanical, thermal, electronic, and software.

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THEORY AND APPLICATIONS
- lens design methodology and innovative lens designs
- aberration theory and image analysis
- advances in techniques for system design, modeling, and global optimization
- optics in consumer, medical, industrial, or space applications
- optics in art, artwork conservation, forensics, and archaeology
- advances in microscopy, lithographic optics, cameras, visual systems, telescopes
- freeform surfaces
- bio-inspired design
- optics in harsh and hostile environments.

INTEGRATION OF OPTICAL DESIGNS INTO COMPLETE INSTRUMENTS
- interaction of optics with mechanics and electronics
- integrated modeling
- fabrication, tolerancing, alignment, stray light considerations
- incorporation of system metrics into optical design
- vision and physiological optics considerations.

DEVELOPMENTS IN OPTICAL COMPONENTS, TECHNIQUES, AND MATERIALS
- diffractive optics, micro-optics, gradient index optics, special optical surfaces
- optical fabrication techniques, novel materials and processes
- optical designs enabled by new techniques and materials
- innovative testing methodologies and instrumentation.

THIN-FILM OPTICAL COATINGS
- design of multilayer films and coatings and performance prediction
- novel optical coating and thin-film materials
- substrate preparation, deposition and pre- and post-processing manufacturing methods
- characterization, monitoring, and measurement
- innovative applications of optical coatings and thin-films from x-ray to the far IR.
CALL FOR PAPERS

APPLICATIONS FOR SOLID-STATE LIGHTING
• lighting for smart cities
• energy-efficient lighting systems
• LEDs for optical communication
• outdoor lighting
• residential lighting
• quality of light
• smart lighting systems
• architectural lighting
• marine lighting
• stadium lighting
• automotive and street lighting
• integrated solar lighting.

SYSTEM-LEVEL ILLUMINATION DESIGN AND OPTIMIZATION
• micro-LEDs and display technology
• fixture designs
• LED lamp, engine, and luminaire designs
• optical design, simulations, and evaluations
• LED light-source modeling
• vision, human factors, and lighting user interface.

DEVICE-LEVEL PACKAGING FOR SOLID-STATE LIGHTING
• lasers in lighting applications
• light extraction from LEDs
• lighting phosphor technology (YAG, tricolor, etc.)
• nanostructured LEDs.

TESTING, RELIABILITY, AND STANDARDS FOR LEDS AND SOLID-STATE LIGHTING
• CIE and chromaticity measurements
• LED and SSL luminous flux and color maintenance
• LED and SSL testing, modeling, and evaluation
• optical materials.
Novel Optical Systems Design and Optimization includes topics on new and unique optical systems as well as original and innovative design methods. Papers submitted should appeal to a reasonably wide audience. Recent topic areas that have been popular include novel instrumentation, camera systems, optimization and simulation methods, displays and freeform optics and novel photonics. We are continuing to solicit submissions in these areas.

Also we are continuing to solicit submissions in the fields of 3D printing/additive optics, human factors and computational optics. Optical technologies that don’t otherwise have a well-defined category are also welcome in this conference.

Novel Optical Systems Design and Optimization XXI is calling for paper submissions in the following topic areas:

**OPTICAL ELEMENTS AND SYSTEMS**
- freeform optics
- wearable optics
- light field optics
- optics and entertainment
- optics in cinematography
- micro- and nano-optics
- liquid optics
- miniature systems
- volumetric displays and 3D imaging
- gradient index optics
- exotic and unconventional optics and systems
- optical technology inspired by biological systems
- multi- and hyperspectral applications
- systems measuring or employing special effects of human perception
- systems employing 3D printed elements or supporting 3D printing technology
- novel photonics.

**OPTICAL DESIGN**
- using phase space in design and analysis
- history
- tricks of the trade
- energy efficiency
- special optical effects
- light propagation
- extending depth of field.

**COMPUTATIONAL TOOLS AND OPTIMIZATION**
- open-source computing
- high-performance computing and cloud computing
- photorealistic rendering
- design and analysis software
- novel optimization and tolerancing methods
- software post-processing
- computational imaging.
CALL FOR PAPERS

OPTICAL SYSTEM ALIGNMENT, TOLERANCING, AND VERIFICATION XII
(OP310)

Conference Chairs: José Sasián, College of Optical Sciences, The Univ. of Arizona (USA); Richard N. Youngworth, Riyo LLC (USA)

Program Committee: Matthew B. Dubin, College of Optical Sciences, The Univ. of Arizona (USA); Jonathan D. Ellis, College of Optical Sciences, The Univ. of Arizona (USA); Ulrike Fuchs, asphericon GmbH (Germany); Sen Han, Univ. of Shanghai for Science and Technology (China); Marco Hanft, Carl Zeiss AG (Germany); William P. Kuhn, Opt-E (USA); Chao-Wen Liang, National Central Univ. (Taiwan); Norbert Lindlein, Friedrich-Alexander-Univ. Erlangen-Nürnberg (Germany); Robert M. Malone, National Security Technologies, LLC (USA); Raymond G. Ohl IV, NASA Goddard Space Flight Ctr. (USA); Craig W. Pansing, Synopsys, Inc. (USA); Robert E. Parks, Optical Perspectives Group, LLC (USA); Brian C. Primeau, Ball Aerospace & Technologies Corp. (USA); Dmitry Reshidko, Microsoft Corp. (USA); Martha Rosete-Aguilar, Ctr. de Ciencias Aplicadas y Desarrollo Tecnológico (Mexico); Peng Su, ASML US, Inc. (USA)

The topics of tolerancing, alignment, and verification are crucial in the development of successful optical systems. The effective assembly of optical systems requires alignment of different system components. The precision level of the alignment depends on the assigned tolerance error budget, and so alignment and tolerances are interrelated. Verification involves validating optical system performance, including assurance of performance under a variety of operating conditions.

This conference seeks to further the state-of-the-art in alignment and tolerancing, including verification of subsystems and at the system level, by providing a forum where these essential topics can be discussed. The conference also seeks to provide the audience with past and current useful insights in these topics. We expect the 2018 conference to continue offering substantial valuable to both authors and audience. Prospective authors and attendees are invited to gauge the breadth and depth of the conference by perusing the eleven previous volumes of the conference proceedings available through SPIE.

Papers are solicited in the following areas:
• theories of alignment and tolerancing
• novel tolerancing methods
• approaches to tolerancing and error budgets
• tolerance desensitization and nominal design
• integrated optical design with tolerancing and design for manufacturability
• pupil alignment in concatenated systems
• modeling and simulation for alignment, tolerancing, and verification
• alignment techniques, equipment, and tools
• instruments for alignment
• development of metrology instruments for alignment
• development of algorithms for alignment and system verification
• optical alignment examples
• alignment in traditional lens systems and telescopes
• alignment of micro optics
• alignment of coherent and high-power optical systems
• optical alignment of nanostructures
• case studies and alignment pitfalls
• alignment and tolerancing of aspheres
• alignment and tolerancing of freeform optics and systems
• loosening tolerances using active elements
• alignment in electro-optical systems
• alignment in metrology applications
• alignment of fiber optic systems
• active optical system alignment and tolerancing
• system verification approaches
• examples and applications of system verification
• tools and techniques for verification
• tutorials on alignment, tolerancing, and/or verification
• optomechanical alignment
• applications of metamaterials to alignment
• novel alignment instrumentation.
This conference addresses how contamination affects system performance, science data results, and instrument and spacecraft design. While the primary emphasis is on molecular and particulate contamination of spaceborne instruments and spacecraft, contamination also affects the performance of nanodevices, biomedical or electronic devices, storage media, and active optical systems.

Contaminants on the surface of optical elements and in the field-of-view of sensors degrade optical system performance. Contaminant-induced surface scatter can reduce off-axis rejection capability. Absorption by surface deposits can reduce optical throughput and contaminants in the field-of-view can attenuate signals and increase sensor background. Surface contaminants can also degrade the optical properties of radiative thermal control surfaces.

The scope of the conference includes contamination modeling and analysis, optical calibration, on-orbit instrument calibration, performance and characterization, launch venting, space environmental effects, and methods to control contamination. Papers concerning contamination issues for spacecraft, spaceborne instruments, nanodevices, semiconductors, high-energy lasers, and astronomical observatories are of particular interest. Papers addressing on-orbit performance of launched spacecraft and instruments are also encouraged.

With the current and upcoming Mars, Europa, asteroid, and other planetary/icy moon missions, topics associated with planetary protection will also be addressed.

In addition to the general areas mentioned above, papers are solicited in following areas:

- contamination effects in nanodevices, lasers, biomedical devices, storage media, semiconductors, electronic devices, and other optical systems
- use of nanotubes to remove or detect contaminants
- characterization of molecular and particulate contaminant generation, transport, deposition, and interactions with surfaces
- prediction and measurement of outgassing rates (in vacuum and in planetary atmospheres/exospheres)
- radiation effects on contaminant sources, transport and deposition (e.g., Jovian environment)
- modeling and experimental characterization of particulate adhesion, transport, deposition and removal during all phases of a mission (e.g., integration & testing; assembly, test an launch operations; launch; entry/descent/landing, surface operations)
- project and mission contamination control planning, testing results, and on-orbit performance results
- system sensitivity to contaminants
- models for predicting system degradation due to contamination including thruster plume analyses
- contamination effects on scatter or stray light
- methods for monitoring and controlling contamination
- methods for cleaning or removing contaminants from surfaces
- in-flight and on-ground data on the effect of contamination on system performance
- physical, chemical, and optical (absorption or scatter) phenomena created by contamination
- contamination control standards and specifications
- contamination-resistant, dust-resistant, and protective coatings and particulate contamination including effects of lunar, Martian, and other planetary dust on surfaces
- development of thermal and specialty coatings
- development, characterization and application of molecular adsorbers (e.g., getters)
- protection and cleaning of coatings and thin-film depositions
- low surface energy coatings
- advancements in conductive and non-conductive paints and coatings for use in optical systems
- planetary protection challenges for icy moons, asteroid, comets, Mars and other planetary missions
- development of planetary protection requirements, control methods, and databases
- launch site processing and launch vehicle particulate/molecular cleanliness.

Conference Chairs: Carlos E. Soares, Jet Propulsion Lab. (USA); Eve M. Wooldridge, NASA Goddard Space Flight Ctr. (USA); Bruce A. Matheson, Ball Aerospace & Technologies Corp. (USA)

Program Committee: Hagop Barsamian, The Aerospace Corp. (USA); Joanne Egges, Ball Aerospace (USA); Alvin Y. Huang, The Boeing Co. (USA); Matthew Macias, Northrop Grumman Aerospace Systems (USA)
INTERFEROMETRY XIX (OP312)

Conference Chairs: Katherine Creath, Optineering (USA), The Univ. of Arizona (USA); Jan Burke, Fraunhofer-Institut für Opttronik, Systemtechnik und Bildauswertung (Germany); Michael B. North Morris, 4D Technology Corp. (USA); Angela D. Davies, The Univ. of North Carolina at Charlotte (USA)

Program Committee: Astrid Aksnes, Norwegian Univ. of Science and Technology (Norway); Armando Alibertazzi Gonçalves Jr., Univ. Federal de Santa Catarina (Brazil); Gastón A. Ayubi, Univ. de la República (Uruguay); Brent C. Berger, Mahr-ESDI (USA), Process Measurement Resources (USA); Manuel Campos-García, Univ. Nacional Autónoma de México (Mexico); Peter J. de Groot, Zygotech Corporation (USA); Nicholas Devaney, National Univ. of Ireland, Galway (Ireland); Konstantinos Falaggis, The Univ. of North Carolina at Charlotte (USA); Pietro Ferraro, Istituto di Scienze applicate e Sistemi Intelligenti (Italy); Cosme Furlong, Worcester Polytechnic Institute (USA); Marc P. Georges, Ctr. Spatial de Liège (Belgium); Goldie L. Goldstein, 4D Technology Corp. (USA); Ulf Griesmann, National Institute of Standards and Technology (USA); Tobias Haist, Institut für Technische Optik (Germany); Sen Han, Univ. of Shanghai for Science and Technology (China); Qian Kemao, Nan Yang Technological Univ. (Singapore); Dae Wook Kim, College of Optical Sciences, The Univ. of Arizona (USA); Beiven Li, Iowa State Univ. of Science and Technology (USA); Chao-Wen Liang, National Central Univ. (Taiwan); Klaus Mantel, Max-Planck-Institut für die Physik des Lichts (Germany); Amalia Martínez-García, Ctr. de Investigaciones en Óptica, A.C. (Mexico); Kate Medicus, Optimax Systems, Inc. (USA); Jiří Novák, Czech Technical Univ. in Prague (Czech Republic); Artur G. Olszak, Àpře Instruments, LLC (USA); Yukitoshi Otani, Utsunomiya Univ. (Japan); Robert E. Parks, Optical Perspectives Group, LLC (USA); Stéphane Perrin, ICube (France), Univ. de Strasbourg (France); Rosario Porras-Aguilar, Warsaw Univ. of Technology (Mexico); Joanna Schmit, 4D Technology Corp. (USA); Michael Schulz, Physikalisch-Technische Bundesanstalt (Germany); Adam R. Styk, Warsaw Univ. of Technology (Poland); James D. Trolinger, MetroLaser, Inc. (USA); Song Zhang, Purdue Univ. (USA)

This conference features interferometry and optical metrology techniques and applications. The techniques enable non-contact inspection of a wide range of objects from macro-scale to nano-scale, and surface finishes from super-polished to structured or randomly rough. Applications in research laboratories, industrial manufacturing, and standardization institutes that rely on the precision, reliability, and flexibility of these techniques steer the industry toward new horizons. For example, applications in new technologies such as MEMS/OEMS, biomedical devices and light weighted segmented mirrors have pushed the field into ever more challenging new solutions. These new developments have greatly impacted the science of optical measurements and instruments.

