Frontiers in Optics | Laser Science 2014

Frontiers in Optics 2014 Wraps Up After Week of Cutting Edge Research, Applications and New Products in Optics and Photonics

OSA's 98th Annual Meeting, Frontiers in Optics 2014, wrapped up today in Tucson, Ariz. USA. FiO featured five days of technical sessions, special symposia, tutorials, business programming, exhibits and special events—all highlighting the latest research and applications of optical technologies. Collocated with the American Physical Society Division of Laser Science's 30th annual meeting, FiO brought together attendees from around the world – and had more than 600 presentations covering the latest advances in all areas of optics and photonics – from adaptive optics and optical sensing to silicon photonics and quantum information science.

The first day of the conference student leaders convened from around the globe to network, present posters and learn about successful chapter management at the annual OSA Student Leadership conference.

Students were also treated to inspiring talks from 2014 Nobel Prize Winner, W.E. Moerner, 2012 Macarthur Genius award winner Olivier Guyon, and others.

Attendees also celebrated the 50th anniversary of the University of Arizona College of Optical Sciences during a special symposium for the school. Speakers included the Honorable Jonathan Rothschild, Mayor of the City of Tucson, Jim Wyant of the University of Arizona and more.

The second day kicked off with the Plenary Session and Awards

Ceremony, showcasing presentations from five world-renowned researchers in optics.

Congressman Ron Barber of Tucson gave welcoming remarks. 2014 Nobel Prize Winner, W.E. Moerner spoke about his work and his recent recognition. Rebecca Richards-Kortum described efforts to engineer appropriate high-performance, low-cost biophotonics technologies to meet health needs in low-resource settings. Jeff Kimble spoke of the need for the creation of an interdisciplinary "toolkit" for the control, manipulation, and interaction of atoms and photons with a complexity and scalability not currently possible. OSA's Frederic Ives Medal Winner Paul Corkum gave a talk on "A Petahertz Oscilloscope – All optical measurement in the atto domain" and APS's 2014 Arthur L. Schawlow Prize in Laser Science Recipient Mordechai Segev spoke about photonic topological insulators.

On Tuesday and Wednesday, the show floor was abuzz with the latest products and features from 60 leading optics and photonics companies including industry leaders such as the Arizona Optics Industry Association, Edmund Optics, Newport Corp., Thorlabs and Toptica Photonics.

Networking opportunities were plentiful with several receptions—including the Southwestern-themed OSA member reception—as well as more formal opportunities at the Minorities and Women of OSA luncheon, receptions where attendees could meet the editors of APS and OSA journals and a luncheon for OSA Fellows.

Highlighted technical session papers included: Predicting Landslides with Light, A New Approach to On-Chip Quantum Computing, The Skin Cancer Selfie, All That Glitters is….Slimy? Gold Nanoparticles Measure the Stickiness of Snot, and Rediscovering Venus to Find Faraway Earths. These papers and more generated buzz in the media – from

The Washington Post to *Gizmodo* and even the local radio station KVOI—The Voice and the *Arizona Daily Star*.

Miss a technical session? Registered technical attendees have free access to recorded sessions from more than 40 percent of the technical conference. In addition, all conference papers are now accessible through OSA's Optics InfoBase.

Conference Program

***Download** the Conference Program Book online.*

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Three ways to access the FiO / LS Conference Program.

1. Use the Itinerary Planner to browse the entire conference program. Search presentations by type, category, keyword, author and more.
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3. Download the onsite Conference Program Book online.

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Cheuk-Yiu Ng, Department of Chemistry, *University of California Davis, USA*

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FiO 3: Optics in Biology and Medicine

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FiO 4: Optics in Information Processing

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FiO 5: Fiber Optics and Optical Communications

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Mikhail Brodsky, *ATT Research, USA*
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FiO 6: Integrated Photonics

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Long Chen, *Bell Labs, Alcatel---Lucent, USA*
Nicholas X. Fang, *Massachusetts Institute of Technology, USA*
Wataru Nakagawa, *Montana State University, USA*
Nicolae C. Panoiu, *University College London, UK*
Joyce Poon, *University of Toronto, Canada*
Mahmoud Rasras, *Bell Labs, Alcatel---Lucent, USA*

FiO 7: Quantum Electronics

Alexander V. Sergienko, *Boston Univ., USA,* **Subcommittee Chair**
Mo Li, *Univ. of Minnesota, USA*
Cefe Lopez, *Instituto de Ciencia de Materiales, Spain*
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FiO 8: Vision and Color

Brian Vohnsen, *Univ. College Dublin, Ireland,* **Subcommittee Chair**
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Andrew Mehta, *Univ. of Melbourne, Australia*
Jason Porter, *Univ. of Houston, USA*

Laser Science Session Organizers

1. Photonic Crystals: Fundamentals and Applications
Julian Sweet, *Wyle Laboratories, USA*

2. Optical and Laser-Based Approaches in Chemical and Biological Sensing
King-Chuen Lin, *National Taiwan University, Taiwan*

3. Filamentation of Ultrashort Intense Laser Pulses
Jerry Moloney, *University of Arizona, USA*

4. Cold Atoms and Molecules - Exploring New Physics with Quantum Degenerate Gases
Brian Anderson, *Univ. of Arizona, College of Optical Sciences, USA*

5. Attosecond EUV and X-ray Light Sources and Their Applications
Andy Kung, *Institute of Atomic and Molecular Sciences, Taiwan*

6. Innovative Resonator-Emitter Coupled Systems
Joshua Hendrickson, *AFRL (Wright-Patterson), USA*

7. Quantum Information with Photons
Elohim Chavez, *University of New Mexico, USA*

8. Semiconductor Nanooptics
Stephan Koch, *Phillips-Universität Marburg, Germany*

Invited Speakers & Topics

FiO 1: Optical Design, Fabrication and Instrumentation

1.1 General Optical Design, Fabrication, Testing, and Instrumentation

- **Evolution of a Linear Systems Formulation of Surface Scatter Theory,** Jim Harvey; *Photon Engineering, USA*
- **Freeform Optics Enables High-performance Augmented Reality Displays**, Hong Hua, *University of Arizona, USA*
- **See-through Three-dimensional Screen Using Holographic Optical Elements**, Byoungho Lee; *Seoul National University, Korea*

1.2 Coherence, Interference, and Polarization

- **Polarization Controlled Surface Plasmon Polariton Propagation: Physics and Applications,** Federico Capasso; *Harvard University, USA*
- **The Polarization Ray Tracing Calculus**, Russell Chipman; *University of Arizona, USA*
- **Controlling Light's Handedness Inside Laser Resonators,** Andrew Forbes; *CSIR-National Laser Centre-South Africa, South Africa*
- **Demonstration of an Optical Nano Beacon for Controlled Directional Emission and Coupling,** Gerd Leuchs; *Max Planck Inst. for the Science of Light at Erlangen, Germany*

1.3 Three-Dimensional Optical Structure Design, Fabrication and Nanopatterning

- **Controlling Light using Three-Dimensional Spatially Variant Self-Collimating Photonic Crystals,** Stephen Kuebler; *University of Central Florida, USA*
- **Integrated Impedance-matched Photonic Dirac-cone Metamaterials,** Yang Li; *Harvard University, USA*
- **Miniature Steerable Optical Sources Beaming Photons with Angular Momentum,** Qiwen Zhan, *University of Dayton, USA*

1.4 Wavefront Sensing and Adaptive Optics

- **Transverse Translation Diversity in Image-Based Wavefront Sensing**, James R. Fienup; *University of Rochester, USA*
- **Beaconless Tomographic Wve-Front Sensing,** Michael Hart; *University of Arizona, USA*

1.5 Freeform Optics

- **Design of Optical Imaging Systems Using Freeform Surfaces,** James Burge; *University of Arizona, USA*

