Frontiers in Optics (FiO) 2011/ Laser Science (LS) XXVII

16-20 October 2011

For 95 years, the optical science community has been gathering to discuss the latest advances in all areas of the field of optics and photonics at OSA's Annual Meeting, Frontiers in Optics. From its start as a local meeting in New York in 1916 to an international conference highlighting hot topics of today such as invisibility cloaking and optical coherence tomography, FiO continues to be the premier venue for staying up-to-date in all aspects of the field. FiO 2011, co-located with Laser Science XXVII, the annual meeting of the American Physical Society (APS) Division of Laser Science (DLS), wrapped up in San Jose, Calif., this week after five days of cutting-edge research presentations, powerful networking opportunities, and engaging educational programs.

Headlining the Plenary and Awards Session on Monday were four optics luminaries speaking on a range of hot topics in the field. Ferenc Krausz of Ludwig-Maximilian's University in Germany spoke on the latest developments in attosecond science, which he says is entering the next decade of innovation.

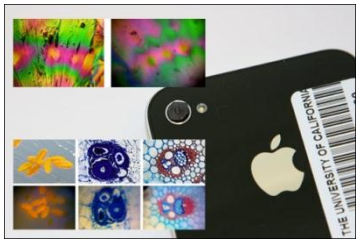
Sir John Pendry of Imperial College London spoke on sub-wavelength optics and the idea of a "perfect lens."

The winner of OSA's Frederic Ives Medal/Jarus W. Quinn Endowment, Ivan Kaminow, gave an interesting look at the early days of lightwave communications, while APS's Arthur L. Schawlow Prize Winner Jorge Rocca discussed current efforts in compact soft x-ray laser research.

Attendees could choose from more than 850 technical presentations this year, on topics as diverse as digital holography and optical microfabrication to optical signal processing and metamaterials.

FiO research generated plenty of buzz including coverage in the New York Times, MSNBC.com, Yahoo! News, NPR, and GizMag, among others.

World-renowned researchers spoke on the world's first temporal cloak, a novel way to tag brain tumors with gold nanoparticles, using the nanostructures of bird feathers to develop lasers, and transforming an iPhone into a high-quality medical imaging device.



New this year, approximately 40 percent of all of the FiO/LS content was recorded and made available within 24 hours of the presentation. Full technical attendees can access the content for free, while those who were unable to attend can access it on a pay-per-view basis.

In addition to the acclaimed research, attendees benefited from a wealth of special events and programming. To name a few, technical division chairs gave an overview of the hot topics in optics today in virtually every sub-field of optics, five special symposia were held on topics ranging from ultrashort pulses to optofluidics, and women leaders in the field came together for a panel discussion on current issues and trends facing women and minorities in science.

Business programming offered attendees perspectives on topics such as patent reform and starting a business in today's marketplace, while a packed exhibit hall showcased the latest innovations on the market today.

Attendees also paused from technical and industry programming to network with colleagues and make new connections, including at the OSA Member Reception Masquerade Party.

FiO/LS 2011 provided attendees from around the world with the opportunity to network, present, learn, and connect. Join us next year as we head back to Rochester, N.Y., for FiO/LS 2012, Oct. 14-18 at the Rochester Riverside Convention Center.

Conference Program

Abstracts:

- Monday, 17 October (pdf)
  - Laser Science Symposium on Undergraduate Research (pdf)
- Tuesday, 18 October (pdf)

- Wednesday, 19 October (pdf)
- Thursday, 20 October (pdf)
- Postdeadline Presentations (pdf)

Agenda of Sessions and Key to Authors and Presiders:

- Agenda of Sessions (pdf)
    - Addendum to Agenda of Sessions (pdf)
- Key to Authors and Presiders (pdf)
- Key to Postdeadline Authors (pdf)

Download the complete program book. (pdf, 1.6MB)

View the online program planner

View Exclusive Chairs' Videos. FiO/LS 2011 Chairs discuss FiO and LS Conference highlights and key program elements such as the Plenary Session, Special Symposia, Student & Young Professional activities, and Short Courses.

Committees

Frontiers in Optics 2011 Chairs

Lahsen Assoufid, *Argonne National Lab., USA*, General Chair
Thomas Carruthers, *National Science Foundation, USA*, General Chair
Inuk Kang, *Bell Labs, Alcatel-Lucent, USA*, Program Chair
David Reitze, *California Institute of Technology, USA*, Program Chair

Laser Science XXVII Chairs

Robert Boyd, *Univ. of Rochester, USA*, General Chair
Roseanne Sension, *Univ. of Michigan, USA*, General Chair

FiO 1: Optical Design, Fabrication and Instrumentation

Guoqiang Li, *Univ. of Missouri-St. Louis, USA*, **Chair**
Peter N. Blake, *NASA Goddard Space Flight Ctr., USA*
Thomas G. Brown, *Univ. of Rochester, USA*
Bruce Dean, *NASA Goddard Space Flight Ctr., USA*
Andrew Forbes, *National Laser Centre, South Africa*
John Koshel, *Photon Engineering Inc., Univ. of Arizona, USA*
Alan Kost, *Univ. of Arizona, USA*
Byoungho Lee, *Seoul National Univ., Korea*