Authors with topics related to interferometry and optical metrology are encouraged to submit contributions to this conference. This conference is expected to receive 80-100 papers covering the latest advances in areas relating to techniques and applications of interferometry and fringe analysis methods. Recent progress and next-generation developments will be highlighted. Invited talks will be included along with regular conference talks and poster presentations. The meeting will encompass 3-4 days and avoid parallel sessions while allowing time for visiting the poster sessions as well as the exhibition. We appreciate your participation and willingness to present your latest research as we explore a number of current and hot topics.

Papers are solicited on the following and related topics:

- active and real-time measurement systems
- atom interferometry
- automotive, aerospace and other industrial applications
- automated measurements
- bio-interferometry to measure and image cells and tissues
- biological and pharmaceutical applications
- calibration and standardization methods
- digital holography and speckle techniques
- distance and shape measurements across multiple scales
- dynamic process characterization
- flats, sphere, and asphere testing
- freeform, mid-spatial frequency, and roughness measurement
- fringe analysis techniques
- fringe projection and reflection methods
- grating and grid (moire) methods
- gravitational wave interferometry
- high-speed 3D metrology
- integrated optical interferometry
- intelligent metrology systems
- interaction between modeling, simulation, and experiments
- interferometric fiber optic sensors
- materials, structural analysis, and testing
- MEMS/OEMS reliability analysis, assembly, and packaging testing
- nano-metrology
- nondestructive testing and failure analysis
- optical projection tomography techniques
- phase measurement techniques
- polarization and geometric-phase techniques
- semiconductor wafer inspection, photolithography mask metrology, and inspection
- shearing interferometry and other gradient methods
- stress and strain analysis
- surface profiling
- astronomical and adaptive optics through micro optics testing
- terahertz techniques and applications
- thin-film metrology
- tunable wavelength, spectral interferometry and wavelength dependent methods
- wavefront sensing techniques
- white light interferometry and optical coherence tomography
- x-ray and high energy optics characterization
- to X-rays and beyond.

We will have a “Fringe Art” Competition: Bring your favorite fringe pattern to display.

IMPORTANT: Manuscripts will be collected before the meeting and published on the SPIE Digital Library on the first day of the conference. Submission of a manuscript (6-page minimum) is obligatory for participation. All manuscripts will be peer reviewed by the program committee and revisions may be required. Note the earlier manuscript due date of 27 June 2018.
Reflection, Scattering, and Diffraction from Surfaces VI (OP313)

Conference Chairs: Leonard M. Hanssen, National Institute of Standards and Technology (USA)

Program Committee: Gérard Berginc, Thales Optronique S.A.S. (France); Samuel D. Butler, Air Force Institute of Technology (USA); Brian G. Hoover, Advanced Optical Technologies (USA); Alexei A. Maradudin, Univ. of California, Irvine (USA); Michael A. Marciniak, Air Force Institute of Technology (USA); Richard N. Pfisterer, Photon Engineering LLC (USA); Hendrik Rothe, Helmut-Schmidt Univ. (Germany); Michael E. Thomas, Johns Hopkins Univ. (USA); Benjamin K. Tsai, National Institute of Standards and Technology (USA)

This conference will bring together the theory, modeling, measurement and applications for the reflection, scattering and diffraction of electromagnetic waves from the far ultraviolet through the far infrared. This meeting provides a forum for researchers, scientists, engineers, and systems designers to present recent results dealing with reflection, rough surface scattering, diffraction, and stray light for related applications.

Papers are solicited on, but not limited to, the following topics:
- reflection, scattering and diffraction theory, modeling and analysis
- advances in measurement methods, techniques and optical instrumentation
- metrology standards and uncertainty evaluation
- coherent effects, including surface plasmons, localization, speckle and speckle correlations, and spectral shifts
- rough surface retrieval
- surface roughness measurement with stylus and optical profilometry, STM, AFM, and near-field optical microscopes
- scatterometry, reflectometry, and spectroscopic ellipsometry
- Rayleigh scattering, velocimetry, transient grating spectroscopy, holography
- bidirectional reflectance, transmittance and scatter distribution functions (BRDF, BTDF, and BSDF, respectively)
- sources of scatter, including surface properties, particulate contamination, molecular contamination, and on-orbit effects
- polarization analysis and measurement for scattering and diffraction
- scattering models and measurements for computer graphics, machine vision, and non-conventional imagery (polarization imagery, 3D laser imagery)
- novel modeling or analysis of system-level stray light effects in systems (diffractive optics, segmented/sparse aperture optics, hyperspectral imaging, etc.), including novel techniques for suppressing stray light and comparison of test and deployed results
- light scattering methods and instruments for medical diagnosis including tissue optics
- multispectral scatter from pharmaceutical and biomedical materials
- signature analysis and processing of laser-radar and seeker data
- micro/nano applications and optical systems
- monitoring and inspection for additive manufacturing.

Optical reflection, scatter and diffraction are of significance for many applications such as detection of surface defects, determination of the contamination of optical systems, remote sensing, target recognition/discrimination, pharmaceutical production, medical diagnosis, food and agricultural product quality control, and telecommunications. Other engineering applications are the development and validation of parameterized BRDF models for rapid image simulation and rendering, the design of micro-structured surfaces for directional illumination and thermal control applications, and the use of scattering theory to guide paint and coating development. Polarizations of scattering and diffractions add more information to the BRDF for the above applications. Tissue optics is the field of tissue diagnostics and imaging which includes optical properties of tissues with strong (multiple) scattering; coherent effects in the interaction of laser radiation with tissues and cell flows; controllng of optical properties of tissues; polarized light interaction with turbid tissues and the optothermal and optoacoustic interaction of light with tissues; optical coherence tomography and heterodyning imaging; and tissue inelastic light scattering.

Comparison of theoretical results with experimental data is crucial to establishing the valid ranges and accuracies of models, so that an appropriate method can be applied with confidence to the determination of a variety of rough surface characteristics.

Optical probes for microelectronics manufacturing are gaining increasing importance. Many applications require the characterization of materials and devices, and test methodologies are also needed to characterize nano-sized particles including ceramics, metals, and alloys to make nano-crystalline structures.
OPTICS AND PHOTONICS FOR INFORMATION PROCESSING XII (OP500)

Conference Chairs: Abdul A. S. Awwal, Lawrence Livermore National Lab. (USA); Khan M. Iftekharuddin, Old Dominion Univ. (USA); Mireya García Vázquez, Ctr. de Investigación y Desarrollo de Tecnologia Digital (Mexico)

Conference Co-Chairs: Andrés Márquez, Univ. de Alicante (Spain); Victor H. Diaz-Ramirez, Ctr. de Investigación y Desarrollo de Tecnologia Digital (Mexico)

Program Committee: George Barbastathis, Massachusetts Institute of Technology (USA); Juan Campos, Univ. Autónoma de Barcelona (Spain); Liangcai Cao, Tsinghua Univ. (China); Xinbin Cheng, Tongji Univ. (China); Laurence G. Hassebrook, Univ. of Kentucky (USA); Kazuyoshi Itoh, Osaka Univ. (Japan); Rigoberto Juarez-Salazar, Ctr. de Investigación y Desarrollo de Tecnologia Digital (Mexico); Mohammad Ataual Karim, Univ. of Massachusetts Dartmouth (USA); Byoungho Lee, Seoul National Univ. (Korea, Republic of); Abhijit Mahalanobis, Lockheed Martin Missiles and Fire Control (USA); Mohammad A. Matin, Univ. of Denver (USA); Osamu Matoba, Kobe Univ. (Japan); Alastair D. McAulay, Lehigh Univ. (USA); Nasser M. Nasrabadi, U.S. Army Research Lab. (USA); Mark A. Neifeld, The Univ. of Arizona (USA); Takanori Nomura, Wakayama Univ. (Japan); Marek R. Ogiea, AGH Univ. of Science and Technology (Poland); Ting-Chung Poon, Virginia Polytechnic Institute and State Univ. (USA); Philippe Réfrégier, Institut Fresnel (France); Joseph Rosen, Ben-Gurion Univ. of the Negev (Israel); John T. Sheridan, Univ. College Dublin (Ireland); Jun Tanida, Osaka Univ. (Japan); Cardinal Warde, Massachusetts Institute of Technology (USA); Erikto Watanabe, The Univ. of Electro-Communications (Japan); Toyohiko Yatagai, Utsunomiya Univ. (Japan); Maria J. Yzuell, Univ. Autónoma de Barcelona (Spain)

This conference is intended to provide a forum for interchange on various algorithms, systems, sensors, and architectures for novel applications in optics and photonics in information processing. Original unpublished contributions reporting recent advances in analog and hybrid optical information systems and techniques are solicited. In addition, papers related to teaching of related topics to the students or tutorials reviewing a particular field from the following list are welcome. All abstracts will be reviewed by the program committee for originality and merit. Topics of interest include, but are not limited to, the following:

ALGORITHMS
- optical encryption, information security, security of digitally stored medium
- optical pattern recognition, devices, optical correlation hardware, nonlinear techniques for pattern recognition
- nonlinear, neural networks algorithms, including deep learning networks
- novel transforms for optical imaging systems, including wavelets transforms
- optical image processing algorithms
- task-specific information for pattern recognition
- algorithms for large scale data (Big Data) processing
- algorithms for data processing on wearable devices
- adaptive algorithms for optical image restoration and enhancement
- algorithms for 3D object digitization.

NEW ARCHITECTURE AND SYSTEMS
- quantum computing and optical information processing
- spatial light modulators (SLMs), photorefractive materials for optical information systems
- holographic techniques in information processing, and information display systems
- optical storage/memory systems for information processing
- optical systems for 3D pattern recognition, 3D imaging, and Big Data image processing
- applications of novel optical materials for information processing
- novel diffractive optics structures and devices
- nano photonics for optical computing
- calibration of optical systems.

OPTICAL SWITCHING AND INTERCONNECTS
- optical interconnects and supercomputing
- optics in server architecture
- waveguide, optical-fiber-based, polarization, and intensity switching, optical limit switches, optical multiplexing
- interconnection networks: fiber optic, free-space, massively parallel optical interconnections, static and reconfigurable interconnects, optical backplanes and VCSEL and VLSI
- implementation of interconnects
- optical back bone for conventional computers, optical/hybrid interconnects for electronic computers.

DIGITAL OPTICAL PROCESSING
- multi-valued logic, linear algebra processor, system demonstrations, fault-tolerant computing, optical logic and memory
- holographic memory-based computing, integrated optics, and soliton-based and semiconductor devices for optical computing
- modeling of holographic elements, joint optimization
- computational sensing, computational imaging for Big Data processing
- digital holography applications.

APPLICATIONS IN BIOPHOTONICS
- optical processing for biophotonics
- applications of optical systems to information security
- optical systems for biometrics sensing and recognition.

Continued
OPTICS AND PHOTONICS FOR INFORMATION PROCESSING XII (OP500) Continued

IMAGE FORMING AND PROCESSING APPLICATIONS
- imaging: 2D, 3D, integral, holographic, optical, digital, polarimetric
- novel x-ray-based image processing, algorithms and systems, noise processing, applications in medical, EUV, modeling, etc.
- image processing of optical images for large scale systems such as laser fusion facilities, applications in optical alignment, optics inspection, off-normal detection
- optical systems and algorithms for Big Data SAR/IR/visible/medical image processing and recognition.

PARALLEL DIGITAL COMPUTING ARCHITECTURE
- high-speed digital computation circuitry for Big Data
- application of FPGAs in optical data processing
- signed-digit based computing
- memristor-based computing.

OPTICAL INFORMATION PROCESSING AROUND THE GLOBE
- review of optical information processing research over decades in different countries around the globe.

Critical Dates

ABSTRACT DUE DATE
7 February 2018

AUTHOR NOTIFICATION
The contact author will be notified of abstract acceptance by email no later than 16 April 2018.

MANUSCRIPT DUE DATE FOR ON-SITE PROCEEDINGS
27 June 2018 (conference OP312 only)

MANUSCRIPT DUE DATE
25 July 2018 (except conference OP312)

Please Note: Submissions imply the intent of at least one author to register, attend the symposium, present the paper as scheduled, where it is an oral or poster presentation, and submit a full manuscript by the deadline.
APPLICATIONS OF DIGITAL IMAGE PROCESSING XLI (OP501)

Conference Chair: Andrew G. Tescher, AGT Associates (USA)

Program Committee: Anne Margot Aaron, Netflix, Inc. (USA); Vasudev Bhaskaran, Qualcomm Inc. (USA); Antonin Descampe, intoPIX s.a. (Belgium); Frederic Dufaux, Télécom ParisTech (France); Touradj Ebrahimi, École Polytechnique Fédérale de Lausanne (Switzerland); Ofer Hadar, Ben-Gurion Univ. of the Negev (Israel); Arianne T. Hinds, CableLabs (USA); Ioannis Katsavounidis, Netflix, Inc. (USA); C.-C. Jay Kuo, The Univ. of Southern California (USA); Ajay Luthra, ARRIS Group, Inc. (USA); Andre J. Oosterlinck, Kuleuven R & D (Belgium); Sethuraman Panchanathan, Arizona State Univ. (USA); Fernando Pereira, Instituto de Telecomunicações (Portugal); Yuriy A. Reznik, InterDigital, Inc. (USA); Thomas Richter, Univ. Stuttgart (Germany); John A. Saghir, California Polytechnic State Univ., San Luis Obispo (USA); Peter Schelkens, Vrije Univ. Brussel (Belgium); Gary J. Sullivan, Microsoft Corp. (USA); David S. Taubman, The Univ. of New South Wales (Australia); Pankaj Topiwala, FastVDO Inc. (USA); Mihaela van der Schaar, Univ. of California, Los Angeles (USA); Anthony Vetro, Mitsubishi Electric Research Labs. (USA)

The field of digital image processing has experienced continuous and significant expansion in recent years. The usefulness of this technology is apparent in many different disciplines covering medicine through remote sensing. The advances and wide availability of image processing hardware has further enhanced the usefulness of image processing. The Application of Digital Image Processing conference welcomes contributions of new results and novel techniques from this important technology.