FiO 2: Optical Sciences

2.1. Novel Intense Attosecond Sources (joint with LS)

- **Production of Intense Isolated Attosecond Pulses for Non-linear XUV-XUV Pump-probe Experiments with 100 eV Photons**, Boris Bergues; *Max-Planck-Institut fur Quantenoptik, Germany*
- **High Photon Flux Atto-second Sources at the Lund Laser Centre,** Anne Harth; *Lunds Universitet, Sweden*
- **High gain Frequency domain Optical Parametric Amplification,** François Légaré; INRS - *Centre Energie Materiaux Telecommunications*
- **Tutorial: Plasma Mirrors as Attosecond Light Sources**, Fabien Quéré; *CEA Saclay, France*
- **Generation of High-power Isolated Attosecond Pulses by an Infrared Two-color Gating**, Eiji J. Takahashi*; RIKEN, Japan*

2.2. Coherent Combination of Laser Beams

- **Coherent Synthesis of Pulsed Waveforms and Energies Using Fiber-Array Combining and Pulse Stacking Techniques,** Almantas Galvanauskas; *University of Michigan, USA*
- **Tracing and Controlling Attosecond Dynamics in Condensed Matter,** Eleftherios Goulielmakis; *Max-Planck_Institute fur Quantenoptik, Germany*
- **Tutorial: High-energy Waveform Synthesis,** Franz Kärtner; *Deutsches Elektronen Synchrotron, Germany*
- **Fiber Components, Fiber Amplifiers and Phase Control for Coherent Combination,** Hakan Sayinc; *Laser Zentrum Hannover e.V., Germany*

2.3. Frequency Combs in Novel Spectral Ranges

- **Tutorial: Intracavity High Harmonic Generation: Frequency Combs From IR to the XUV,** R. Jason Jones; *University of Arizona, USA*
- **Broadband Comb-resolved Spectroscopy in the Midinfrared,** Kevin Lee; *IMRA America, Inc., USA*
- **Mid-Infrared Frequency Combs for Direct Molecular Spectroscopy,** Albert Schliesser; *Universityof Copenhagen, Denmark*

2.4. Relativistic Light Sources

- **Tunable, Quasi-monoenergetic X-rays from Thomson Scattering with Laser-driven Electrons,** Stefan Karsch*; Max-Planck-Institut fur Quantenoptik, Germany*
- **Bright X-ray Pulse Generation by Laser Thomson-Backscattering and Traveling Wave Optical Undulators,** Ulrich Schramm; *Helmholtz-Zentrum Dresden-Rossendorf, Germany*
- **Extreme Light: Driver for a Table-Top Electron Accelerator and Tunable Narrowband Hard X-Ray Light Source**, Donald Umstadter; *University of Nebraska Lincoln, USA*

FiO 3: Optics in Biology and Medicine

3.1 Fibers for Biomedical Applications

- **Multimodality Fiber-based Endoscopes for Cancer Detection,** Jennifer Barton; *University of Arizona, USA*

3.2 Microscopy and OCT

- **Acoustic Radiation Force Optical Coherence Elastography,** *Z*hongping Chen; *University of California, USA*
- **3D Full Morphometric Assessment by Holographic Imaging at Lab-on-Chip Scale for Biomedical Applications**, Pietro Ferraro; *Istituto Nazionale di Ottica, Italy*
- **Multiscale Optical Imaging for Detection of Oral Cancer**, Kristen Maitland; *Texas A&M University, USA*
- **Imaging Cancer-associated Motility and Remodeling by Temporal Statistics of OCT Signals,** Amy Oldenburg; *University of North Carolina-Chapel Hill, USA*

3.3 Optical Trapping and Manipulation

- **Do Holographic Optical Tweezers Work for Large Swimming Micro-Organisms?**, Monika Ritsch-Marte; *Innsbruck Medical University, Austria*
- **Optical Trapping, Stretching, and Self-Assembly for Biological Measurements,** Michelle Povinelli; *University of Southern California, USA*

3.4 Lab-on-a-chip and Optofluidics

- **Colloidal Quantum Dots for Photo-sensing and Stimulation**, Lih Lin; *University of Washington, USA*

FiO 4: Optics in Information Processing

4.1 Optical System Design for Information Optics

- **Tutorial: Information Based Design for Compressive Imaging,** Mark Neifeld; *University of Arizona, USA*

4.2 Coherence and Polarization Imaging

- **Tutorial: Passive and Active Polarization Imaging: Fundamentals, Phenomenology, and System**, Scott Tyo, *University of Arizona, USA*
- **Engineering Spatial Coherence of Lasers for Speckle-Free Imaging,** Hui Cao;*Yale University, USA*

- **Bio-Inspired Spectral-Polarization Imaging Sensors for Medical Applications,** Victor Gruev; *Washington University in St. Louis, USA*

4.3 Information Bio-optics

- **Label-free Assessment of Mitochondrial Organization in Three-dimensional Tissues,** Irene Georgakoudi; *Tufts University, USA*

4.4 Information Capacity of the Photon

- **Compressive Quantum Sensing,** John Howell, *University of Rochester, USA*
- **High Information Capacity Image Recognition Using Correlated Orbital Angular Momentum (OAM) States,** Alexander Sergienko, *Boston University, USA*

FiO 5: Fiber Optics and Optical Communications

5.1 Enabling Technologies for High Speed Optical Communications

- **Cladding Pumped Erbium-doped Multicore Fiber Amplifiers for Space Division Multiplexing,** K. S. Abedin; *OFS Laboratories, USA*
- **High Spectral Efficiency Submarine Transmission Systems,** D. G. Foursa, *TESubCom, USA*
- **Wavelength-Selective Switches for Space-Division Multiplexing,** Roland Ryf, *Bell Labs, Alcatel-Lucent, USA*
- **Manufacturable Ultra-Low Loss Pure-Silica-Core Fiber for Trans-Oceanic Telecommunication,** Masaaki Hirano; *Sumitomo Electric Industries, Japan*

5.2 Optical Fiber Sensors

- **Tutorial: Fiber Optic Gyroscopes: Past and Present,** Michel Digonnet; *Stanford Univ., USA*
- **Tutorial: Fiber Optic Sensors for Structural Monitoring,** Eric Udd; *Columbia Gorge Research, USA*
- **Bragg Grating Sensors for Extreme Temperature Applications,** John Canning; *Univ. of Sydney, Australia*
- **Distributed Fibre Optic Sensing Techniques for Soil Slope Monitoring,** Luigi Zeni, *Second University of Naples, Italy*

5.3 Long Wavelength (Mid-IR to THz) Fiber Devices

- **Nonlinear Properties of Silicon Optical Fibers from Telecoms to the Mid-infrared,** Anna Peacock; *Univ. of Southhampton, UK*
- **Synthesis, Characterization and Applications of Mid-infrared Optical Fibers,** Pierre Lucas; *Univ. of Arizona, USA*
- **New Materials and Structures: Expanding the Properties of Optical Fibres,** Tanya Monro; *Univ. of Adelaide, Australia*

- **Tutorial: Mid-Infrared Fiber Sources: Challenges and Opportunities,** Stuart Jackson; *University of Sydney, Australia*

5.4 Frequency Comb Generation in Optical Fibers and Their Applications

- **Frequency Combs in Telecommunications Applications,** Nilola Alic; *UCSD, USA*
- **Mean-field Numerical Modelling of Microresonator Frequency Combs,** Miro Erkintalo; *Auckland University, New Zealand*
- **Noise Inhibited Frequency Generation in Wideband Parametric Mixers,** Stojan Radic; *Univeristy of California San Diego, USA*
- **Efficient Broadband Vacuum-Ultraviolet Generation in Gas-Filled Hollow-Core Photonic Crystal Fibers,** John Travers; *Max Planck Institute, Germany*