Ronguang Liang, *Carestream Health, USA*
Zhaolin Lu, *Rochester Inst. of Technology, USA*
Krzysztof Patorski, *Warsaw University of Technology, Poland*
Qiwen Zhan, *Univ. of Dayton, USA*

FiO 2: Optical Sciences

Csaba Toth, *Lawrence Berkeley Labs., USA*, **Chair**
Koichi Yamakawa, *JAEA, Japan*
Olivier Albert, *LOA, France*
Laszlo Veisz, *MPQ, Germany*
Igor Jovanovich, *Penn State, USA*
Gilles Doumy, *Argonne-APS, USA*
Ian Coddington, *NIST, USA*

FiO 3: Optics in Biology and Medicine

Carlos Lopez-Mariscal, *Navy Res. Labs, USA*, **Chair**
Alvin Yeh, *Texas A&M, USA*
Nozomi Nishimura, *Cornell, USA*
Peter J. Reece, *Univ. of New South Wales, Australia*
David McGloin, *Univ. of Dundee, UK*
Alvaro Casas-Bedoya, *Univ. of Sydney, Australia*
Bernard Choi, *Univ. of California at Irvine, USA*
Andrew Dunn, *Univ. of Texas at Austin, USA*

FiO 4: Optics in Information Science

Scott Carney, *Beckmann Inst., UIUC*, **Chair**
Markus, Testorf, *Dartmouth College, USA*
Dan, Marom, *Hebrew Univ. of Jerusalem, Israel*
Johannes Courtial, *Glasgow Univ., UK*
Uriel Levy, *Hebrew Univ. of Jerusalem, Israel*
Greg Gbur, *UNC Charlotte, USA*
Damon Diehl, *ASE Optics, Inc., USA*
Dan Marks, *USA*
David Fischer, *NASA Glenn Res. Ctr., USA*
Markus Anastasio, *Illinois Inst. of Technology, USA*
Olga Korotkova, *Univ. of Miami, USA*
Michelle Povinelli, *Univ. of Southern California, USA*

FiO 5: Fiber Optics & Optical Communications

Nikola Alic, *Univ. of California at San Diego, USA*, **Chair**
Mikhail Brodsky, *AT&T Res., USA*
Lianshan Yan, *Jiantong Southwest Univ., China*

Yanick Lize, *Applied Micro Circuits Corp., USA*
Sid Ramachandran, *Boston Univ., USA*
John Marciante, *Univ. of Rochester, USA*
John Dudley, *Univ. de Franche Compte, France*
Chongjin Xie, *Bell Labs, USA*

FiO 6: Integrated Photonics

Mihaela Dinu, *Bell Labs, Alcatel-Lucent,* **Chair**
Ivan Biaggio, Lehigh Univ., *USA*
Long Chen, *Bell Labs, Alcatel-Lucent, USA*
Luca Dal Negro, *Boston Univ., USA*
Mani-Hossein Zadeh, *Univ. New Mexico, USA*
Nicolae Panoiu, *Univ. College London, UK*
Mahmoud Rasras, *Bell Labs, Alcatel-Lucent, USA*
Ron Reano, *Ohio State Univ., USA*
Shuang Zhang, *Univ. of Birmingham, UK*

FiO 7: Quantum Electronics

Alfred U'Ren, *Inst. de Ciencias Nucleares, Univ. Nacional Autónoma de México*, **Chair**
Shayan Mookherjea, *Univ. of California San Diego, USA*
Lev Deych, *CUNY Queens College, USA*
Josh Rothenberg, *Northrop Grumman Corp, USA*
Wolfgang Tittel, *Univ. of Calgary, Canada*
Stephen Walborn, *Univ. Federal de Rio de Janeiro, Brazil*
Paul Voss, *Georgia Inst. of Technology, USA*
Shuang Zhang, *Univ. of Birmingham, UK*
Tal Carmon, *Univ. of Michigan, USA*

FiO 8: Vision & Color

Jennifer Hunter, *Univ. of Rochester, USA,* **Chair**
Melanie Campbell, *Univ. of Waterloo, Canada*
Jason Porter, *Univ. of Houston, USA*
Alf Dubra, *Univ. of Rochester, USA*
Jungate Rha, *Medical College of Wisconsin, USA*
Alex Wade, *Smith Kettlewell Eye Research, USA*

LS Topic Organizers

1. Coherence and Control in Energy Transfer
Jennifer Ogilvie, *Univ. of Michigan, USA*
Tom Weinacht, *SUNY Stony Brook, USA*