Papers are solicited in the broad areas of digital image processing applications, including:

- medical applications
- digital cinema
- color processing
- robot vision
- facsimile
- registration techniques
- image processing architectures, workstations, and programmable DSPs
- multimedia applications
- high-quality color representation
- impact of standardization on image processing
- restorations and enhancements
- image transmission and coding
- remote sensing
- hybrid techniques
- pattern recognition
- multidimensional image processing
- video processing
- video compression
- perceptual image/video quality
- system-level optimization in video transmission and communication
- dynamic point cloud compression
- high-resolution display
- super-high-definition image processing
- computational imaging
- visual search.
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Pavan Chandra Konda presented “Scheimpflug multi-aperture Fourier ptychography: coherent computational microscope with gigapixels/s data acquisition rates using 3D printed components” at SPIE Photonics West 2017. Authored by Pavan Chandra Konda; Jonathan M. Taylor; Andrew R. Harvey; doi: 10.1117/12.2251884; CID 100760R.
Many important optical subsystems are concerned with power transfer and brightness rather than with image fidelity. Nonimaging optics is a design approach that departs from the methods of traditional optical design to develop techniques for maximizing the collecting power of concentrator and illuminator systems.

Nonimaging devices substantially outperform conventional imaging lenses and mirrors in these applications, approaching the theoretical (thermodynamic) limit. Nonimaging design methods usually involve solving ordinary or partial differential equations, calculating the flow lines of the ray bundles, coupling the edge rays of extended sources and targets or optimizing a multi-parameter merit function computed by ray-tracing techniques. While geometrically based, the design fundamentals have been extended to the diffraction limited and even sub-wavelength domain. Therefore applicability exists in near-field optical microscopy and nanometer scale optics.

This conference will address the theory of nonimaging optics and its application to the design and experimental realization of illumination and concentration systems, tailored freeform optics, display backlighting, condenser optics, high-flux solar and infrared concentration, daylighting, LED optical systems, laser pumping, and luminaires.

The revival of considerable work in solar energy concentration for both photovoltaic and thermal applications, much of which includes nonimaging optics, prompts reincorporating these fields into this conference.

The use of nonimaging optics promises higher efficiency, relaxed physical tolerances, improved optical uniformity, and reduced manufacturing costs. We encourage submissions ranging from fundamentals to critical design issues and practical applications.

Paper submissions are also solicited in the following and related areas:

- radiative transfer near the étendue limit
- concentrator optics
- illumination and irradiation optics
- solar photovoltaic and solar thermal concentration
- fiber-optic and light-pipe optical systems
- radiometry
- daylighting
- characterization of light-transfer devices
- freeform optics
- optical furnaces and radiative heating
- infrared detection
- LED applications
- laser pumping
- condenser optics
- ultra-compact concentrator systems
- luminaires.
ULTRAFAST NONLINEAR IMAGING AND SPECTROSCOPY VI (OP411)

Conference Chairs: Zhiwen Liu, The Pennsylvania State Univ. (USA); Demetri Psaltis, Ecole Polytechnique Fédérale de Lausanne (Switzerland); Kebin Shi, Peking Univ. (China)

Program Committee: George Barbastathis, Massachusetts Institute of Technology (USA); Randy A. Bartels, Colorado State Univ. (USA); Martin Centurion, Univ. of Nebraska-Lincoln (USA); Jason M. Eichenholz, Open Photonics, Inc. (USA); Kenan Gundogdu, North Carolina State Univ. (USA); Hans D. Hallen, North Carolina State Univ. (USA); Iam Choon Khoo, The Pennsylvania State Univ. (USA); Zhenyu Li, The George Washington Univ. (USA); Fiorenzo Gabriele Omenetto, Tufts Univ. (USA); Michelle Y. Sander, Boston Univ. (USA); Jigang Wang, Iowa State Univ. of Science and Technology (USA); Yong Xu, Virginia Polytechnic Institute and State Univ. (USA)

The main theme of this conference is focused on exploiting ultrafast and nonlinear optical techniques for imaging and spectroscopy applications. The merging of ultrafast nonlinear optics and imaging has created exciting opportunities to explore nonlinear susceptibility as contrast mechanisms for label-free imaging. For instance, second harmonic generation (SHG) imaging relies on the difference in second order nonlinear susceptibility to form an image and can be used to probe molecules or structures without inversion symmetry. The introduction of the multi-photon nonlinear excitation technique using femtosecond pulses to fluorescence microscopy has allowed for the use of longer excitation wavelengths hence deeper penetration depth in scattering media, reduced photo-toxicity, and natural optical sectioning capability. By combining nonlinear molecular vibrational spectroscopy (such as coherent anti-Stokes Raman spectroscopy – CARS, and stimulated Raman scattering – SRS) with imaging, coherent Raman microscopy possesses the unique chemical selective imaging capability. Last but not the least, various novel sources generated by ultrafast nonlinear processes (e.g., supercontinuum) also have significant impact on the field of imaging and spectroscopy.

This conference provides an excellent opportunity for researchers working on the field of ultrafast nonlinear imaging and spectroscopy to present their most recent progress. Papers on all related areas are solicited, including novel ultrafast nonlinear optical imaging and spectroscopy techniques, nonlinear imaging contrast mechanisms, applications of ultrafast nonlinear imaging and spectroscopy, nonlinear optical sources, and computational techniques related to ultrafast nonlinear imaging and spectroscopy. The following are a list of exemplary topical areas:

- novel ultrafast and nonlinear imaging and spectroscopy techniques
- computational nonlinear imaging and spectroscopy
- biological and chemical imaging and sensing applications.
WIDE BANDGAP POWER AND ENERGY DEVICES AND APPLICATIONS III (OP412)

Conference Chairs: Mohammad Matin, Univ. of Denver (USA); Srabanti Chowdhury, Univ. of California, Davis (USA); Achyut K. Dutta, Banpil Photonics, Inc. (USA)

Program Committee: Mowafak M. Al-Jassim, National Renewable Energy Lab. (USA); Abdul A. S. Awwal, Lawrence Livermore National Lab. (USA); Daniel F. Fezell, The Univ. of New Mexico (USA); David Wenzhong Gao, Univ. of Denver (USA); M. Saif Islam, Univ. of California, Davis (USA); Andrew P. Lange, Lawrence Livermore National Lab. (USA); Hidenori Mimura, Shizuoka Univ. (Japan); Rebecca J. Nikolic, Lawrence Livermore National Lab. (USA); Madan Niraula, Nagoya Institute of Technology (Japan); Nezih Pala, Florida International Univ. (USA); Xiaolong Qiang, Northeastern Univ. (China)

Challenges in producing clean energy while maintaining a clean environment is being vigorously pursued worldwide. One of the most promising approaches to producing clean energy is utilizing photovoltaic technology, however, while a plethora of activities are performed in the photovoltaic area, there seems to be much less activity in related areas, making it possible to reduce the overall cost of delivering clean energy and improving system efficiency. Reducing cost requires technological advancement in a variety of areas such as solar cells, inverter electronics, power management, storage, and smart grid. This conference is intended to focus on power electronics and optical devices based on wide-bandgap (WBG) materials. Wide bandgap semiconductors are materials that possess bandgaps greater than those of silicon. An example of successful WBG materials includes, but not limited to, Gallium nitride (GaN) based material, the material enabling the ultra-high efficiency light emitting diodes (LEDs), photodetector, and energy harvester (e.g. PV Cell). Device technologies based on such material platforms promise to deliver cost-effective performance that is many orders of magnitude better than the current Si devices.

Recent improvements in the performance and reliability of WBG materials and devices make it a promising technology to consider for power circuits and clean energy applications. WBG enable power electronic components to be smaller, cheaper, faster, more reliable and efficient than their silicon-based counterparts because of reduced energy losses, higher voltage-, temperature- and frequency-operation and improved power quality. It is expected that new research on WBG materials will spur innovations in the next generation of clean energy power electronics, alternate energy vehicles and smart grid technology. The goal of realizing WBG power devices requires solutions to many complex engineering problems. Original unpublished contributions report recent advances along these lines in addition to review papers that summarize the evolution of the development of any particular aspect of these areas. All abstracts will be reviewed for originality and merit. Topics of interest include, but are not limited to, the following:

**ENGINEERING CHALLENGES**
- cost effective manufacturing
- balancing cost versus performance
- substrate size versus manufacturing cost
- meeting design requirements
- packaging and systems integration
- engineered bandgap, controlling defects and phase separation
- innovative devices based on nano-structures.

**APPLICATIONS**
- inverter technology for renewable (solar, wind) energy
- power electronics
- high efficiency photovoltaic (PV) cells
- storage technology
- light emitting diodes (LEDs)
- laser diodes (LDs)
- photodetector
- buildings and industrial
- electronics and IT
- transportation and vehicle technology
- consumer electronics
- military systems (high-density power applications, satellite communications, and high-frequency and high-power radar)
- smart grid with renewable energy
- lighting
- industrial motors
- sensors (high-pressure, high-temperature, high E&M radiation and extreme vibration)
- betavoltaic and alphavoltaic batteries
- MEMS devices
- memory and charge storage devices.

**THEORY, GROWTH, FABRICATION, AND CHARACTERIZATION OF WBG MATERIALS**
- silicon carbide (SiC)
- oxides (ZnO, B-Ga₂O₃)
- III-nitride (GaN, AlN, BN and alloys)
- diamond (C).
The Photonic Fibers and Crystal Devices Conference aims to establish a well-defined forum with focus on innovations of photonic, optoelectronic, and optical devices that depend essentially on advancement in materials processing, optical and photonic property, wave mixing, and photorefractive phenomena. This conference is a continuation of the successful SPIE conferences on Photorefractive Fiber and Crystal Devices with strengthened topics on crystal growth of nonlinear optic materials. The scope of applications this conference encompasses covers a broad range from components to systems architectures in optical signal processing, optical storage, optical networks and communications, and photorefractive material-based novel photonic devices. The objective of this conference is to promote scientific interaction that bridges advancement in photonic fibers and bulk crystal materials with innovations in photonic technology and device development.

Sessions will focus on the latest achievements on both photonic materials and device technologies that can lead to further advances in the communication, sensing, data storage, display, biomedical, and defense applications. The status and future challenges in these areas also will be reviewed by invited speakers.

Authors are encouraged to submit papers addressing the following session topics:

**PHOTONIC FIBERS AND CRYSTAL MATERIALS**

- novel photorefractive, electro-optic, and nonlinear optical fibers and crystals including glasses, semiconductors, ferroelectrics, polymERIC, and magneto-optic materials
- crystal growth, defect and doping control, quasi phase matching and domain manipulation
- photonic fibers, 2 and 3-dimensionally engineered photonic crystal, and photonic bandgap materials
- photosensitivity and spectral responses, physical and optical characterizations
- experiments and theory that elucidate correlations between materials doping and defect-structure with photonic properties
- chalcogenide photons
- hollow-core photonic crystal fiber design and applications
- polarization maintaining photonic crystal fiber designs and applications
- progress in high peak power capable photonic fibers
- work on understanding the fundamental mechanisms on photodarkening in fibers along with process and design improvements to reduce photodarkening effects
- advances in software for the design and simulation of photonic fibers and photonic fiber based systems.

**PHOTONIC DEVICES AND APPLICATIONS**

- components for optical communication, sensing, and data storage, including transmission, amplification, modulation, detection, dispersion management, switching, data handling, and packaging
- integrated optical components, nonlinear frequency converters, diffractive devices, three-dimensional optical memory, and dynamic memories
- dynamic sensing for chemical, harsh environment, biophotonic, and defense applications
- adaptive optical devices utilizing coupled effects such as electro-optic, elasto-optics, photostriiction, magneto-optics, and pyro-optics
- novel free-space and waveguiding optical components, devices and subsystems including supercontinuum lasers for photonic computing, optomechanics, interconnects, switching, and packaging of photonic processors
- analog and digital holographic data storage, holographic miniaturization of functional mapping, holographic image amplification, volume holographic imaging, 3D imaging and display
- phonic bandgap switches and modulation-based switching devices
- photonic devices for energy conversion and harvesting
- electromagnetics (nonlinear phenomena and propagation of light in nonlinear crystals/optical media)
- crystalline fiber lasers.
The terahertz region extends from approximately 100 GHz to 10 THz and this frequency range can be considered as a link between electronics and photonics. Since the beginning of the 1990s this domain was growing first with the development of time-domain spectroscopy and now is becoming more and more attractive with the emergence of new technologies: quantum cascade lasers, nano-transistors, photomixing, and mixers. Systems based on these devices have found a lot of applications exploiting unique properties of the THz domain of the electromagnetic spectrum. This conference is intended to provide a forum for scientists, engineers, and researchers from a diverse set of disciplines who are interested in either learning more about terahertz technology. The scope of the conference includes sources and detectors of THz radiation, optical components and systems for this frequency domain, as well as different applications utilizing this technology.

Papers are solicited in the following areas:

**FUNDAMENTALS OF GENERATION, DETECTION, AND PROPAGATION OF THZ WAVES**
- modeling of THz sources and detectors, performance limitations, optical components and systems, gratings, waveguides, couplers, photonic crystal structures and metamaterials, photonic crystal devices and applications, single element antennas, phased array antennas, photonically driven antennas, photonic phase locked loops, MMICs, THz imaging systems.

**NOVEL CONCEPTS AND MATERIALS FOR THZ TECHNOLOGY**
- new concepts, experimental procedures, and implementations
- new fabrication processes
- novel applications
- integrated photonic devices
- linear and nonlinear optical materials and devices
- III-nitride alloys
- organic source and modulator materials and devices.

**SOURCES OF THZ RADIATION**
- quantum cascade lasers, frequency mixers, frequency multipliers, FET and HEMT sources, resonant tunneling diodes, parametric oscillators, solid-state sources, electron beam sources, vacuum electronics sources, graphene, p-germanium sources, photoconductive sources, single frequency and broad band sources, tunable sources, high power sources.