5.5 Optical Interconnections for Data Centers

- **Efficient Interconnection for Modern Computing Systems,** Odile Liboiron-Ladouceur, *McGill Univ., Canada*
- **Advanced Modulation Techniques for Optical Interconnects**, Tafur Monroy, *Technical Univ. of Denmark, Denmark*
- **Optical Innovations in Data-centers Interconnects and Networking,** Loukas Paraschis; *Cisco, USA*
- **Record Small and Low Loss Slow Light Delay Lines and Dispersion Compensators***,* Misha Sumetsky; *Aston Univ., UK*

5.6 Enabling Technologies for Astrophotonics (joint sith FiO 6)

- **Tutorial: A Green Astro-comb for Earth-like Exoplanet Searches,** Chih-Hao Li; *Harvard Univ., USA*
- **Diffraction-limited Photonic Micro-Spectrographs for Astronomy,** Sergio Leon-Saval; *Univ. of Sydney, Australia*
- **Dispersion Engineering in Silicon Nitride,** Martin Roth; *Leibniz-Institut für Astrophysik Potsdam, Germany*
- **Photonic Bandgap Fiber Laser for Sodium Guide Star Applications,** Akira Shirakawa; *University of Electro-Communications, Japan*

FiO 6: Integrated Photonics

6.1 Silicon Photonics

- **Silicon Photonics: From Drawing Board to a Working IC,** Pieter Dumon; *University of Gent, Belgium*
- **Filters and Spectrum Analyzers, and Their Applications in Classical and Quantum Telecommunications,** Shayan Mookherjea; *University of California, San Diego, USA*
- **Integrated Nanophotonics Technology for Optical Interconnects,** Wilfried Haensch; *IBM T.J. Watson Research Center, USA*
- **CMOS Integrated Ge Detectors,** Jason Orcutt; *IBM T. J. Watson Research Center, USA*

6.2 Hybrid Integrated Photonics

- **High Performance Photonic BiCMOS – A Novel Technology for the Large Bandwidth Era,** Dieter Knoll; *IHP GmbH, Germany*
- **Large-Scale and Low-Power Photonic Circuits,** Michael Watts*; Massachusetts Institute of Technology, USA*
- **Nanomembrane Integrated Silicon Photonics and Flexible Optoelectronics**, Weidong Zhou; U*niversity of Texas, Arlington, USA*

6.3 Waveguide Integrated Optics

- **Enhancing the Electrooptic Effect Using Modulation Instability,** Bahram Jalali; *University of California, Los Angeles, USA*
- **Electro-optic Effects in Silicon Waveguides,** Heinrich Kurz*; AMO GmbH Aachen, Germany*
- **Development of Photon Pair Sources Using Periodically Poled Lithium Niobate (PPLN) Waveguides and Fiber Optic Components,** Lee Oesterling*; Battelle, USA*
- **Silicon Optical Switches for ROADM Applications,** Shigeru Nakamura; G*reen Platform Res. Labs., NEC Corporation, Japan*
- **Laser-written Integrated Photonic Quantum Circuits**, Alexander Szameit; *Friedrich-Schiller-Universität Jena, Germany*

6.4 Photonic Crystals

- **Silicon Nanomembrane Based Devices for Optical Sensing and On-chip Interconnects,** Ray Chen; U*niversity of Texas, Austin, USA*
- **Novel Effects in Photonic Crystal Cavities,** Thomas F Krauss*; University of St Andrews, UK*
- **Agile Silicon Photonic Systems for Sensing and Telecommunications,** Axel Scherer*; California Institute of Technology, USA*

6.5 Plasmonics and Nanophotonics

- **Tutorial: Dealing with Losses in Plasmonics and Metamaterials,** Jacob Khurgin*; Johns Hopkins University, USA*
- **Quantum Electrodynamics with Plasmonic Waveguides**, Francisco J. Garcia-Vidal; *Universidad Autonoma de Madrid, Spain*
- **Recent Progress in Plasmonic and Metallic Cavity Semiconductor Nanolasers,** Cun-Zheng Ning; *Arizona State University, USA*

6.6 General Integrated Photonics

- **Tutorial: III-V and Silicon Photonic Integrated Circuit Technologies,** Thomas L. Koch; *University of Arizona, USA*
- **PT Symmetry in Optics,** Demetrios Christodoulides; *University of Central Florida, USA*
- **Integrated Photonics for Space-Division Multiplexing**, Nicolas Fontaine; *Bell Labs, Alcatel-Lucent, USA*

- **Silicon Nitride Optomechanical Crystals**, Kartik Srinivasan*; NIST, USA*

FiO 7: Quantum Electronics

7.1 Integrated Quantum Optics

- **Ultrafast and Fault-Tolerant Quantum Communication over Long Distances,** Liang Jiang; *Yale Univ., USA*
- **Deterministic Creation and Strong Purcell Enhancement of Long-lived Nitrogen-Vacancy Spin Qubits in Diamond Photonic Crystal Cavities,** Tim Schröder*, MIT, USA*
- **Experimental Boson Sampling with Integrated Photonics,** Fabio Sciarrino; *Universita degli Studi di Roma La Sapienza, Italy*

7.2 Quantum Communications

- **Manipulation of Photons and Cold Atoms: Scalable Quantum Communication, Computation and Simulation,** Jian-Wei Pan; *USTC, China*

7.3 Quantum Optical Measurement and Quantum Technologies

- **Interfacing Optical Quantum Memories with Telecommunication Optical Fibres**, Hugues de Riedmatten, *ICFO Barcelona and ICREA, Barcelona, Spain*
- **Quantum Motion and Microwave Fields,** Tauno Palomaki, *University of Colorado, USA*
- **Entanglement and Simplified Quantum Information Operations**, Geoff Pryde; *Griffith Univ., Australia*

7.4 Nonlinear Optics in Micro/Nano-Optical Structures

- **Modelocking and Synchronization of Chip-Based Frequency Combs,** Alex Gaeta; *Cornell Univ., USA*
- **Interaction-free All-optical Switches for Quantum Applications,** Yuping Huang, *Northestern University, USA*
- **Nanophotonic Structures for Extreme Nonlinearities On-Chip,** Michal Lipson, *Cornell University, USA*
- **Microwave Generation Using Nonlinear Optics in High-Q Resonators**, Kerry Vahala; *Caltech, USA*

7.5 Optics and Photonics of Disordered Systems

- **Resonant and Non-resonant Electromagnetic Fields at the Nanoscale with Active Photonic-plasmonic Nanostructures,** Luca Dal Negro; *Boston Univ., USA*

FiO 8: Vision and Color

8.1 Wavefront Sensing and Adaptive Optics for the Eye

- **Wavefront Aberrations of the Eye During the Development of Refractive Error,** Nancy Coletta; *New England College of Optometry, USA*
- **Evolution of Ocular Wavefront Sensing,** Jim Schwiegerling; *University of Arizona, USA*

8.2 Analysis of the Eye from the Retina to the Visual Cortex

- **Polarimetric Imaging of the Human Retina for the Quantification of Neural and Blood Vessel Status,** Ann Elsner; *Indiana University, USA*
- **The Use of Masks and Split-detection in Adaptive Optics Scanning Light Ophthalmoscopy,** Yusufu Sulai, *Medical College of Wisconsin, USA*
- **Progress on Cellular Resolution Retinal Imaging: Setting the Stage for Translation Between Clinical and Basic Science**, Robert J. Zawadzki; *University of Califorinia, Davis, USA*

8.3 Applications of Visual Science and Physiological Optics

- **Night Myopia Revisited with Adaptive Optics,** Pablo Artal; *Murcia University, Spain*

8.4 Low-cost ophthalmic instrumentation and imaging (Joint with FiO 1)

- **mobileVision: A Face-mounted, Voice-activated, Non-mydriatic "Lucky" Ophthalmoscope,** Ashok Veeraraghavan, *Rice University, USA*
- **NETRA-G: Towards a Subjective Self-Refraction**, Vitor Pamplona*, CTO, EyeNetra, USA*