**THZ DETECTORS**
- quantum detectors, Schottky and other mixers, bolometers and other thermal detectors, THz focal plane arrays, antenna integrated detectors, heterodyne detection techniques, active and passive imaging systems.

**IMAGING**
- active and passive THz imaging systems, image treatment, substance identification.

**SPECTROSCOPY**
- spectral measurement techniques
- spectroscopic approaches and techniques
- identification of organic and inorganic materials using THz spectroscopy.

**BIOMEDICAL APPLICATIONS**
- DNA identification, cell abnormalities, medical imaging
- identification of biological and chemical species
- burn and water content analysis, tissue abnormality identification, cancer identification and screening
- pharmaceutical, dentistry, other medical and clinical applications.

**OTHER APPLICATIONS**
- nondestructive testing
- security and defense applications
- THz communications, principles, instrumentation, media characteristics, wireless communications, detection systems
- astronomy and space applications, imaging techniques.
OPTICAL DATA STORAGE 2018: INDUSTRIAL OPTICAL DEVICES AND SYSTEMS (OP415)

Conference Chairs: Ryuichi Katayama, Fukuoka Institute of Technology (Japan); Yuzuru Takashima, College of Optical Sciences, The Univ. of Arizona (USA)

Program Committee: Min Gu, RMIT Univ. (Australia); Thomas D. Milster, College of Optical Sciences, The Univ. of Arizona (USA); Kimihiro Saito, Kindai Univ. Technical College (Japan); Luping Shi, Tsinghua Univ. (China); Kenichi Shimada, Hitachi, Ltd. (Japan); Xiaodi Tan, Beijing Institute of Technology (China); Din Ping Tsai, Research Ctr. for Applied Sciences - Academia Sinica (Taiwan)

The ODS special conference offers an excellent forum for exchanging information on the status, advances, and future directions in the field of optical data storage and related technologies. The Blu-ray-Disc-based professional archival optical disk system has been put into practical use. However, competition with hard disk drives and solid state drives, as well as the growth of storage in the cloud, is making it unclear what the future ODS system might look like.

In 2018, the scope of ODS conference will be extended to “industrial Optical Devices and Systems (iODS)”. Currently, optics research and development community in industry, which was very active in ODS in the past, is seeking for new applications of the technologies developed for ODS. Of course, new developments in technologies for future ODS systems such as holographic recording and new methodologies in related areas such as nano-photronics will be the main focus at this conference. In addition, the possibility of applications of ODS technologies to emerging industrial domains such as IoT, big data, intelligent cars, healthcare, security, etc. will be discussed. Contributions in a variety of areas including traditional ODS as well as new iODS are strongly encouraged.

Papers are solicited in the following and related areas:
• holographic recording
• multi-dimensional recording
• heat-assisted magnetic recording
• other technologies for future ODS
• basic theory and modeling
• testing and characterization
• media and materials
• components and devices
• coding and signal processing
• systems and applications
• nano-photronics related to ODS
• plasmonics related to ODS
• spintronics related to ODS
• bio-photronics related to ODS
• other technologies related to ODS
• professional archival storage
• Internet of Things
• big data
• other applications of ODS technologies.
The detection of infrared radiation has proven to be a viable tool in environmental studies, homeland security, and in medical, automotive, and military applications. This conference will provide a venue for papers ranging from basic device physics to novel applications. Improvements in infrared sensing & imaging relating to improvements in feature size for the read-out integrated circuit (ROIC) fabrication and compositional and doping control for the detector layer, have led to new opportunities for meeting the needs of the terrestrial, air, and space user communities. Unique IR device structure have been shown to evolve from new capabilities in the nanotechnology realm. Recent developments in novel detector materials, including those for strained superlattice and barrier architectures, promise significant technological advances. Room temperature infrared detectors for terrestrial use also benefit from these advancements. Various read-out circuit architectures allow functionality for higher-performance cooled IR focal plane arrays, and also permit increased capabilities. We are also seeking papers that expand the state-of-the-art in novel pixel readout approaches, improved signal processing, and lower cost, including the digital flow of data off the FPA in the form of LVDS, for example.

The conference is a high-level forum bringing together scientists and engineers involved in the research, design, and development of infrared sensors and focal plane arrays.

Papers are solicited for infrared technology, including the following topics:

**NOVEL DETECTOR MATERIALS AND ARCHITECTURES**
- SWIR, MWIR, LWIR, and VLWIR detectors
- materials (e.g., InSb, HgCdTe, InAsSb)
- nanotechnology-based EO/IR detectors/ Arrays
- nano-/microbolometers
- HgCdTe (MCT) technology
- HgCdTe detector growth on alternative substrates
- III-V strained-layer superlattice detector technology
- higher-operating temperature infrared detectors
- high sensitivity at low photon flux detectors / applications
- UV, visible and IR avalanche photodiodes.

**MODELING OF IR OPTOELECTRONIC DEVICES AND MATERIALS**
- carrier transport models for novel IR materials
- carrier transport models for super lattices and quantum devices
- simulation techniques for detector arrays
- optical and electrical simulation models for crosstalk, modulation transfer functions and photon recycling
- models for point and extended defects and their impact on device performance
- novel numerical approaches for large scale IR detector and array simulation.

**FOCAL PLANE ARRAYS, READ-OUT INTEGRATED CIRCUITS, AND COMPONENTS**
- FPA signal and data processing, both on- and off-Chip
- electronic readout image intensifier devices
- smart focal planes
- diffractive optics on the FPA
- advanced microchannel plates
- photon-counting technology
- image intensification
- improved photocathodes
- plasmonics.

**APPLICATIONS OF IR TECHNOLOGY**
- terrestrial, air, and space sensors
- multispectral sensors
- imaging spectrometer applications
- imaging polarimeter applications
- infrared imaging for next generation smart phones
- space-based sensing applications
- astronomical applications
- industrial & structural applications
- automotive applications
- medical applications
- cameras for low light levels
- unmanned autonomous vehicle cameras.

**ADVANCED CHARACTERIZATION TECHNIQUES**
- energetic particle radiation effects
- anomalous noise sources
- responsivity and frequency response
- cryogenic and ultra-low noise.
OPTICS AND PHOTONICS FOR SUSTAINABLE ENERGY

NONIMAGING OPTICS: EFFICIENT DESIGN FOR ILLUMINATION AND SOLAR CONCENTRATION XV (OP421)

Conference Chairs: Roland Winston, Univ. of California, Merced (USA); Eli Yablonovitch, Univ. of California, Berkeley (USA)

Program Committee: Pablo Benítez, CeDInt-UPM (Spain), Light Prescriptions Innovators LLC (USA); William J. Cassarly, Synopsys, Inc. (USA); Daniel Feuermann, Ben-Gurion Univ. of the Negev (Israel); Michael W. Haney, ARPA-E (USA); Sarah R. Kurtz, Univ. of California, Merced (USA) Juan Carlos Miñano, CeDInt-UPM (Spain), Light Prescriptions Innovators LLC (USA); Narkis E. Shatz, SureFire, LLC (USA)

Many important optical subsystems are concerned with power transfer and brightness rather than with image fidelity. Nonimaging optics is a design approach that departs from the methods of traditional optical design to develop techniques for maximizing the collecting power of concentrator and illuminator systems.

Nonimaging devices substantially outperform conventional imaging lenses and mirrors in these applications, approaching the theoretical (thermodynamic) limit. Nonimaging design methods usually involve solving ordinary or partial differential equations, calculating the flow lines of the ray bundles, coupling the edge rays of extended sources and targets or optimizing a multi-parameter merit function computed by ray-tracing techniques. While geometrically based, the design fundamentals have been extended to the diffraction limited and even sub-wavelength domain. Therefore applicability exists in near-field optical microscopy and nanometer scale optics.

This conference will address the theory of nonimaging optics and its application to the design and experimental realization of illumination and concentration systems, tailored freeform optics, display backlighting, condenser optics, high-flux solar and infrared concentration, daylighting, LED optical systems, laser pumping, and luminaires.

The revival of considerable work in solar energy concentration for both photovoltaic and thermal applications, much of which includes nonimaging optics, prompts reincorporating these fields into this conference.

The use of nonimaging optics promises higher efficiency, relaxed physical tolerances, improved optical uniformity, and reduced manufacturing costs. We encourage submissions ranging from fundamentals to critical design issues and practical applications.

Paper submissions are also solicited in the following and related areas:
• radiative transfer near the étendue limit
• concentrator optics
• illumination and irradiation optics
• solar photovoltaic and solar thermal concentration
• the optical science of light trapping
• the science of extracting the luminescence
• electro-luminescent refrigeration
• thermo-photovoltaic electricity generation
• fiber-optic and light-pipe optical systems
• radiometry
• daylighting
• characterization of light-transfer devices
• freeform optics
• optical furnaces and radiative heating
• infrared detection
• LED applications
• laser pumping
• condenser optics
• ultra-compact concentrator systems
• luminaires
• Cerenkov detectors for astronomy.
NOVEL PHOTONIC TECHNOLOGIES FOR SOLAR ENERGY CONVERSION (OP422)

Conference Chair: Jeremy N. Munday, Univ. of Maryland, College Park (USA)

This conference centers on discovering and exploring novel concepts in photonics with significant potential to improve the performance of photovoltaic (PV) devices, typically referred to as solar cells. Related research impacting other parts of a solar energy system is also of interest. The aim of this meeting is to bring together scientists, engineers, and technologists to discuss state-of-the-art research in optics, photonics, and plasmonics that is most relevant to developing significant advances in PV devices and subsystems.

This conference will primarily cover the following areas:
- bulk nanostructured and nanocomposite solar cells
- quantum well and quantum dot solar cells
- nanowire and nanotube-based solar cells
- nanoplasmonic structures for solar cells
- nanostructures for light management and subwavelength optical phenomena
- advanced conversion mechanisms employed in the above structures, such as tandem or multijunction structures, intermediate bands, hot carrier effects, and multi-exciton generation
- novel photonic concepts to reduce photon entropy (e.g., angular restriction mechanisms) or cool PV devices (e.g., radiative cooling)
- spectrum conversion mechanisms such as up- and down conversion
- novel materials and concepts, including thin films, for solar energy conversion
- new applications for PV with photonics-relevant challenges (e.g., building-integrated photovoltaics, unmanned aerial vehicles, etc.).

Authors are invited to submit an original manuscript to the Journal of Photonics for Energy, which is now covered by all major indexes and Journal Citation Reports.

Critical Dates

ABSTRACT DUE DATE
7 February 2018

AUTHOR NOTIFICATION
The contact author will be notified of abstract acceptance by email no later than 16 April 2018

MANUSCRIPT DUE DATE FOR ON-SITE PROCEEDINGS
27 June 2018 (conference OP312 only)

MANUSCRIPT DUE DATE
25 July 2018 (except conference OP312)

Please Note: Submissions imply the intent of at least one author to register, attend the symposium, present the paper as scheduled, where it is an oral or poster presentation, and submit a full manuscript by the deadline.
Thermal radiation is a fundamental heat transfer process, which plays an outsized role in many sustainable energy systems, particularly at elevated temperatures. In this context, achieving control over thermal radiation offers many novel phenomena as well as valuable applications. For instance, it has the potential to convert input heat into useful optical emission, which can select for certain angles or wavelengths. Recent developments in material science, nanophotonics, plasmonics, and metasurfaces make this a uniquely promising time to develop new capabilities in this direction. These new capabilities can then have direct applications in a range of fields, including but not limited to energy-efficient lighting, infrared sources, and the thermophotovoltaic generation of electricity. Other topics of relevance in thermophotovoltaics include design of advanced photonic crystals effective in high-temperature environments, management of excess heat in the photovoltaic cell, enhancement of the low-bandgap photovoltaic cells, and integrating various components into high-performance systems. Another key area requiring careful control of thermal radiation is radiative cooling, whether for terrestrial or space-based applications. Radiative cooling allows both for daytime passive cooling above and beyond standard convective processes, as well as below-ambient cooling for night time power generation. In summary, achieving control over thermal radiation is a multi-faceted, multidisciplinary problem impacting both basic science and practical applications, where more exciting new ideas could potentially reach fruition.

Special topics of interest:

**THERMOPHOTOVOLTAICS**
- low-bandgap photovoltaic cells
- photovoltaic thermal management
- advanced photonic crystals
- high-temperature reliability
- system integration strategies.

**SELECTIVE THERMAL EMITTERS**
- wavelength-selective thermal emission
- angle-selective thermal emission
- thermal null beam steering
- energy-efficient lighting
- thermal emission characterization.

**SELECTIVE SOLAR ABSORBERS**
- solar heating for hot water
- solar photovoltaic/solar thermal hybrid systems
- solar thermal storage.

**RADIATIVE COOLING**
- selective radiative emission near ambient temperature
- daytime cooling
- below-ambient cooling.
RELIABILITY AND DEVELOPMENT OF PHOTOVOLTAIC CELLS, MODULES, COMPONENTS, AND SYSTEMS XI (OP424)

Conference Chairs: Michael D. Kempe, National Renewable Energy Lab. (USA); Keiichiro Sakurai, National Institute of Advanced Industrial Science and Technology (Japan); Neelkanth G. Dhere, Univ. of Central Florida (USA)

Program Committee: David S. Albin, National Renewable Energy Lab. (USA); Takuya Doi, National Institute of Advanced Industrial Science and Technology (Japan); Vivek S. Gade, Jabil Circuit, Inc. (USA); William J. Gambogi Jr., DuPont (USA); Gautam Gupta, Univ. of Louisville (USA); Werner Herrmann, TÜV Rheinland Group (Germany); Aravinda Kar, CREOL, The College of Optics and Photonics, Univ. of Central Florida (USA); Michael Köhl, Fraunhofer-Institut für Solare Energiesysteme (Germany); Xavier Mathew, Ctr. de Investigación en Energia (Mexico); Robert McConnell, Arzon Solar, LLC (USA); Aditya D. Mohite, Los Alamos National Lab. (USA); Yoichi Murakami, Japan Electrical Safety & Environment Technology Labs. (Japan); Laure-Emmanuelle Perret-Aebi, Ecole Polytechnique Fédérale de Lausanne (Switzerland)

This conference will center on the science and engineering of reliability, durability, and safety of photovoltaic (PV) cells, modules, components, and systems, with emphasis on attaining long service lifetimes. Major material systems of interest include crystalline silicon, cadmium telluride, thin-film chalcogenides like CIGS and CZTS, as well as perovskites. Hybrid systems combining PV modules with fuel cells, batteries, and other storage technologies are also of interest.

The conference will cover the reliability of photovoltaic cells, modules, and components, with particular emphasis on optically-active components, including absorber materials, encapsulants, frontsheets, backsheets, transparent conductive oxides, concentrator optics and receivers, and BOS components such as inverters, connectors and fuses amongst others. It will also include analysis using techniques like optical spectroscopy (e.g., reflectance/transmittance, Raman, FTIR, fluorescence, microscopy), and electronic/optoelectronic measurements (e.g., I-V, impedance spectroscopy, electro-luminescence, photoluminescence, and lock-in thermography). Accelerated stress testing and qualification techniques, as well as other sources of quality assurance, standards development, and lifetime assessment, are also of great interest.

The aim of this meeting is to bring together material scientists, chemists, physicists, engineers, and technologists to discuss and review PV module and system reliability challenges, particularly as they relate to optics and photonics.

Authors are invited to submit an original manuscript to the Journal of Photonics for Energy, which is now covered by all major indexes and Journal Citation Reports.
This conference centers on the science and technology of organic and hybrid light emitting materials and devices for flat panel displays, solid state lighting and lasers. Applications range from handheld displays to large flat panel screens, large-area distributed light sources, and next-generation organic lasers.

The scope of the conference will cover the following areas:

- highly efficient molecular and polymeric light emitters and devices
- thermally activated delayed fluorescent materials
- 2D and 3D metal-organic perovskites light emitting materials
- quantum dot light emitting materials and devices
- efficient white emitting materials and devices for solid state lighting
- novel light extraction schemes
- microcavity effects for solid state lighting and lasers
- device failure mechanisms and durability studies
- novel approaches, patterning, and driving schemes for full color displays and solid state lighting
- novel substrates and electrodes for flexible devices
- physics of carrier injection, transport and recombination
- photophysics of excited state
- light emitting OTFTs

**HIGHLIGHTS:**

- Special Session on Solid State Lasers based on Organic Thin Films, Molecular, and Photonic Crystals.

Manuscripts for the conference proceedings will be peer-reviewed.

Authors are invited to submit an original manuscript to the Journal of Photonics for Energy, which is now covered by all major indexes and Journal Citation Reports.
ORGANIC, HYBRID, AND PEROVSKITE PHOTOVOLTAICS XIX (OP213)

Conference Chairs: Zakya H. Kafafi, Lehigh Univ. (USA); Paul A. Lane, U.S. Naval Research Lab. (USA); Kwanghee Lee, Gwangju Institute of Science and Technology (Korea, Republic of)

Program Committee: Hendrik Bolink, Univ. de València (Spain); Paul L. Burn, The Univ. of Queensland (Australia); David S. Ginger, Univ. of Washington (USA); Fei Huang, South China Univ. of Technology (China); Gang Li, The Hong Kong Polytechnic Univ. (Hong Kong, China); Thuc-Quyen Nguyen, Univ. of California, Santa Barbara (USA); Ana Flavia Nogueira, Univ. Estadual de Campinas (Brazil); Hideo Ohkita, Kyoto Univ. (Japan); Barry P. Rand, Princeton Univ. (USA); Ifor D. W. Samuel, Univ. of St. Andrews (United Kingdom); Natalie Stingelin-Stutzmann, Georgia Institute of Technology (USA); Huaping Zhou, Peking Univ. (China); Xiaoyang Zhu, Columbia Univ. (USA)

The SPIE Conference on Organic Photovoltaics celebrated its 18th anniversary in 2017 with an expanded scope to include hybrid organic/inorganic and perovskite solar cells in addition to organic solar cells. The focus in 2018 will accordingly be on high-performance light-harvesting and carrier transporting materials, highly efficient and stable organic, hybrid and perovskite solar cells, device physics including interfaces, film structure and morphology, photophysics of carrier generation, and transport. The conference will also cover new techniques for fabrication, encapsulation, and printing of solar cells on large-area flexible substrates. The aim of this meeting is to bring together scientists, engineers, and technologists from multiple disciplines to report on and discuss the fundamental issues that affect device operation, including efficiency and long term stability. The theme of the conference will be “state-of-the-art” performance of organic, hybrid and perovskite solar cells and their applications in future technologies.

The scope of the conference will cover but is not limited to the following areas:

• molecular, macromolecular, and polymeric photovoltaics
• hybrid organic/inorganic photovoltaics
• perovskite-based solar cells
• tandem and multi-absorber solar cells
• plasmonic and photonic structures for light management
• new electron and hole transport materials
• new electrode materials and nanostructures
• new flexible substrate materials
• physics of exciton diffusion, charge carrier generation, transport, and recombination
• organic/inorganic interfaces
• film structure and morphology
• novel contact (e.g. metal oxide) layers and nanostructures
• new techniques for fabrication, encapsulation, and printing of solar cells
• large-area processing and fabrication of solar modules
• stability, lifetime, and reliability of modules
• future prospects for organic, hybrid, and perovskite solar cell technology.

HIGHLIGHTS:

• A joint session with Next Generation Technologies for Solar Energy Conversion
• A joint session with Physical Chemistry of Interfaces and Nanomaterials

Manuscripts for the conference proceedings will be peer-reviewed. Authors are invited to submit an original manuscript to the Journal of Photonics for Energy, which is now covered by all major indexes and Journal Citation Reports.
ADVANCES IN X-RAY/EUV OPTICS AND COMPONENTS XIII (OP314)

Conference Chairs: Shunji Goto, Japan Synchrotron Radiation Research Institute (Japan); Christian Morawe, ESRF - The European Synchrotron (France); Ali M. Khounsary, Illinois Institute of Technology (USA)

Program Committee: Lucia Alianelli, Diamond Light Source Ltd. (United Kingdom); Lahsen Assoufid, Argonne National Lab. (USA); Stefan Braun, Fraunhofer IWS Dresden (Germany); Daniele Cocco, SLAC National Accelerator Lab. (USA); Raymond P. Conley Jr., Argonne National Lab. (USA); Sultan B. Dabagov, Istituto Nazionale di Fisica Nucleare (Italy); Christian David, Paul Scherrer Institut (Switzerland); Hans M. Hertz, KTH Royal Institute of Technology (Sweden); Werner H. Jark, Elektra-Sincrotrone Trieste S.C.p.A. (Italy); George A. Kyrala, Los Alamos National Lab. (USA); Eric Louis, MESA+ Institute for Nanotechnology (Netherlands); Carolyn A. MacDonald, Univ. at Albany (USA); Hidekazu Mimura, The Univ. of Tokyo (Japan); Patrick P. Naulleau, Lawrence Berkeley National Lab. (USA); Howard A. Padmore, Lawrence Berkeley National Lab. (USA); Ladislav Pina, Czech Technical Univ. in Prague (Czech Republic); Yuriy Y. Platonov, Rigaku Innovative Technologies, Inc. (USA); Seungyu Rah, Pohang Univ. of Science and Technology (Korea, Republic of); Peter Revesz, Cornell Univ. (USA); Horst Schulte-Schrepping, Deutsches Elektronen-Synchrotron (Germany); Regina Soufl, Lawrence Livermore National Lab. (USA); Daniele Spiga, INAF - Osservatorio Astronomico di Brera (Italy); Stanislav Stoupin, Cornell Univ. (USA); Mau-Tsu Tang, National Synchrotron Radiation Research Ctr. (Taiwan); Akihiko Ueda, JTEC Corp. (Japan); Zhanzhan Wang, Tongji Univ. (China); Joerg Wiesmann, Incoatec Gmbh (Germany); Makina Yabashi, RIKEN (Japan), Japan Synchrotron Radiation Research Institute (Japan); Kazuto Yamauchi, Osaka Univ. (Japan); Brian W. Yates, Canadian Light Source Inc. (Canada)

Expanding use of x-ray and EUV radiation in many scientific and technical applications requires the continued development of new and improved sources and optics to deliver brighter, better-conditioned beams to the end-user. This conference focuses on the advances, as well as the emerging needs, in x-ray and EUV sources, optics, and applications including next-generation synchrotron sources, EUV photolithography, and x-ray astronomy.

In radiation to sources and source/optics integration, the topics covered include design, development, fabrication, installation, evaluation, and applications of optical elements such as mirrors, monochromators, multilayers, zone-plates, and lenses. It is also an aim of this conference to provide an opportunity for the developers and users to share both the progress and challenges in each of these and related areas.

Presentations on emerging needs, progress reports, and topical reviews covering the following and related topics are solicited:

- x-ray sources (synchrotron, XFEL, laboratory-based etc...)
- emerging needs in x-ray, XFEL, and EUV optics
- novel optical substrates, materials, processes, and applications
- crystal optics design, fabrication, and applications
- x-ray and EUV mirror fabrication: surface figuring and finishing techniques, capabilities, and limitations
- management of optical components under high heat/radiation load and in hostile environments
- thermal and mechanical stability of optical systems
- active/passive/adaptive shape control of optical elements
- coherence preservation and wave front quality
- coating- and multilayer-based optics and performance
- focusing optics including refractive, reflective, and diffractive optics
- filters, windows, x-ray beam position monitors
- x-ray optics for extreme spatial and/or energy resolution
- optical and x-ray metrology
- x-ray optics software and simulation.
ADAPTIVE X-RAY OPTICS V (OP315)

Conference Chairs: Daniele Spiga, INAF - Osservatorio Astronomico di Brera (Italy), SLAC National Accelerator Lab. (United States); Hidekazu Mimura, The Univ. of Tokyo (Japan)

Conference Co-Chairs: Mourad Idir, Brookhaven National Lab. (USA); Kawal Sawhney, Diamond Light Source Ltd. (United Kingdom); Maurizio Vannoni, European XFEL GmbH (Germany)

Program Committee: Raymond Barrett, ESRF - The European Synchrotron (France); Daniele Cocco, SLAC National Accelerator Lab. (USA); Vincenzo Cotroneo, Harvard-Smithsonian Ctr. for Astrophysics (USA); Ombeline de La Rochefoucauld, Imagine Optic SA (France); Guillaume Dovillaire, Imagine Optic SA (France); René Hudic, Astronomical Institute of the ASCR, v.v.i. (Czech Republic); Ali M. Khounsary, Illinois Institute of Technology (USA); Michele Manfreda, Elettra-Sincrotrone Trieste S.C.p.A. (Italy); Stephen L. O’Dell, NASA Marshall Space Flight Ctr. (USA); Michael J. Pivovaroff, Lawrence Livermore National Lab. (USA); Roberto Ragazzoni, INAF - Osservatorio Astronomico di Padova (Italy); Daniel A. Schwartz, Harvard-Smithsonian Ctr. for Astrophysics (USA); Riccardo Signorato, Strumenti Scientifici CNIT S.p.A. (Italy); John P. Sutter, Diamond Light Source Ltd. (United Kingdom); Cristian Svetina, Elettra-Sincrotrone Trieste S.C.p.A. (Italy); Hisataka Takenaka, TOYAMA Co., Ltd. (Japan); Melville P. Ulmer, Northwestern Univ. (USA); Valentina Viotto, INAF - Osservatorio Astronomico di Padova (Italy); Kazuto Yamauchi, Osaka Univ. (Japan); Philippe Zeitoun, ENSTA ParisTech (France)

Adaptive optics is a well-established technology, first developed for correcting wavefront errors due to atmospheric turbulence. Its applications are expanding into areas ranging from ophthalmology to laser communications, from industrial laser aberration corrections to microscopy. At slower cadence, active optics enables the adjustment of orientation, focal length, and low-order figure of mirrors, in order to compensate for gravitational, thermal, or manufacturing deformations.

While these applications are mainly for infrared and visible (normal-incidence) optical systems, aspects of the techniques and technologies are transferable to the x-ray regime. For example, synchrotron and free-electron laser facilities have implemented deformable x-ray (grazing-incidence) optics to some limited extent.

This conference on Adaptive X-Ray Optics, the fifth in the series, will broadly explore the extension of the tools and techniques of adaptive and active optics into the x-ray domain, both for terrestrial (laboratory) and for in-space (x-ray telescope) applications.