Laser Science

1. Photonic Crystals: Fundamentals and Applications

- **Cavity QED in Quantum Dot-photonic Crystal Nanocavity Coupled Systems**, Yasuhiko Arakawa; *University of Tokyo, Japan*
- **Nanocavity and Nanobeam Waveguide Optomechanics,** Paul Barclay; *University of Calgary, Canada*
- **Waveguides Arrays in Hexagonal Photonic Crystals,** Martijn de Sterke; *University of Sydney, Australia*
- **Spontaneous Emission of Er atoms in Metallic Nanocavity**, Yong-Hee Lee; *KAIST, Korea*
- **Towards Few-photon Optoelectronics with Photonic Crystal Devices**, Arka Majumdar; *University of Washington, USA*
- **Topological States of Photons in Nanostructures,** Alexander Poddubny; *Ioffe Physical-Technical Institute, Russia*

- **Nonlinear Quantum Optics and Precision Measurements in Mesoscopic High-Q Optical Cavities,** Chee Wei Wong; *Columbia University, USA*

2. Optical and Laser-Based Approaches in Chemical and Biological Sensing

- **Bioimaging and Quantum Sensing Using Nitrogen-Vacancy Centers in Nanodiamonds,** Huan-Cheng Chang; *Institute of Atomic and Molecular Science, Taiwan*
- **Single-Beam Stimulated Raman Scattering for sub-Microgram Standoff Detection of Explosives,** Marcos Dantus*; Michigan State University, USA*
- **Chemical Imaging of Single Nanoparticles by Photothermal Microscopy,** Bogdan Dragnea; *Indiana University, USA*
- **Evanescent Wave Cavity Ring-down Spectroscopy in Application to Chemical and Biological Sensing,** King-Chuen Lin, *National Taiwan University, Taiwan*
- **Optical Cavity-based Detection of Magnetic Field Effects in Condensed Phases,** Stuart Mackenzie; *Oxford University, UK*
- **Time Resolved Frequency Comb Spectroscopy for Studying Gas Phase Free Radical Kinetics**, Mitchio Okumura;*Caltech, USA*
- **Sensing of Protein Reactions Using Pulsed Laser Based Transient Grating,** Masahide Terazima; *Kyoto University, Japan*
- **The Making of 3D Multi-Resolution Motion Pictures for the Microscopic Worlds,** Haw Yang*; Princeton University, USA*
- **Bio-light for Optical Sensing,** Seok-Hyun (Andy) Yun, *KAIST, Korea*

3. Filamentation of Ultrashort Intense Laser Pulses

- **Solitonic Self-compression of 100-uJ 1.7-um Pulses to a Single Optical Cycle in a Hollow-core Kagome Lattice Fiber,** Andrius Baltuska, *Vienna University of Technology, Austria*
- **Interaction of Fi laments with Their Surroundings**, Jean-Claude Diels, *University of New Mexico, USA*
- **Resonant Radiation from Collapsing Light Pulses and Spatiotemporal Light Bullets,** Daniele Faccio, *Heriot-Watt University, UK*
- **Fully Microscopic Studies of Strong-Field Atom Ionization,** Stephan Koch, *Philipps-Universität Marburg, Germany*
- **Non-perturbative Time-domain Modeling of Light-Matter Interactions for Computer Simulation in Extreme Nonlinear Optics,** Miroslav Kolesik, *University of Arizona, USA*
- **Stimulated Emission from Filaments in Air,** Andre Mysyrowicz, *LOA – ENSTA ParisTech, France*
- **Rogue Events in the Atmospheric Turbulence of Multifilaments,** Günter Steinmeyer, *Max-Born Institute. Germany*
- **Laser Filament-induced Ice Multiplication under Cirrus Cloud Conditions**, Jean-Pierre Wolf, *University of Geneva, Switzerland*
- **The Role of Filamentation in THz Wave Air Photonics,** Xi-Cheng Zhang, *University of Rochester, USA*
- **Air Waveguides Generated by Femtosecond Filaments,** Jared Wahlstrand, *University of Maryland, USA*

4. Cold Atoms and Molecules - Exploring New Physics with Quantum Degenerate Gases

- **Clusters and Cascades: Vortex Motion in 2D Quantum Turbulence,** Ashton Bradley; *Univ. of Otago, New Zealand*
- **Phase Slips and Weak Links: Experiments with Superfluid Atom Circuits,** Gretchen Campbell; *NIST/Univ. of Maryland, USA*
- **Lightspeed at a Snail's Pace: Relativity Meets Ultracold Physics,** Lincoln Carr; *Colorado School of Mines, USA*
- **Probing Quantum Many-body Physics with Bright Matter-wave Solitons and Ultracold Polar Molecules,** Simon Cornish; *Durham Univ., UK*
- **Experiments With Bose-einstein Condensates In A Spin-orbit Coupled Optical Lattice**, Peter Engels; *Washington State Univ., USA*
- **Vortex Dynamics In Spin-orbit Becs,** Alexander Fetter; *Standford Univ., USA*
- **Monopoles in Spinor Bose-Einstein Condensates,** David Hall; *Amherst College, USA*
- **Simulating Many-Body Dynamics in Systems of Cold Atoms, Molecules, and Ions,** Johannes Schachenmayer; *JILA/Univ. of Colorado, USA*
- **Spin-dependent Gauge Fields in Atomic Gases,** Ian Spielman; *NIST/Univ. of Maryland, USA*
- **Coherent Optics Of Magnon Waves In A Spinor Bose-einstein Condensate,** Dan Stamper-Kurn*; Univ. of California at Berkeley, USA*
- **Quantum Hydrodynamics and Turbulence in Atomic Bose-Einstein Condensates,** Makota Tsubota; *Osaka City Univ., Japan*
- **Quantum Vortex Microscope for Observing Two-dimensional Vortex Dynamics in Bose-Einstein Condensates,** Kali Wilson; *College of Optical Sciences, University of Arizona, USA*

5. Attosecond EUV and X-ray Light Sources and Their Applications

- **Tabletop Nanometer Extreme Ultraviolet Imaging in an Extended Reflection Mode,** Dan Adams, *JILA, University of Colorado, Boulder, USA*
- **A 200 Tw Driving Laser For Generating Microjoule Level Isolated Attosecond Pulses,** Zenghu Chang, *University of Central Florida, USA*
- **Generation of Bright Isolated Attosecond Soft X-Ray Pulses Driven by Multi-Cycle Mid-Infrared Lasers,** Ming-Chang Chen, *National Tsing Hua University, Taiwan*
- **Attosecond Probing of Atomic & Molecular Structure**, Louis DiMauro, *Ohio State University, USA*
- **Sub-10 fs DUV Laser Pulses and Their Application to Ultrafast Molecular Spectroscopy and Dynamics,** Takayoshi Kobayashi, *University of Electro-Communications, Japan*
- **Attosecond Electronic Band Dynamics,** Stephen R. Leone, *University of California and Lawrence Berkeley National Laboratory, USA*
- **Waveforms for Optimal Enhancement of High-order Harmonics by Synthesizing Two- or three-color Laser Fields,** Chii-Dong Lin, *Kansas State University, USA*
- **Probing Atomic and Molecular Processes by Intense Attosecond Pulses**, Katsumi Midorikawa, *RIKEN, Japan*
- **Probing and Controlling Electron Dynamics in Atoms and Molecules with Attosecond Electron Wave Packets,** Xinhua Xie, *Photonics Institute, Vienna University of Technology, Austria*