Topics covered include the following:

• adaptive and active optics tools
• mirror profile design (e.g., Kirkpatrick-Baez) and bending devices
• potential applications and limitations in the x-ray region
• technologies needed for adaptive and active x-ray optics
• fabrication and metrology for active optics
• thin active x-ray mirrors for astronomical applications
• x-ray beam shaping and characterization
• bimorph actuators and figure control
• optimization criteria and automatization algorithms
• in situ and at-wavelength wavefront sensing
• high-precision shape sensing and control
• thermal compensation and control
• gravity deformation corrections
• Micro Electro Mechanical Systems (MEMS) and other novel technologies for active optics.
Energy security is a significant concern for national and international economic vitality and stability. A major step towards energy independence for the global community would be the successful demonstration of thermonuclear ignition in a laboratory setting, marking an era of potentially limitless energy supply. Inertial confinement fusion is one path that may lead to this goal. Target Diagnostics Physics and Engineering for Inertial Confinement Fusion refers to the cross-disciplinary research, development, and engineering being performed at high-energy-density science facilities around the world, aimed at providing key performance data to enable scientific programs to obtain ignition. Target Diagnostics Physics and Engineering (TDPE) draws from a broad set of disciplines including, optical and materials sciences, atomic, nuclear, and plasma physics, as well as mechanical, optical, and nuclear engineering. The disciplines are brought to bear on a variety of key scientific phenomena, such as radiation and material temperatures, shock and material velocities, material dimensions, as well as, plasma phenomena such as laser matter interactions. Diagnostic techniques typically require a team of physicists, engineers, and skilled technicians, to perform the research and development required to bring new techniques to maturity, design and implement these as operational diagnostics, as well as to qualify and maintain these important scientific tools. TDPE solicits contributed papers concerning, but not limited to, the design, implementation, qualification, and operation of diagnostics, or systems addressing:

- optical techniques, such as system and target alignment, target performance, such as backscatter and velocimetry, etc...
- x-ray and gamma-ray techniques, including streaked, gated, and time integrated imaging and spectroscopy
- particle techniques, including time-of-flight, gated and time integrated imaging, and spectroscopy
- data acquisition and timing
- emerging and novel techniques, such as prompt radiochemistry, or time dilated x-ray imaging.
CALL FOR PAPERS

HARD X-RAY, GAMMA-RAY, AND NEUTRON DETECTOR PHYSICS XX (OP317)

Cospromoted by:

Conference Chairs: Stephen A. Payne, Lawrence Livermore National Lab. (USA); Ralph B. James, Savannah River National Lab. (USA); Arnold Burger, Fisk Univ. (USA); Michael Fiederle, Freiburger Materialforschungszentrum (Germany)

Program Committee: Toru Aoki, Shizuoka Univ. (Japan); Gerard Arino-Estrada, Univ. of California, Davis (USA); Jim E. Baciak Jr., Univ. of Florida (USA); Zane W. Bell, Oak Ridge National Lab. (USA); Koushik Biswas, Arkansas State Univ. (USA); Lynn A. Boatner, Oak Ridge National Lab. (USA); Aleskey E. Bolotnikov, Brookhaven National Lab. (USA); Mary Ellen Braunreuther, Brookhaven National Lab. (USA); Giuseppe S. Camarda, Brookhaven National Lab. (USA); Bill Cardoso, Creative Electron (USA); Henry Chen, eV Products, Inc. (USA); Nerine J. Chevrepy, Lawrence Livermore National Lab. (USA); Jeffrey J. Derby, Univ. of Minnesota (USA); Petro M. Fochuk, Yuriy Fedkovych Chernivtsi National Univ. (Ukraine); Jan Franc, Charles Univ. in Prague (Czech Republic); Larry Franks, Consultant (USA); Fei Gao, Univ. of Michigan (USA); Zhong He, Univ. of Michigan (USA); Keitaro Hitomi, Tohoku Univ. (Japan); Alan Janos, U.S. Dept. of Homeland Security (USA); Mercouri Kanatzidis, Northwestern Univ. (USA); KiHyun Kim, Korea Univ. (Korea, Republic of); Henric Krawczynski, Washington Univ. in St. Louis (USA); Kelvin G. Lynn, Washington State Univ. (USA); Krishna C. Mandal, Univ. of South Carolina (USA); Robert D. McLaren, Consultant (USA); Shariar Motakef, CapeSym, Inc. (USA); Sanjoy Mukhopadhyay, International Atomic Energy Agency (USA); Madan Nairula, Nagoya Institute of Technology (Japan); Utpal N. Roy, Brookhaven National Lab. (USA); Arie Ruzin, Tel Aviv Univ. (Israel); Narsingh Bahadur Singh, Univ. of Maryland, Baltimore County (USA); Michael R. Squillante, Radiation Monitoring Devices, Inc. (USA); Ashley C. Stowe, Y-12 National Security Complex (USA); Csaba Szeles, Niouos Technologies Inc. (USA); Sergey E. Ulin, National Research Nuclear Univ. MEPhI (Russian Federation); Edgar V. van Loef, Radiation Monitoring Devices, Inc. (USA); Aaron L. Washington II, Savannah River National Lab. (USA); Richard T. Williams, Wake Forest Univ. (USA); Ge Yang, North Carolina State Univ. (USA); Kan Yang, Saint-Gobain Crystals (USA); Ren-Yuan Zhu, California Institute of Technology (USA)

Advances continue to be made in hard x-ray, gamma-ray, neutron detectors and associated technologies for spectroscopy and imaging of these energetic photons and particles. Many types of position and energy sensitive detectors are actively being developed, including semiconductor detectors and arrays, high-density noble gas detectors, phosphors, scintillators, thin film transistor arrays, charge-coupled devices, microchannel plates, and calorimetric detectors. These detectors are being employed singly, or in conjunction with optical components and x-ray/gamma-ray sources to produce systems having important applications ranging from medical diagnostics and treatment to astronomical research. Important examples include nuclear medicine, dental imaging, dosimetry, industrial radiography, nondestructive testing, heavy metals analysis, cargo inspection, nuclear safeguards and surveillance, treaty verification, explosives detection, and environmental monitoring. This conference will provide rapid dissemination of the latest results from the forefront of research on hard x-ray, gamma-ray and neutron detector physics through seminal invited papers and qualified contributed papers from academic, government, and industry researchers.

Important new results are solicited concerning, but not limited to, the following general areas:

- theory of hard x-ray and gamma-ray detector operation
- design, fabrication, and testing of new devices for direct and indirect photon detection
- advanced room-temperature semiconductor materials such as: CdZnTe; CdTe; Si; LiInSe 2; HgI 2; PbI 2; InP; GaAs; BiI 3; TIBr; InI; CdSe; ZnSe; polycrystalline films; amorphous Si; and amorphous Se
- semiconductor and scintillator crystal growth and characterization
- electrical contacts and their effects on device response
- scintillator physics, scintillator/PM tube devices, scintillating fiber optics, phosphors
- scintillator/semiconductor array devices (such as Si-APD and Si-PM)
- microchannel plates
- gaseous and liquid medium detectors
- calorimeters
- low-temperature detection systems
- development of neutron and charged particle detectors
- advanced readout electronics including smart-spars charge amplifier arrays, CCDs, CIDs, TFTs
- development of electronic techniques to compensate for material deficiencies
- radiation damage, aging, and environmental effects
- spatial, energy, and timing sensitivity and resolution
- compact, low power handheld devices for spectroscopy and/or imaging
- fabrication and tests of stripped pixel arrays and discrete detectors
- development of the detectors for space, cargo inspection, nondestructive testing, dosimetry, x-ray fluorescence, environmental, industrial, security, safeguards, and surveillance applications.
RADIATION DETECTORS IN MEDICINE, INDUSTRY, AND NATIONAL SECURITY XIX (OP318)

Conference Chairs: Gary P. Grim, Lawrence Livermore National Lab. (USA); Lars R. Furenlid, The Univ. of Arizona (USA); H. Bradford Barber, The Univ. of Arizona (USA)

Program Committee: Stuart A. Baker, National Security Technologies, LLC (USA); Yonggang Cui, Brookhaven National Lab. (USA); F. Patrick Doty, Sandia National Labs. (USA); Patrick Feng, Sandia National Labs. (USA); Paul P. Guss, National Security Technologies, LLC (USA); Geoffrey Harding, Morpho Detection (Germany); Khalid M. Hattar, Sandia National Labs. (USA); Ralph B. James, Savannah River National Lab. (USA); Edward S. Jimenez, Sandia National Labs. (USA); Will E. Johns, Vanderbilt Univ. (USA); Michael J. King, Rapiscan Systems Labs. (USA); Edward A. McKigney, Los Alamos National Lab. (USA); Wondwosen Mengesha, Sandia National Labs. (USA); Frank E. Merrill, Los Alamos National Lab. (USA); Rex A. Moats, The Univ. of Southern California (USA); Vivek V. Nagarkar, Radiation Monitoring Devices, Inc. (USA); Eiichi Sato, Iwate Medical Univ. (Japan); Michael R. Squillante, Radiation Monitoring Devices, Inc. (USA)

Radiation detectors are used to detect energetic ionizing radiation such as: gamma rays, x-rays, protons, alpha particles, neutrons, and beta particles (electrons and positrons). Radiation-detector technologies span a wide range of applications of benefit to mankind. Examples include: medical imaging, biomedical research, nuclear safeguards, and nonproliferation, explosives detection and threat reduction, nondestructive testing, and materials research. Energetic ionizing radiation presents unique challenges to the designers of components and systems, due to the nature of its interactions with matter. This conference provides an interdisciplinary forum for detector-materials developers, instrument designers and users to report on recent results, improvements, and new approaches for using ionizing radiation. Emphasis is on new detector materials, novel applications, and imaging. Contributed papers are solicited concerning, but not limited to:

• new applications of semiconductor detectors (CdZnTe, CdTe, TlBr, Ge, Si, etc.)
• detector applications of novel scintillators (LaBr₃:Ce, LaCl₃:Ce, elpasolites, SrI₂, etc.)
• new imaging configurations for PET or SPECT
• medical imaging systems that use adaptive imaging strategies
• collimators for imaging optics for medical x-ray or gamma-ray imaging
• multi-modality medical imaging systems
• pixelated imagers for digital radiography
• small gamma cameras or detector systems for intraoperative use
• improved detectors for portal imaging
• metrology for new clinical radiology systems
• gamma-ray or x-ray microscopy
• nuclear safeguards
• nondestructive test and evaluation
• materials characterization
• homeland security
• elemental analysis in rock, coal, and minerals
• explosives detection
• neutron imaging
• coded-aperture imaging
• Compton imaging
• novel sources of penetrating radiation
• high-speed pulse and spectral processing
• neutron scattering instrumentation
• gamma-ray and neutron radiography
• nuclear chemistry
• process monitoring and control.

Advances in electro-optic technologies and data acquisition and analysis techniques by commercial, academic, and governmental research institutions have promoted the successful on-orbit operation of hyperspectral Earth remote sensing instruments and enabled the development of lower-cost, miniature satellite sensors with specific areas of performance equal to or better than those of traditional systems. Lastly, space agencies continue to formulate and/or refine their long term mission plans. For example, in response to the 2007-2017 U.S. National Research Council's Decadal Survey on Earth Science and Applications from Space, several NASA missions are in the pre-formulation or formulation stages. Meetings continue in preparation and publication of the 2017-2027 Decadal Survey. Also in response to the Decadal Survey, the NASA Earth Venture (EV) class of science-driven, full-orbital missions, sub-orbital missions, and instruments are underway. ESA and EUMETSAT continue instrument formulation and launch planning for their future Earth Explorers, follow-on Copernicus Sentinel Missions, Meteosat Third Generation (MTG), and EUMETSAT Polar System-Second Generation (EPS-SG) programs.

In summary, the Earth Observing Systems XXIII conference welcomes the submission of papers over a wide range of remote sensing topics. Papers are solicited in the following general areas:

- Earth-observing mission studies including new system requirements and plans
- commercial system designs
- electro-optical sensor designs and sensitivity studies
- ultraviolet through thermal infrared, microwave, radar, and lidar remote sensing systems
- hyperspectral remote sensing instruments and methodologies
- instrument sub-system and system level pre-launch and on-orbit calibration and characterization
- vicarious calibration techniques and results
- satellite instrument airborne simulators
- techniques for enhancing data processing, reprocessing, archival, dissemination, and utilization
- conversion from research to operational systems
- on-orbit instrument inter-comparison techniques and results
- enabling technologies (optics, antennas, electronics, calibration techniques, detectors, and models)
- sensor calibration traceability, uncertainty, and pre-launch to on-orbit performance assessments.
A great deal of knowledge about the Earth’s environment and about space (including outer space) has recently been acquired using infrared remote sensing and astronomical techniques. In this conference we plan to bring together scientists and engineers involved with the design, engineering, and data analysis of existing and future infrared remote sensing instruments, including scientific returns obtained from remotely collected data.

Areas of interest include:

- scientific objectives for future missions
- scientific results for those missions that have flown
- instrument design requirements to meet mission objectives and the resultant design and implementation experiences
- sensor technology challenges in meeting instrument requirements
- instrument and sensor integration challenges and experiences
- planned and required enabling technologies.

Papers are solicited on the following and related topics:

**REMOTE SENSING FUNDAMENTALS**
- radiometry and energy throughput
- imaging
- fundamental limits to IR imaging, including detector quantum noise and background limit
- stray light considerations, including analysis, signal-to-noise, and instrument performance limitations
- instrument calibration, comparison of predicted and measured results
- space environment and radiation effects
- calibration and testing
- data analysis
- standards and characterization of components and materials
- IR/electro-optical system modeling and simulations
- non-contact and non-invasive technique.

**INSTRUMENT OBSERVATIONAL FACILITIES**
- Planck Observatory
- James Webb Space Telescope
- SPICA Far-IR Facility
- SAFIR Telescope
- Darwin
- IRTF
- SOFIA
- HERSCHEL.

**INSTRUMENTS AND THEIR SCIENTIFIC RETURNS**
- bolometers
- spectrometers
- imaging cameras
- photometers (multiband)
- radiometers
- imaging and nonimaging interferometers
- microcameras
- interferometer.

**REMOTE SENSING**
- Earth resource mapping
- atmosphere and weather prediction
- space exploration
- remote calibration.

**ENABLING TECHNOLOGIES**
- sensor design
- cold read-out electronics
- infrared materials.

**INFRARED TELESCOPES FOR EARTH REMOTE SENSING, FOCAL PLANE TECHNOLOGY, AND DETECTION SCHEMES**
- near-IR detectors
- IR detectors
- far-IR detectors
- sub-mm detectors
- focal plane layout and architecture.
CALL FOR PAPERS

INFRARED SENSORS, DEVICES, AND APPLICATIONS VIII (OP433)

Conference Chairs: Paul D. LeVan, Air Force Research Lab. (USA); Priyalal Wijewarnasuriya, U.S. Army Research Lab. (USA); Arvind I. D’Souza, DRS Sensors & Targeting Systems, Inc. (USA)

Program Committee: Sachidananda R. Babu, NASA Goddard Space Flight Ctr. (USA); Enrico Bellotti, Boston Univ. (USA); Vincent M. Cowan, Air Force Research Lab. (USA); Eric A. DeCuir Jr., U.S. Army Research Lab. (USA); Eustace L. Dereniak, College of Optical Sciences, The Univ. of Arizona (USA); Nibir K. Dhar, U.S. Army Night Vision & Electronic Sensors Directorate (USA); Sarath D. Gunapala, Jet Propulsion Lab. (USA); Sanjay Krishna, Ctr. for High Technology Materials (USA); Jay S. Lewis, Defense Advanced Research Projects Agency (USA); Hooman Mohseni, Northwestern Univ. (USA); Hiroshi Murakami, Japan Aerospace Exploration Agency (Japan); Ünal Sakoglu, Univ. of Houston-Clear Lake (USA); Ashok K. Sood, Magnolia Optical Technologies, Inc. (USA)

The detection of infrared radiation has proven to be a viable tool in environmental studies, homeland security, and in medical, automotive, and military applications. This conference will provide a venue for papers ranging from basic device physics to novel applications. Improvements in infrared sensing & imaging relating to improvements in feature size for the read-out integrated circuit (ROIC) fabrication and compositional and doping control for the detector layer, have led to new opportunities for meeting the needs of the terrestrial, air, and space user communities. Unique IR device structures have been shown to evolve from new capabilities in the nanotechnology realm. Recent developments in novel detector materials, including those for strained superlattice and barrier architectures, promise significant technological advances. Room temperature infrared detectors for terrestrial use also benefit from these advancements. Various read-out circuit architectures allow functionality for higher-performance cooled IR focal plane arrays, and also permit increased capabilities. We are also seeking papers that expand the state-of-the-art in novel pixel readout approaches, improved signal processing, and lower cost, including the digital flow of data off the FPA in the form of LVDS, for example.

The conference is a high-level forum bringing together scientists and engineers involved in the research, design, and development of infrared sensors and focal plane arrays.

Papers are solicited for infrared technology, including the following topics:

NOVEL DETECTOR MATERIALS AND ARCHITECTURES
• SWIR, MWIR, LWIR, and VLWIR detectors
• materials (e.g., InSb, HgCdTe, InAsSb)
• nanotechnology-based EO/IR detectors/ Arrays
• nano-/microbolometers
• HgCdTe (MCT) technology
• HgCdTe detector growth on alternative substrates
• III-V strained-layer superlattice detector technology
• higher-operating temperature infrared detectors
• high sensitivity at low photon flux detectors / applications
• UV, visible and IR avalanche photodiodes.

MODELING OF IR OPTOELECTRONIC DEVICES AND MATERIALS
• carrier transport models for novel IR materials
• carrier transport models for super lattices and quantum devices
• simulation techniques for detector arrays
• optical and electrical simulation models for crosstalk, modulation transfer functions and photon recycling
• models for point and extended defects and their impact on device performance
• novel numerical approaches for large scale IR detector and array simulation.

FOCAL PLANE ARRAYS, READ-OUT INTEGRATED CIRCUITS, AND COMPONENTS
• FPA signal and data processing, both on- and off-Chip
• electronic readout image intensifier devices
• smart focal planes
• diffractive optics on the FPA
• advanced microchannel plates
• photon-counting technology
• image intensification
• improved photocathodes
• plasmonics.

APPLICATIONS OF IR TECHNOLOGY
• terrestrial, air, and space sensors
• multispectral sensors
• imaging spectrometer applications
• imaging polarimeter applications
• infrared imaging for next generation smart phones
• space-based sensing applications
• industrial & structural applications
• automotive applications
• medical applications
• cameras for low light levels
• unmanned autonomous vehicle cameras.

ADVANCED CHARACTERIZATION TECHNIQUES
• energetic particle radiation effects
• anomalous noise sources
• responsivity and frequency response
• cryogenic and ultra-low noise.
Remote sensing and related geospatial technologies are providing opportunities for natural and managed ecosystems monitoring and management that have been heretofore unavailable. Ecosystems are sensitive to changes caused by both natural events and human activities. Concerns about water availability and quality, sanitation, loss of biodiversity, invasive species, elevated CO2, nitrogen deposition, sustainable soil fertility and food production, land use and land cover change, ecosystem degradation, human social systems (urbanization), health and hygiene, environmental policy, disease of pests, plants, and humans require community effort and new technologies. Enhanced monitoring capabilities are essential for early detection, assessment, and mitigation of changes that can indicate harm to the environment. Remote sensing and geospatial information technologies are able to monitor and, therefore, oversee how human activities impact the environment on local, regional, national, and global scales. Integrated system models increase the capability to simulate, evaluate, understand, and ultimately predict ecosystem changes and their interactions with other natural processes and human activities as well as consequent impacts. Scientists are applying advanced remote sensing technologies and integrated system models to solve problems that are facing our resource managers as well as stakeholders. This conference is designed to focus on the use of remote sensing and models for sustainability in agriculture, forest, hydrology, ecology, wetland, and arid and semi-arid ecosystems to improve our fundamental understanding of the Earth’s biophysical processes and their interactions with other natural variations and human activities, and to develop and improve techniques for analyzing and interpreting remotely sensed data from Earth observation systems.

In addition to papers on current applications of remote sensing to natural ecosystems management, this conference will also give special attention to the subject of the future of space-based and airborne observations. Example topics include, but are not limited to, the most recent or planned new instrument launches; technology impacts on the requirements for post-launch reconfigurability; management of extremely high-data volumes; and innovative approaches to minimizing the effects of atmospheric confounders.

We are seeking contributions to this conference from the following research areas:

* Remote sensing in ecosystems (agriculture, forest, grassland, wetland, arid and semi-arid lands) assessment and monitoring
* Specific parameter retrievals using ultraviolet, visible, infrared, microwave and Lidar techniques
* Aircraft and ground-based sensor systems
* New and future satellite observing systems for ecosystems
* Site-specific agricultural management
* Agricultural/forestall yield and monitoring
* Remote sensing of the hydrological cycle including soil moisture, water quality, and open water
* Bioproduction and resources sustainability
* Land cover dynamics, including land cover classification and degradation assessment
* Remote sensing for urbanization impacts
* Assimilating remotely sensed variables into functional models, such as agricultural/forestall ecological/hydrological models
* Compare and/or combine different sources of remotely sensed data, techniques to combine remotely sensed data with ground observations
* Development and application of integrated models for objective evaluation, better understanding and improved prediction of ecosystem changes and interactions with climate, other natural variations, and human activities.

In addition to papers on current applications of remote sensing to natural ecosystems management, this conference will also give special attention to the subject of the future of space-based and airborne observations. Example topics include, but are not limited to, the most recent or planned new instrument launches; technology impacts on the requirements for post-launch reconfigurability; management of extremely high-data volumes; and innovative approaches to minimizing the effects of atmospheric confounders.
CALL FOR PAPERS

IMAGING SPECTROMETRY XXII: APPLICATIONS, SENSORS, AND PROCESSING (OP435)

Conference Chairs: John F. Silny, Raytheon Space & Airborne Systems (USA); Emmett J. Ientilucci, Rochester Institute of Technology (USA)

Program Committee: Robert D. Fiete, Harris Corp. (USA); Ronald B. Lockwood, MIT Lincoln Lab. (USA); Pantazis Mouroulis, Jet Propulsion Lab. (USA); Mario Parente, Univ. of Massachusetts Amherst (USA); Robert Sundberg, Spectral Sciences, Inc. (USA)

The newest scientific and commercial imaging spectro-radiometers collect high signal-to-noise ratio data with simultaneously high spectral and spatial resolution. The design of these systems and the availability of high information-rich data pose unique challenges to system designers and data analysts. These challenges include: opto-mechanical sensor designs, system trade-offs, calibration, on-board processing, compression, data exploitation, and atmospheric correction. Equally important is the understanding of hyperspectral phenomenology and its translation into useful exploitation tools for the scientific community.

We also understand the emergence of low-cost and easy-to-use Unmanned Aerial Systems (UAS), coupled with newly designed compact spectral sensors and near real-time processing, has led to an explosion of imaging spectrometry in multiple applications, such as: precision agriculture, food safety, law enforcement, search and rescue, and infrastructure inspection.

SPECIAL FOCUS ON EMERGENCY RESPONSE, DISASTER RECOVERY, AND REMEDIATION:

The year 2017 witnessed a number of devastating natural disasters and catastrophic events, including the magnitude-7.1 earthquake that shook Mexico City, and hurricanes Maria and Irma that swept through Puerto Rico and parts of Florida. This year’s conference is soliciting tools, techniques, algorithms, and hardware that can be used to predict, monitor, assess, and recovery from natural disasters.

Areas of general interest are active and passive sensors; spectrometer sensor system designs and trade-offs; near-real-time and automated processing of hyperspectral data; techniques to detect, classify, identify, and map objects, emissions, and physical phenomena in spectral data; fusion of remote sensing data from disparate sensors and wavelength regions to enhance the value of remotely sensed data.

Papers are solicited in all areas of Imaging Spectrometry, including:

PHENOMENOLOGY AND APPLICATIONS

• emergency response, disaster recovery, and remediation
• geology and mineralogy for earth and planetary applications
• ocean, coastal ocean, and inland waters
• vegetation monitoring and health assessment
• homeland security, defense, and cartography
• atmospheric temperature and water vapor sounding
• chemistry and air pollution
• meso- and micro-scale applications: in-situ, process control, biology, medicine, microscopy, forensics.

SENSOR DESIGN AND IMPLEMENTATION

• active and passive spectrometer design and development for all spectral regions from the UV to the thermal IR, for space, airborne, and ground-based systems
• verification and calibration methods and techniques
• simulation techniques in sensor design and characterization
• sensor artifact assessment and suppression
• novel architectures and spectrometer designs
• enabling technologies.

DATA PROCESSING AND EXPLOITATION

• real-time and off-line data processing and exploitation methods and algorithms
• spectral signature libraries and databases
• laboratory and field measurement data-collection techniques
• physics-based spectral phenomenology understanding and modeling
• atmospheric correction techniques
• Radiative transfer modeling
• advances in detection, classification, and characterization
• sensor and data fusion.

Invited speakers will highlight major developments and survey the state-of-the-art in their fields.
CUBESATS AND NANOSATS FOR REMOTE SENSING II (OP436)

Conference Chairs: Thomas S. Pagano, Jet Propulsion Lab. (USA)
Conference Co-Chairs: Charles D. Norton, Jet Propulsion Lab. (USA)

Program Committee: Sachidananda R. Babu, NASA Goddard Space Flight Ctr. (USA); William J. Blackwell, MIT Lincoln Lab. (USA); Siegfried W. Janson, The Aerospace Corp. (USA); Clarence M. Korendyke, U.S. Naval Research Lab. (USA); Pamela Millar, NASA Goddard Space Flight Ctr. (USA); Pantazis Mouroulis, Jet Propulsion Lab. (USA); Jeffery J. Puschell, Raytheon Space and Airborne Systems (USA); Michael S. Seabloom, NASA Headquarters (USA); Charles M. Swenson, Utah State Univ. (USA); Thomas H. Zurbuchen, Univ. of Michigan (USA)

Advances in electro-optic remote sensing technologies now enable measurements to be made in a fraction of the size once required in earlier systems. Miniaturization of critical instrument technologies including optical systems, electronics, mechanisms, cryocoolers and sensors as well as increases in the density of semiconductor electronics and detector arrays now enable instruments to be made significantly smaller while achieving the same or better performance. Additionally, spacecraft technologies including navigation, C&DH, communications, power systems, and structures can be made in a fraction of the size enabling the entire satellite and instrument to be housed in “CubeSats” (where a single “U” is 10x10x10cm), and “NanoSats” where satellites are significantly smaller than traditional but not necessarily in the “U” form factor. These technologies lead to a significant reduction in instrument, spacecraft and launch costs, building robustness into current remote sensing programs and enabling new measurements to be made through more opportunity and through constellations of satellites to improve revisit time. Numerous challenges remain, including achieving legacy performance in a small package, power and data rate limitations, and mission reliability.

This conference is intended to explore all aspects of remote sensing with CubeSats and NanoSats including:

**PAYLOAD TECHNOLOGIES**
- Instrument systems to support remote sensing of Earth, moon, planets, comets, asteroids
- Optics: including telescopes, spectrometers, imagers, etc.
- Sensors: UV, visible, infrared, microwave, radar, lidar, fields and particles
- Telecom: Satellite-to-satellite, satellite-to-ground communications. High data rate solutions
- Electronics: In-flight demonstrations of novel electronic designs and payload electronic architectures
- Mechanical Systems: Packaging approaches enabling smaller instruments.

**SPACECRAFT TECHNOLOGIES**
- Power Management: Batteries, solar panels
- Communications: Transmitters, receivers
- Navigation and Pointing Control: Star trackers, GPS, propulsion
- De-orbit Strategies and Technologies
- Flight Computers and On-board Signal Processing
- Mechanical Aspects: Bus structure, materials, packaging, vibration and thermal control.
LASER COMMUNICATION AND PROPAGATION THROUGH THE ATMOSPHERE AND OCEANS VII (OP441)

Conference Chairs: Jeremy P. Bos, Michigan Technological Univ. (USA); Alexander M. J. van Eijk, TNO Defence, Security and Safety (Netherlands); Stephen M. Hammel, Space and Naval Warfare Systems Command (USA)

Program Committee: Larry C. Andrews, Univ. of Central Florida (USA); Jaime Anguita, Univ. de Los Andes (Chile); Shlomi Arnon, Ben-Gurion Univ. of the Negev (Israel); Sukanta Basu, Delft Univ. of Technology (Netherlands); Matthew M. Bold, Lockheed Martin Space Systems Co. (USA); Mikhail I. Charnotski, MC Consulting (USA); Gang Chen, Univ. of California, Riverside (USA); Christopher C. Davis, Univ. of Maryland, College Park (USA); Robert J. Grasso, RJG Consulting (USA); Vladimir B. Markov, Advanced Systems & Technologies, Inc. (USA); Ronald L. Phillips, Florida Space Institute (USA); William S. Rabinovich, U.S. Naval Research Lab. (USA); Karin Stein, Fraunhofer-Institut für Optronik, Systemtechnik und Bildauswertung (Germany); Miranda van Iersel, MvI Consultancy (Netherlands); Thomas Weyrauch, Univ. of Dayton (USA); Otakar Wilfert, Brno Univ. of Technology (Czech Republic)

The objective of this conference is to provide a forum for researchers, product engineers, and systems developers to present and discuss the latest developments in communication and imaging systems for commercial and defense applications and to stimulate interdisciplinary discussions of atmospheric turbulence and propagation phenomena and their impact on these systems.