6. Innovative Resonator-Emitter Coupled Systems

- **Coupling Spins in Quantum Dots to Photonic Crystal Cavities,** Sam Carter; *Naval Research Laboratory, USA*
- **Quantum Nano-Photonic Devices Based on Rare-Earth Doped Crystals,** Andrei Faraon; *Caltech, USA*
- **Diamond Quantum and Nonlinear Photonics,** Marco Loncar; *Harvard University, USA*
- **Breaking the Mirror Symmetry of Spontaneous Emission Via Spin-orbit Interaction of Light**, Arno Rauschenbeutel, *Vienna Center for Quantum Science and Technology, Austria*
- **A Nanophotonic Quantum Phase Switch with a Single Atom,** Jeff Thompson, *Harvard University, USA*
- **Quantum Emitters in Optical Nanocavities: Physics and Applications,** Jelena Vuckovic; *Stanford University, USA*
- **Coherent Control of Light-Matter Interactions Using a Quantum Dot in a Cavity**, Edo Waks; *Joint Quantum Institute, Univ. of Maryland, USA*

7. Quantum Information with Photons

- **Squeezing Enhanced Quantum Operation,** Ulrik Lund Andersen; *Technical University of Denmark, Denmark*
- **Engineering Parametric Down-conversion in Multimode Nonlinear Waveguides,** Konrad Banaszek; *University of Warsaw, Poland*
- **Harnessing the Time-frequency Structure of Ultrafast Quantum States,** Benjamin Brecht; *University of Paderborn, Germany*
- **Quantitative Quantum Communication: Practical Realizations of Exponential Quantum Advantage,** Norbert Lütkenhaus; *University of Waterloo, Canada*
- **Practical Limits of an Optimized Quantum Receiver,** Christoph Marquardt; *Max Planck Institute for the Science of Light, Germany*
- **Raman Memories For Synchronized Quantum Photonics,** Joshua Nunn; *University of Oxford, United Kingdom*
- **Bidirectional And Efficient Conversion Between Microwave And Optical Light,** Cindy Regal, *University of Colorado at Boulder, JILA, USA*
- **Experimental Realisation of a Measurement-based Noiseless Linear Amplifiers,** Thomas Symul; *Australian National University, Australia*
- **Quantum Communication in Space,** Rupert Ursin; *Institute for Quantum Optics and Quantum Information, Australian Academy of Sciences, Australia*

8. Semiconductor Nanooptics

- **Probing Electron-Photon Interactions at the Saddle Point in Graphene,** Rolf Binder; *University of Arizona, USA*
- **Quantum Optical Experiments in Semicondcutor Quantum Well Systems,** Steve Cundiff; *JILA, University of Colorado, USA*
- **Coherent Bloch Oscillations Driven by Ultrastrong THz Excitation,** Rupert Huber; *University of Regensburg,Germany*
- **Quantum-dot Microcavity Lasers with Superradiant Coupling and Non-classical Light Emission,** Frank Jahnke; *University of Bremen, Germany*

- **Ultrashort-pulse Generation Using VECSELs and MIXSELs,** Ursula Keller; *ETH Zürich, Switzerland*
- **Quantum Theory of Dropletons,** Mackillo Kira; P*hilips-University Marburg, Germany*
- **Terahertz Experiments on Microcavities,** Yun-Shik Lee; *Oregon State University, USA*
- **Semiconductor Quantum Light Sources for Integrated Quantum Photonic Applications**, Peter Michler; *University of Stuttgart, Germany*
- **VCESL Theory & Experiment**, Jerry Moloney; *University of Arizona, USA*
- **Ge Nanowire Experiments**, Ted Norris; *University of Michigan, USA*
- **Optical Control of Electron and Nuclear States**, Duncan Steel; *University of Michigan, USA*

Special Symposia

Symposium on the 50th Anniversary of Optical Sciences

Organizer: Tom Koch, *University of Arizona, USA*

Sunday, 19 October
16:00 - 18:30
Arizona Ballroom, Salons 1-6
This 50th Anniversary Symposium will include a brief tour through the history of the College of Optical Sciences at the University of Arizona, leading to talks that capture how the seeds planted 50 years ago by Aden Meinel have blossomed into today's vibrant collection of research endeavors.

 Welcoming remarks will be given by the **Honorable Jonathan Rothschild**, Mayor of the City of Tucson (Invited and Scheduled to attend).

 **Symposium Keynote: A Brief History of the College of Optical Sciences**, James C. Wyant; *University of Arizona, USA*

Invited Speakers:

- **Image Science at OSC,** Harrison H. Barrett; *University of Arizona, USA*
- **Biomedical Optics at OSC**, Jennifer Barton; *University of Arizona, USA*
- **Fabrication & Metrology of Large Optics at OSC,** Jim Burge; *University of Arizona, USA*
- **Atoms and Photons: One Perspective on Quantum Optics at the College of Optical Sciences,** Poul Jessen; *University of Arizona, USA*
- **Semiconductor Physics at the Optical Sciences Center,** Stephan Koch; *Philipps-Universitat Marburg, Germany*
- **The Force Law of Classical Electrodynamics: Lorentz versus Einstein and Laub,** Masud Mansuripur; *University of Arizona, USA*
- **Photonics at OSC,** Nasser Peyghambarian; *University of Arizona, USA*

Laser Science Symposium on Undergraduate Research

Organizer: Harold Metcalf,*Stony Brook Univ., USA*

Monday, 20 October
12:00 - 18:00
Tucson Ballroom, Salon D

This special DLS annual symposium started in 2001 and has rapidly become one of the most successful

DLS traditions. During the past several years the number of undergraduates presenting papers has grown from only 10 to more than 40, and the talks have been of outstanding quality, some absolutely stellar. Last year's posters were outstanding as well, and generated a great deal of lively interest and on-the-spot discussion. This year's symposium will consist of afternoon poster and oral sessions. The event provides an opportunity for some of the student members of our community, who are already among the finest young scientists to be found anywhere, to present their work before an audience of their peers as well as the larger optics community. All are invited and encouraged to attend the session. For more information on the Laser Science Undergraduate Symposium visit the APS page.

Symposium on Translational Biophotonics – Focus on Cancer

Organizers: Melissa Skala, *Vanderbilt University, USA*; Bernard Choi, *University of California, Irivine, USA* and Nozomi Nishimura, *Cornell University, USA*

Monday, 20 October
13:30 - 15:30
Tucson Ballroom, Salon A

Optical tools have great potential for innovation in pathology and diagnostics. New imaging modalities, contrast mechanisms and design improvements could enable novel ways of diagnosing, treating and monitoring cancer. In addition, optical technologies are entering the operating room and clinic as in situ diagnostics. As research tools, optical technologies are enabling the measurement of function such as metabolism or tissue perfusion and new developments make it possible to use access, visualize and treat anatomy previously unreachable. Novel methods providing chemical information may also change how pathologists look at cancer. Optical technologies are attractive for probing cancer because they provide unique insight into tumor physiology, and are low cost platforms for clinical translation. This symposium will showcase promising optical technologies in cancer research and oncology that are at various stages of clinical translation.

Invited Speakers:

- **Knowledge of the Principles of Oxygen Transport in Solid Cancers Enables Translational Decisions,** Mark Dewhirst; *Duke University, USA*
- **What Can We Learn About Cancer Therapy from Single Cell Tracking**, Charles Lin; M*assachusetts General Hospital, USA*
- **Molecular and Metabolic Imaging of Tumors to inform Therapeutic Interventions,** Narasimhan Rajaram; *Duke University, USA*
- **Preclinical and Clinical Chemotherapy Response Monitoring with Diffuse Optical Technologies,** Darren Roblyer; *Boston University, USA*

Symposium on 50 Years of Lasers in Ophthalmology and the New ANSI Safety Standard

Organizer: Brian Vohnsen, *University College Dublin, Ireland*

Wednesday, 22 October
08:00 - 11:00

Tucson Ballroom, Salon A

The first use of a ruby laser to destroy a retinal tumor was realized by Charles J. Campbell in 1961, but the clinical breakthrough on the ophthalmic use of lasers for photocoagulation to prevent retinal detachment was reported by Milton Flocks and Christian Zweng in 1964. In this symposium, historical highlights on the use of lasers in ophthalmology will be given alongside state-of-the-art in the current ophthalmic use of lasers and corresponding safety limits.

Invited Speakers:

- **The Limits of Human Vision,** Josef Bille, *Heidelberg University, Germany*
- **Lasers in Retinal Imaging**, Stephen A. Burns; *Indiana University, USA*
- **Laser Technologies Enhancing OCT Performance,** Wolfgang Drexler; *Medical University Vienna, Austria*
- **The ANSI 2014 Standard for Safe Use of Lasers**, Francois Delori, *Schepens Eye Research Institute, USA*
- **Application of Second Harmonic Generation Imaging for Visualization of the Characteristics of Corneal Stromal Collagen in Normal and Diseased Eyes,** Naoyuki Morishige; *Yamaguchi University, Japan*

Symposium on Laser Particle Acceleration and Novel Acceleration Methods

Organizer: Laszlo Veisz, *Max-Planck-Institut fur Quantenoptik, Germany* and Cameron Geddes, *Lawrence Berkeley National Lab, USA*

Wednesday, 22 October
13:30 - 18:00
Arizona Ballroom, Salon 12

2014 is the tenth anniversary of the first generation of quasi-monoenergetic electron spectra from laser wakefield acceleration. This achievement has given a significant boost to the development of compact laser plasma acceleration as well as alternative laser-driven acceleration scenarios such as electron acceleration in vacuum by laser or THz fields producing high energies and ultra-short pulses. The rapid evolution of these sources has made them a competing alternative to conventional accelerators by extending their properties and opening up novel application fields from light sources to energy frontier physics. Contributions are sought that explore these laser-based electron accelerators.

Invited Speakers:

- **Laser Accelerator on a Chip (>300MeV/m): A Path to TeV Energy Scale Physics and Table Top Coherent X-rays**, Robert Byer; *Stanford University, USA*
- **Multi-GeV Laser-plasma Electron Accelerators,** Mike Downer; *University of Texas at Austin, USA*
- **Development of a High Repetition Rate Laser-plasma Accelerator for Application to Ultrafast Electron Diffraction,** Jérôme Faure; *LOA-ENSTA, France*
- **Dielectric Laser Acceleration -- From the Proof-of-concept Experiment with Non-relativistic Electrons to Future Applications,** Peter Hommelhoff; *Friedrich-Alexander-Universitat Erlangen, Germany*

- **Optimized Photonic Structures for GV/M Laser Acceleration of Electrons,** James Rosenzweig; U*niversity of California, Los Angeles, USA*
- **Electron Acceleration Experiments by Using a Density-tapered Capillary Plasma Source,** Hyong Suk; *GIST, Korea*
- **Multi-GeV Laser Plasma Accelerators Using Plasma Waveguides and Integration of Multiple Acceleration Modules,** Joroen van Tilborg, *LBNL, USA*

Symposium on Radiation Reaction in Ultra-High Intensity Lasers

Organizers: Richard T. Hammond, *US Army Research Office* and *University of North Carolina Chapel Hill, USA* and
Natalia M. Litchinitser, *University at Buffalo, The State University of New York, USA*

Thursday, 23 October
08:00 - 15:45
Tucson Ballroom, Salon A

By 1905 the problem of radiation reaction in electrodynamics appeared in Abraham's book on the theory of electricity. In 1938 Dirac derived his famous relativistic equation for the equation of motion with radiation reaction, but it gave the infamous unphysical runaway solutions. Landau and Lifshitz used a perturbative form of Dirac's equation that gave sensible results. Since then there have been a number of theories of radiation reaction and the equation of motion, but the physics community has not generally accepted any one approach as correct. Today, with laser intensities already surpassing 10^{22}W cm^{-2} and higher expected in the near future, radiation reaction is a pressing problem. This symposium hopes to bring theoreticians and experimentalists together to find ways to test various theories of radiation reaction.

Invited Speakers:

- **High Repetition Rate kJ-class Nanosecond to Femtosecond Lasers,** Todd Ditmire; University of Texas, Austin, USA
- **Radiation Reaction and the Quantum Langevin Equation,** George Ford; *University of Michigan, USA*
- **Probing Radiation-Reaction in the igh Acceleration Regime**, Yaron Hadad; *University of Arizona, USA*
- **Solid-Density Experiments for Laser-Based Thomson Scattering: Approaching the Radiation Dominated Regime**, John Nees; *University of Michigan, USA*
- **Tutorial: Review of the Ford-O'Connell Results on Radiation Reaction in Electrodynamics,** Robert O'Connell; *Louisiana State University, USA*
- **Tutorial: Nonlinear Radiation Effects with Filaments - Inside and Outside,** Martin Richardson; *University of Central Florida, CREOL, USA*
- **Radiation Reaction of Relativistic Electrons Scattered by Relativistic Intensity Light**, Donald Umstadter; *University of Nebraska, Lincoln, USA*
- **Radiation Reaction and Ultra-high Intensity Lasers,** Sheldon Wu; *Lawrence Livermore National Laboratory, USA*

Plenary Session and Awards Ceremony

Special Opening Remarks

Congressman Ron Barber, Arizona's 2nd Congressional District

Congressman Ron Barber represents Arizona's 2nd Congressional District which includes communities such as Tucson, where cutting-edge technology is being developed.

Invited and scheduled to attend.

William E. Moerner, 2014 Nobel Prize Recipient in Chemistry

Invited and scheduled to attend.

Keynote Speakers

Rebecca Richards-Kortum
Rice University, USA

Point-of-Care Diagnostics for Low-Resource Settings

Abstract
Half the world's children live on less than $2/day and do not have access to basic medical technologies. This talk will describe efforts to engineer appropriate high-performance, low-cost biophotonics technologies to meet health needs in low-resource settings.

Biography

Rebecca Richards-Kortum is the Stanley C. Moore Professor and Chair of Bioengineering at Rice University. After receiving a B.S. in Physics and Mathematics from the University of Nebraska-Lincoln in 1985, she continued her graduate work at the Massachusetts Institute of Technology, where she received an MS in Physics in 1987 and a PhD in Medical Physics in 1990. She joined the faculty in Bioengineering at Rice University in 2005. In addition to being named a Howard Hughes Medical Institute Professor in 2002 and 2006, her awards include election to the US National Academy of Engineering (2008).

Dr. Richards-Kortum's research group is developing imaging systems to enable better screening for oral, esophageal, and cervical cancer and their precursors at the point-of-care. More recently, her group has worked to integrate advances in nanotechnology and microfabrication to develop novel, low-cost sensors to detect infectious diseases at the point-of-care, including cryptosporidium, malaria, and HIV.

Jeff Kimble

Caltech, USA

Atom-Light Interactions in Photonic Crystals

Abstract

New paradigms for strong atom-photon interactions would emerge by trapping arrays of atoms in one and two-dimensional photonic crystals. Bringing this future to fruition requires the creation of an interdisciplinary"toolkit" for the control, manipulation, and interaction of atoms and photons with a complexity and scalability not currently possible.

Biography

H. Jeff Kimble is the William L. Valentine Professor and Professor of Physics at the California Institute of Technology, where he is Director of the Institute for Quantum Information and Matter. He completed his undergraduate degree at Abilene Christian University in 1971, then his doctoral degree in 1977 at the University of Rochester. He spent two years as a staff scientist at the General Motors Research Laboratories. In 1979,he joined the faculty at the University of Texas at Austin, where he eventually held the Sid Richardson Regents' Chair of Physics before moving to Caltech in 1989. Professor Kimble is a Fellow of the American Association for the Advancement of Science, the American Physical Society, and the Optical Society of America, and is a Member of the US National Academy of Sciences.

Awards Ceremony

OSA and APS will present awards and honors during the Plenary Session.