The effects of the atmosphere and oceans on optical propagation can often be the limiting performance factor in many optical system applications. The primary factors in beam degradation are absorption and scattering, large-scale refractive effects, and optical turbulence. For many applications, it is necessary to understand how these factors can be predicted and modeled. Specific environments remain difficult for beam propagation models: long horizontal propagation paths near or through the ocean surface or near the land surface can encounter large vertical gradients in turbulence intensity and in extinction. Inhomogeneous regions such as coastal areas, mountains, or urban islands are difficult to simulate.

High data rate directional free-space optical (FSO) communication remains an emerging technology with a number of technical challenges preventing widespread acceptance and implementation. The focusing and transmission of directed laser energy through the atmosphere, space, and air-water interfaces involves problems related to signal reception, tracking, steering, pointing, laser-beam propagation, laser speckle, rain effects, system design, and information processing. For imaging systems, atmospheric effects may lead to serious degradation of image quality, e.g., through contrast reduction, blurring and scintillation. There is a need for a description of turbulence in terms of environmental parameters, in terms of its impact on image quality, and in terms of image processing techniques to improve image quality by removing turbulence effects.

We encourage submissions that address:

• The use of high-resolution NWP (numerical weather prediction) to produce propagation predictions for inhomogeneous regions,
• Application of remote sensing tools such as LIDAR or radar to describe the atmospheric propagation environment,
• Self-focusing effects of Ultra-Short Pulse Lasers (USPL) in the atmosphere to provide remote beacons,
• Optimal configurations of USPL for filamentation and propagation.

Papers are solicited in the following and related areas:

• measurement and modeling of the effects of turbulence, aerosols, rain and particulates on laser beam propagation and imaging systems
• critical analyses of the current state-of-the-art propagation and radiance codes
• novel techniques for rapid target acquisition, laser beam pointing, and tracking
• laser and hybrid (combination of laser and RF) communications: advanced techniques and issues
• atmospheric effects on high data rate FSO data links (including pulse broadening)
• underwater FSO communications
• techniques for mitigation of atmospheric effects, including error correction coding techniques
• adaptive optics and other mitigation techniques for FSO and imaging systems
• Modeling of oceanic and atmospheric distortions using scene-based rendering
• Modeling and mitigation of extreme anisoplanatism
• Light-field approaches to imaging through turbulence
• optical components including modulated retro-reflectors for free-space laser communication systems
• novel optical receivers and architectures to improve link SNR and reliability
• experimental demonstrations, tests, and performance characterizations in laboratory and field.
Quantum communications and quantum imaging are emerging technologies that promise great benefits beyond classical communications and classical imaging - as well as great challenges. The objective of this conference is to provide a forum for scientists, researchers, and system developers in both fields and encourage technology exchange between the quantum communication and quantum imaging research communities. Papers are solicited on the following and related topics:

**QUANTUM COMMUNICATIONS, QUANTUM INTERNET, AND QUANTUM INFORMATION**

- quantum free-space and fiber optics communications and cryptography
- quantum communications experimental demonstrations
- quantum key distribution (QKD), entangled QKD, stochastic QKD, heralded QKD
- quantum cryptography protocols
- quantum probes
- quantum communication security
- quantum communications with orbital angular momentum (OAM) states
- quantum communication using entanglement
  - teleportation; continuous variable teleportation counter-factual quantum communications
  - Bell-state analyzer development
  - nonlinear crystal and nonlinear fiber use in generating and engineering entanglement
  - multiphoton and multiple-particle entangled states and entangled beams
  - continuous and pulsed laser sources of entangled photons
- fundamental properties of the photon
  - qubit physics
  - single and multi-photon physics
  - squeezed states
  - slow/trapped light and photons
  - amplification and transmission of photon holes
  - quantum wavefunctions & measurements
  - quantum probability
  - quantum bi-photon physics
  - frequency & polarization entanglement
- atmospheric quantum communication, satellite, and technology applications
  - quantum satellites, quantum cube satellites
  - quantum UAV, drone, robot and aircraft research and applications
  - atmospheric effects on quantum communications systems
  - atmospheric quantum communication propagation experiments, theory, simulation

- quantum computing with photons
  - optical/photonic/fiber quantum computing; novel quantum computing
  - photon chips
  - quantum storage, gates, and control
  - single-photon sources
  - quantum algorithms
  - fine-grained quantum computing; few-qubit quantum computing
  - quantum state engineering
  - quantum random number generation
- quantum information communication
  - information in a photon
  - quantum data compression
  - compressive sensing and compressive imaging with quantum information
  - nonclassical information from entangled states and non-entangled states
  - non-local measurements
  - quantum secret sharing
- quantum networks
  - atom-photon quantum networks
  - quantum repeaters, memories, switches
  - entanglement of distant quantum memories
  - distributed quantum computing
  - atom chips
  - atom-ion optics; multiphoton interference, multiparticle interference
  - storage of entangled photons
  - photon frequency conversion
  - loop-hole-free quantum teleportation.

**QUANTUM IMAGING AND QUANTUM SENSING**

- quantum ghost imaging, ghost imaging
  - quantum imaging with entangled photons
  - quantum imaging with thermal light
  - incoherent light and solar light quantum imaging
  - quantum imaging in turbulence and obscurants
  - quantum imaging and satellites
  - color and multispectral quantum imaging
  - quantum imaging at diverse wavelengths
  - quantum imaging and quantum lithography: bi-photon photo resist
  - bi-photon and n-photon quantum imaging
  - quantum holography and quantum identification
- quantum imaging resolution and superresolution
- quantum imaging with sparsity constraints
- quantum imaging noise reduction
- quantum imaging for medical applications
- quantum imaging using fluorescence
- temporal and spatial quantum / ghost imaging
- plenoptic quantum imaging
• nonlocal quantum imaging physics
- quantum versus classical imaging physics
- quantum imaging versus speckle imaging
- uncertainty principle in quantum imaging
- quantum interference; multiphoton interference
- squeezed states
• quantum remote sensing; quantum sensors; quantum sources
- quantum two-photon sensing and detection
- single-photon and multiphoton detectors
- quantum measurements using cameras
- fast, sensitive cameras for quantum technology
- quantum lidar and quantum ladar
- new ways to make entangled photon and pseudo thermal sources for quantum imaging
- quantum illumination
• quantum relativity, GPS, and metrology
- quantum clock synchronization
- quantum clocks in quantum coincidence measurements.

Critical Dates

ABSTRACT DUE DATE
7 February 2018

AUTHOR NOTIFICATION
The contact author will be notified of abstract acceptance by email no later than 16 April 2018

MANUSCRIPT DUE DATE FOR ON-SITE PROCEEDINGS
27 June 2018 (conference OP312 only)

MANUSCRIPT DUE DATE
25 July 2018 (except conference OP312)

Please Note: Submissions imply the intent of at least one author to register, attend the symposium, present the paper as scheduled, where it is an oral or poster presentation, and submit a full manuscript by the deadline.
The combination of novel imaging techniques, sophisticated synthesis and reconstruction algorithms, and powerful digital computers promises revolutionary advances in high-resolution imagery with higher information content than that offered by conventional imagery. Evolving techniques have exploited diverse properties of the electromagnetic field and novel measurement schemes. The digital computer has become an important tool in the synthesis of high-resolution imagery from measurements and the subsequent analysis and interpretation. Application areas include long-range imaging through atmospheric turbulence, optical and electron microscopy, synthetic aperture imaging, 3- and 4D imaging, tomographic imaging, biological imaging, and imaging of nanostructures. Applications in, ultrasonic, x-ray CT, MRI, optical diffusion, optical coherence, laser imaging, optical and radio astronomy, optical and electron microscopy, x-ray and electron crystallography, molecular imaging, geophysical imaging (atmospheric profiling, ocean acoustic, seismic, etc.) are requested.

The objective of this conference is to bring together scientists and researchers interested in the development of a) unconventional imaging and wavefront sensing techniques and scientific interpretation and analysis of the imagery with enhanced information content, and b) methods and algorithms for reconstructing images of physical or biological systems or objects from measured data that are incomplete, in the sense that they do not, by themselves, allow a direct computation of a useful and quantitative image.

Therefore, we seek papers that:
• describe novel imaging using unconventional means of sensing, collection, data processing, and interpretation;
• address space-based, airborne, and ground-based adaptive optical systems and laser systems, including those requiring compensation for extended path aberrations, high-speed aberrations, aero-optics effects, and highly scintillated optical fields;
• seek to design effective and efficient algorithms for processing different kinds of available data and constraints to obtain solutions to many kinds of sensing and imaging applications.

Papers from industry, government, academia, and other research organizations are solicited on the following and related areas:

**IMAGING**
- imaging and system modeling and regularization
- imaging from active or passive illumination
- imaging from image-plane measurements, pupil-plane measurements, or both
- probabilistic and Bayesian methods for inverse problems
- imaging from diversity measurements, including phase diversity, polarization diversity, aperture diversity, wavelength diversity, and wavefront sensing
- imaging using ultrafast pulses
- radar, lidar, and sonar imaging
- biological and molecular imaging
- imaging of, or through turbulent, refracting, or highly scattering media
- profile inversion
- wavefield propagation
- synthetic aperture imaging
- nanoimaging
- mm wave imaging
- phase retrieval, superresolution, and deconvolution
- multispectral and hyperspectral imaging
- coded aperture imaging
- compressive sensing & 3D and surface reconstruction and computer vision
- information-theoretic limits for image recovery and synthesis
- experimental results or hardware related to the implementation of unconventional imaging systems
- low-light imaging
- computationally efficient algorithms
- applications in remote sensing, medicine, biology, geophysics, etc.
- reconfigurable diffractive optical systems
- probabilistic and Bayesian methods for inverse problems.
WAVEFRONT SENSING AND CONTROL
• high-resolution and large-range wavefront aberration sensing and analysis
• wavefront sensing with extended, noncooperative beacons
• high-resolution, high-speed, and large-range wavefront phase modulation including mechanically deformable mirrors, membrane-based mirrors, MEMS mirrors, LCOS phase modulators, and OASLMs scene-based wavefront sensing
• advances in gradient, curvature, and interferometric wavefront sensors
• advanced wavefront control systems for applications such as ground-to-ground imaging, retinal imaging, confocal microscopy, ultrashort pulse shaping, fiber coupling, laser communications, laser designation, astronomy, and wavefront control inside laser cavity
• analysis of nonlinear systems, devices, and processes for imaging, wave propagation, and information processing as it relates to wavefront spatio-temporal dynamics
• dynamic measurement, control, and correction approaches for severely aberrated optics and flexible optics
• wide dynamic range wavefront sensing and control including severe aberration control and nonmechanical beam steering
• ophthalmological applications of adaptive optics and wavefront sensing
• artificial turbulence generation, dynamics, and measurement.
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- If you haven’t yet chosen a conference to submit to, browse to locate a conference from one of the three areas:
  NanoScience + Engineering
  Organic Photonics + Electronics
  Optical Engineering + Applications

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- Please also submit a 100-word text summary suitable for early release. If accepted, this summary text will be published prior to the meeting in the online or printed programs promoting the conference.
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- Only original material should be submitted.
- Abstracts should contain enough detail to clearly convey the approach and the results of the research.

- Commercial papers, papers with no new research/development content, and papers where supporting data or a technical description cannot be given for proprietary reasons will not be accepted for presentation in this conference.
- Please do not submit the same, or similar, abstracts to multiple conferences.

**REVIEW, NOTIFICATION, AND PROGRAM PLACEMENT INFORMATION**

- To ensure a high-quality conference, all submissions will be assessed by the Conference Chair/Editor for technical merit and suitability of content.
- Conference Chair/Editors reserve the right to reject for presentation any paper that does not meet content or presentation expectations.
- The contact author will receive notification of acceptance and presentation details by e-mail no later than 16 April 2018.
- Final placement in an oral or poster session is subject to the Chairs’ discretion.

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**Critical Dates**

**ABSTRACT DUE DATE**
7 February 2018

**AUTHOR NOTIFICATION**
The contact author will be notified of abstract acceptance by email no later than 16 April 2018

**MANUSCRIPT DUE DATE**
25 July 2018
GENERAL INFORMATION

VENUE
SPIE Optics + Photonics 2018 will be held at the San Diego Convention Center, 111 West Harbor Dr., San Diego, CA 92101 and at the San Diego Marriott Hotel & Marina located adjacent to the Convention Center at 333 West Harbor Dr., San Diego.

REGISTRATION
SPIE Optics + Photonics registration will be available April 2018.
All participants, including invited speakers, contributed speakers, session chairs, co-chairs, and committee members, must pay a registration fee. Authors, coauthors, program committee members, and session chairs are accorded a reduced symposium registration fee.

Fee information for conferences, courses, a registration form, and technical and general information will be available on the SPIE website in April 2018.

HOTEL INFORMATION
Opening of the hotel reservation process for SPIE Optics + Photonics is scheduled for April 2018. SPIE will arrange special discounted hotel rates for SPIE conference attendees.
The website will be kept current with any updates.

STUDENT TRAVEL GRANTS
A limited amount of contingency student travel grants will be awarded based on need. Grant applications can be found in the Student Member area of www.SPIE.org, under the Student Author Travel Grants section. Applications will be accepted from 16 April 2018 to 11 June 2018. Eligible applicants must present an accepted paper at this meeting. Offer applies to undergraduate/graduate students who are enrolled full time and have not yet received their PhD.

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If government and/or company clearance is required to present and publish your presentation, start the process now to ensure that you receive clearance if your paper is accepted.

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