2014 Frederic Ives Medal / Jarus Quinn Prize Recipient

Paul Corkum
National Research Council, Canada

For outstanding contributions to the foundation of the fields of attosecond science, high-harmonic spectroscopy and molecular optics

Presentation: A Petahertz Oscilloscope – All optical measurement in the atto domain

Abstract

A highly multiphoton process is hardly modified by a weak perturbing field. Yet, the perturbing field can impress a subtle imprint that we can use for measurement. Applied to attosecond pulse generation, we can simultaneously measure the attosecond pulse and the time dependence of the perturbing field.

Biography

A Canadian originally from Saint John, New Brunswick, Paul Corkum is a fellow of the Royal Society of London and a foreign member of both the U.S. and Austrian Academies of Sciences. An OSA Fellow, he has been awarded the King Faisal Prize for Science, the Harvey Prize for Science, the OSA Charles H. Townes Award, the IEEE Quantum Electronics Award, the Arthur L. Schawlow Prize of the American Physical Society (APS), and the Zewail Prize of the American Chemical Society.

Corkum received his Ph.D. from Lehigh University in 1972 and joined the Canadian National Research Council in 1973. He introduced many concepts for how atoms and molecules interact with intense light pulses. From this work, he showed how atomic or molecular gases can be used to produce and measure attosecond pulses, as well as how a molecule can “photograph” itself. He currently directs the Joint Attosecond Science Laboratory in Ottawa and holds a Canada Research Chair in Attosecond Photonics at the University of Ottawa.

OSA Awards and Honors

Esther Hoffman Beller Medal
Shin-Tson Wu, University of Central Florida, U.S.A.

Max Born Award
Costas M. Soukoulis, Iowa State University and Ames Laboratory, USA

Stephen D. Fantone Distinguished Service Award
Anthony J. Campillo, The Optical Society, U.S.A.

Michael S. Feld Biophotonics Award
Rebecca Richards-Kortum, Rice University, U.S.A.

Robert E. Hopkins Leadership Award
Robert P. Breault, Breault Research Organization, U.S.A.

Edwin Land Medal (co-sponsored with IS&T)
Mathias Fink, École Supérieure de Physique et de Chimie Industrielles de la Ville de Paris, France

2014 Arthur L. Schawlow Prize in Laser Science Recipient

Mordechai Segev

Technion - Israel Institute of Technology

For groundbreaking contributions to the study of light-matter interactions, in particular the discovery of optical spatial solitons in photorefractive media, for milestone contributions to nonlinear waves in photonic lattices, and for the observation of Anderson localization of light

Presentation: Photonic Topological Insulators

Abstract

Photonic systems are naturally an excellent avenue to study fundamental concepts of waves' interactions, and many times lead to new discoveries. In this context, the recent breakthroughs on photonic topological insulators will be discussed, with an emphasis on fundamental aspects that are universal to many waves systems in nature.

Biography

Mordechai (Moti) Segev is a Distinguished University Professor and the Trudy and Norman Louis Professor of Physics, at the Technion - Israel Institute of Technology, Haifa, Israel. He received his B.Sc. and D.Sc. from the Technion, Israel, in 1985 and 1990, respectively. Moti Segev has spent one year at Caltech as a post-doctoral fellow and two more years as a Senior Research Fellow. He joined Princeton in September of 1994 as an Assistant Professor, becoming an Associate Professor in 1997, and a Professor in 1999. In the summer of 1998, Moti Segev went back to his home country, Israel, and joined the Technion, eventually resigning from Princeton in 2000. In 2009, he was appointed as Distinguished University Professor - the highest rank at the Technion, currently held by only five other professors.

Moti Segev is a Fellow of the Optical Society of America – OSA (1997), a Fellow of the American Physical Society (2000). He has won several awards, among them 2007 Quantum Electronics Prize of the European Physics Society, the 2009 he won the Max Born Award of the OSA, and the 2014 Arthur L. Schawlow Award of the APS. On the national level, he has won the 2008 Israeli Landau Prize, and in 2011 he was elected to the Israel Academy of Sciences and Humanities.

Sang Soo Lee Award (co-sponsored with the Optical Society of Korea)
Maria GARAVAGLIA, Centro de Investigaciones Ópticas, Argentina

Emmett Leith Medal
Posthumous recognition of Adam Kozma

Adolph Lomb Medal
Alexander Szameit , Friedrich-Schiller-Universität Jena, Germany

William F. Meggers Award
François Biraben, Laboratoire Kastler Brossel, France

David Richardson Medal
Jannick P. Rolland, University of Rochester, U.S.A.

R. W. Wood Prize
Michael Bass, University of Central Florida, U.S.A.

2013 Frederic Ives Medal/Jarus W. Quinn Prize
Alain Aspect, Institut d'Optique, École Polytechnique and CNRS, France

OSA Enabled by Optics Contest

Awarded to the company whose submission best demonstrates the impact optics, as an enabling technology, has on society and our everyday lives. Winner will be announced in August and presented with their award during the Plenary Session. Visit osa.org/enabledbyoptics for more information about this program.

Special Events


FIO/LS Welcome Reception

Sunday, 19 October, 18:30 – 20:00
Ania Terrace

Get the FiO/LS 2014 conference off to a great start by attending the welcome reception! Meet with colleagues from around the world and enjoy light hors d'oeuvres. Complimentary to all Technical Conference Attendees. Volunteers from the Tucson Amateur Astronomy Association will have telescopes set up for you to observe under the clear, dark skies of Tucson.

Plenary Session and Awards Presentation

Monday, 20 October, 08:00 - 12:00
Arizona Ballroom, Salons 1-6

The 2014 Joint FiO/LS Awards Ceremony and Plenary Session will feature two world-renowned speakers. Special welcome remarks will be given by Congressman Ron Barber, Arizona's 2nd Congressional District See the plenary page for detailed descriptions of the speakers and their presentations.

Laser Science Symposium on Undergraduate Research

Monday, 20 October, 12:00 - 18:00
Tucson Ballroom, Salon E

This special DLS annual symposium started in 2001 and has rapidly become one of the most successful DLS traditions. During the past several years the number of undergraduates presenting papers has grown from only 10 to more than 40, and the talks have been of outstanding quality, some absolutely stellar. Last year's posters were outstanding as well, and generated a great deal of lively interest and on-

the-spot discussion. This year's symposium will consist of afternoon poster and oral sessions. The event provides an opportunity for some of the student members of our community, who are already among the finest young scientists to be found anywhere, to present their work before an audience of their peers as well as the larger optics community. All are invited and encouraged to attend the session. For more information on the Laser Science Undergraduate Symposium visit the APS page.

Organizer: Harold Metcalf, *Stony Brook Univ., USA*

Meet OSA's Journal Editors

Monday, 20 October, 17:30 - 19:00
Ania Terrace

OSA's journal Editors invite you to join them for conversation and refreshments. The Editors welcome your questions, concerns and ideas for the journals, such as:

- What are best practices when submitting your manuscript?
- What constitutes a useful manuscript review?
- What criteria do journal editors look for in submitted manuscripts?
- How do you propose a Feature Issue topic for publication in an OSA Journal?
- Other topics of interest to you

Refreshments will be provided. All are welcome.

Minorities and Women in OSA (MWOSA) Networking Reception

Monday, 20 October, 17:30 - 19:00
Tucson Ballroom, Salons I-J

Free of Charge – RSVP Required

Our guest speaker for the 2014 MWOSA networking reception is Dr. Jessie Rosenberg. She is a Research Staff Member at the IBM TJ Watson Research Center, where she focuses on developing silicon photonics technology integrated with CMOS electronics for optical communication applications. She received a Ph.D. degree in Applied Physics from the California Institute of Technology in 2010 at the age of 23, and was recently named to the Forbes 30 under 30 list of innovators in science.

The registration process is EASY! To confirm your attendance, you may either:

1. Check the MWOSA Networking Reception box when filling out the FiO Registration Form ***or***
2. Email your contact information to mwosa@osa.org.

OSA Technical Group Meetings

Network with peers, meet group leaders, and get involved in planning future group activities by attending technical group meetings during FiO. The following technical groups are sponsoring activities at FiO:

OSA Optical Communication Technical Group Networking Event
Monday, 20 October, 13:30 – 15:00
Tucson Ballroom, Salon G

OSA Optical Fabrication & Testing Technical Group Networking Event
Monday, 20 October, 18:30 – 19:30
Arizona Ballroom, Salon 12

OSA Environmental Sensing Special Talk: AFOSR Program on Imaging and Beam Control Through Deep Turbulence
Monday, 20 October, 19:00 -20:00
Arizona Ballroom, Salon 11

OSA Holography & Diffractive Optics Student Tutorial: Getting Started with Digital Holograms
Tuesday, 21 October, 18:00 – 19:00
Arizona Ballroom, Salon 10

OSA Applications of Visual Science Technical Group Networking Event
Wednesday, 22 October, 18:30 -19:30
Tucson Ballroom, Salon A

View details of technical group activities.

Joint FIO/LS Poster Session, Tuesday, 21 October, 12:00 - 13:30, Exhibit Hall
Joint FIO/LS Posters Session, Wednesday, 22 October, 12:00 - 13:30, Exhibit Hall

Poster presentations offer an effective way to communicate new research findings and provide an opportunity for lively and detailed discussion between presenters and interested viewers. Plan on attending these interactive and exciting sessions.

VIP Industry Leaders Networking Event: Connecting Corporate Executives, Recent Graduates and Students

Tuesday, 21 October, 08:00 – 09:30
Tucson Ballroom, Salon F

This event is sold out.

This session brings together Industry Executives to share their business experience – from how they started their careers and lessons learned along the way, to using their degree in an executive position – with Recent Graduates and Students. The program starts with informal networking during breakfast and then transitions into "speed meetings" – small, brief visits with 6-8 executives to discuss careers, industry trends or other career topics.

Participating executives include:

Robert "Bob" Breault, *Founder/Chairman/President, Breault Research Organization, Inc.*
Arturo Chavez-Pirson, *Chief Technology Officer, NP Photonics, Inc.*
James Fisher, *Vice President, Newport Corporation*
Thomas L. Koch, *Dean and Professor, College of Optical Sciences, University of Arizona*
Jason Mulliner, *Chief Financial Officer, Edmund Optics*
Donald A. Pearson, II, *President & CEO, TRIOPTICS USA / Davidson Optronics / Wells Research*
Stephen Schaffer, *Vice President, Evaporated Coatings, Inc.*
Andre Wong, *Director, Product Line Management, JDSU*

Space is limited. Only Students and Recent Graduates (those who have completed their final degree in the last three years) are eligible to attend.

OSA Fellow Members Lunch

Tuesday, 21 October, 12:00 - 14:00
Tucson Ballroom, Salons G-I

Join your colleagues at the OSA Fellow Member Lunch and Program featuring Andre Wong from JDSU, who will present on their innovative light source used in 3D sensing technology. This technology enables interactions with devices naturally using bodies, gestures, eyes or voice and is used in gaming. Hear about this and other promising applications of 3D sensing technology during the program. JDSU is the corporate contest winner of the OSA Enabled by Optics Contest, which raises public awareness about the role optics and photonics plays as a key enabler of the technologies that improve daily life worldwide. View all the corporate submissions to the Enabled by Optics contest at www.osa.org/enabledbyoptics.

Note: OSA Fellows Members, Honorary Members and special guests will receive an invitation to the lunch in September. Guests must RSVP to reserve a place by 10 October with an email to OSAInvitation@osa.org.

Meet the APS Journal Editors

Tuesday, 21 October, 15:30 - 17:00
Ania Terrace

The Editors of the APS journals invite you to join them for conversation and light refreshments. The Editors will be available to answer questions, hear your ideas, and discuss any comments about the journals. All are welcome. We hope you will be able to join us.

Division of Laser Science Annual Business Meeting

Tuesday, 21 October, 18:00 - 19:00
Tucson Ballroom, Salon D

All members and interested parties are invited to attend the annual business meeting of the Division of Laser Science (DLS). The DLS officers will report on the activities of the past year and on plans for the

future. Questions will be taken from the floor. This is your opportunity to help define the operations of the DLS and the LS Conference.

OSA's Annual Business Meeting

Tuesday, 21 October, 18:00 - 19:00
Arizona Ballroom, Salon 8

Learn more about OSA and join the OSA Board of Directors for the Society's annual business meeting. The 2013 activity reports will be presented and the results of the Board of Directors election will be announced.

OSA Member Reception: The Scorchin' Sonoran

Tuesday, 21 October, 19:00 - 21:00
Tucson Ballroom, Salons E-F

Complimentary and for OSA Members only*

OSA cordially invites **OSA Members** to a blazingly celebratory night amidst the Sonoran Desert. Meet up with friends and colleagues as you savor the flavors of the American Southwest. Tucson has a rich, tri-cultural heritage stemming from Native American, Hispanic and Old West traditions. Your evening is infused with a fusion of cuisine and culture from each group. Enjoy music, drinks and appetizers; and get an introduction to the tastes of Tucson and the sounds of the Southwest.

Please bring your conference registration badge or OSA Membership card; if you join OSA on-site, please bring your receipt.

*This event is complimentary and is for OSA Members. Not a member yet? Join today to attend this complimentary OSA Member event.

Laser Science Banquet

Tuesday, 21 October, 19:00 - 21:00
Signature Grill Restaurant, Outdoor Patio - JW Marriott Tucson Starr Pass Resort

Join your colleagues for the annual LS Banquet. Tickets are required for this event and can be purchased when you register for the meeting.

OSA Members & Families: Arizona-Sonora Desert Museum Tour

Wednesday, 22 October, 08:30 - 12:30

OSA members and their families are invited to visit the Arizona-Sonora Desert Museum as guests of OSA. Ranked as the #9 museum in the world in 2013 by TripAdvisor.com, the Desert Museum interprets and showcases the Sonoran Desert region, widely recognized as the lushest desert on earth. Tour participants will enjoy a fusion experience: zoo, botanical garden, natural history museum, aquarium, art

gallery and several live animal presentations, exhibited on 21 acres that include two miles of walking paths. Additional tour details to be announced.

To reserve a spot, contact mpaterson@osa.org. Download a flyer.

Science Educators' Day (EDAY)

Wednesday, 22 October, 17:00 - 20:00
Tucson Ballroom, Salon E

Free of Charge – RSVP Required.

Our guest speaker for the 2014 Science Educators' Day (EDAY) event is Dr. Michael Raymer. He is a physicist and Phillip H. Knight Professor of Liberal Arts and Sciences at the University of Oregon. He was on the faculty at the University of Rochester's Institute of Optics before moving to Oregon, where he co-founded the University's Oregon Center for Optics. His interest in teaching began as an undergraduate at the University of California at Santa Cruz, where he co-instructed a beginning course in chemistry. Many years later he parlayed that experience into the founding of the UO's Science Literacy Program, which is funded by the Howard Hughes Medical Institute, and which reaches across the departments of physics, chemistry, biology, and geology. His interest in teaching science literacy led him to author a textbook, *The Silicon Web: Physics for the Internet Age* (Taylor & Francis, 2009), to accompany a course he teaches called *The Physics Behind the Internet*.

The registration process is EASY. To confirm your attendance simply email your name and contact information to eday@osa.org.

*OSA members may attend the student chapter demonstrations (17:00 - 18:00). Dinner and speaker session is for middle and high school science teachers only. RSVP is required to attend both.

FIO Postdeadline Papers

Thursday, 23 October, 10:30 – 12:00

The FiO 2014 Technical Program Committee will accept a limited number of postdeadline papers for presentation. The purpose of postdeadline sessions is to give participants the opportunity to hear new and significant material in rapidly advancing areas. Only those papers judged to be truly excellent and compelling in their timeliness were accepted. More information, including the schedule and locations, will be posted in the weeks preceding the conference.