2. Techniques and Applications of Ultrafast X-Rays to Studies of Atomic, Molecular, and Condensed Matter Systems

David Reis, *Stanford Univ., USA*
Markus Guehr, *SLAC, Stanford Univ., USA*

3. Advances in Nano-Scale Spectroscopy
Markus Raschke, *Univ. of Colorado, USA*

4. Techniques and Applications in Nonlinear Microscopy
Chris Xu, *Cornell Univ., USA*
Martin Fischer, *Duke Univ., USA*

5. Attosecond and Strong Field Physics
Lou DiMauro, *Ohio State Univ., USA*
Albert Stolow, *Steacie Inst. for Molecular Sciences, Natl. Res. Council of Canada, Canada*

6. Optics and Alternative Energy Sources
Philippe Fauchet, *Univ. of Rochester, USA*

7. Applications of the Orbital Angular Momentum of Light
Miles Padgett, *Univ. of Glasgow, UK*

8. Information in a Photon
Dan Gauthier, *Duke Univ., USA*
John Howell, *Univ. of Rochester, USA*

9. Optical Metamaterials
David Smith, *Duke Univ.,USA*

10. Absolute Metrology Based on Quantum Information Science
Charles Bamber, *NRC Ottawa, Canada*

Location Information

The city of San Jose is the “Capital of Silicon Valley” and has been ranked numerous times in magazines such as Fortune and Money as one of the top 10 places to live and locate a business. A city of rich cultural and ethnic diversity, it is consistently named the "Safest Big City in America.” It has a vibrant downtown scene, impressive dining and friendly accommodations while attracting visitors from all over the world. The downtown area has over 125 restaurants within walking distance of the San Jose Convention Center. Dining in San Jose is a delight! Please visit the San Jose Conventions and Visitors Bureau website for more information at www.sanjose.org.

Plenary Session and Awards Ceremony

The FiO 2011/LS XXVIi Plenary Session and Awards Ceremony is on Monday, 17 October in the Regency Ballroom, Fairmont Hotel.

Plenary Session

Professor Ferenc Krausz, Max-Planck-Institut für Quantenoptik & Ludwig-Maximilians-Universität München, Germany

Seeing is believing: capturing electrons in real time

Abstract: Atomic-scale electronic motion is a key process in life as well as modern technologies, unfolding within tens to thousands of attoseconds (1 attosecond [as] = 10-18 s). The talk will review recent advances in laser science that have opened the door to watching and controlling these hitherto inaccessible microscopic dynamics [1]-[14].

[1] M. Hentschel *et al.*, *Nature* **414**, 509 (2001); [2] R. Kienberger *et al.*, *Science* **291**, 1923 (2002); [3] A. Baltuska *et al.*, *Nature* **421**, 611 (2003); [4] R. Kienberger *et al.*, *Nature* **427**, 817 (2004); [5] E. Goulielmakis *et al.*, *Science* **305**, 1267 (2004); [6] M. Drescher *et al.*, *Nature* **419**, 803 (2002); [7] M. Uiberacker *et al.*, Nature **446**, 627 (2007); [8] M. Kling *et al.*, Science **312**, 246 (2006); [9] A. Cavalieri *et al.*, *Nature* **449**, 1029 (2007); [10] E. Goulielmakis *et al.*, *Science* **317**, 769 (2007); [11] E. Goulielmakis *et al.*, *Science* **320**, 1614 (2008); [12] F. Krausz, M. Ivanov, *Rev. Mod. Phys.* **81**, 163 (2009). [13] M. Schultze *et al.*, *Science* **328**, 1658 (2010). [14] E. Goulielmakis *et al.*, *Nature* **466**, 739 (2010).

Biography: Ferenc Krausz was born in Hungary in 1962. He studied Electrical Engineering and Physics. In 1991 he obtained his doctorate in Quantum Electronics and Laser Technology and became a professor in 1999 at the Vienna University of Technology. In 2003 Professor Krausz was appointed director at the Max Planck Institute of Quantum Optics in Garching and holds a Chair in Experimental Physics (Laser Physics) at LMU Munich since 2004. He is also director of the Cluster of Excellence*: Munich Centre for Advanced Photonics*. Ferenc Krausz has made pioneering contributions to advancing femtosecond and creating attosecond technology.

CV

1986 M.Sc., Budapest U. Technology
1991 Ph.D. Vienna U. Technology
1998 Professor, Vienna U. Technology
2003 Director, Max Planck Inst. Quant. Optics, Garching, Germany
2004 Chair of Exp. Physics, Ludwig-Maximilians Univ. Munich
2006 Director, Munich-Centre for Advanced Photonics

Research

Ultrashort-pulse lasers, ultrafast spectroscopy, high-field physics, attosecond physics: control and real-time observation of atomic-scale motion of electrons; development of compact, laser-driven sources of brilliant x-ray and particle beams for medical applications.

Professor Sir John Pendry FRS, The Blackett Lab, Imperial College, United Kingdom

Inside the Wavelength - seeing really small objects with light

Abstract: Light, though our eyes, gives us the most direct means of observing the world. Using a microscope we can see many objects invisible to the naked eye, but even themicroscope has its limitations: it is impossible with a conventional microscope to resolve anything smaller than the wavelength of light. Typically this sets a resolution limit of about 0.5 microns. To do better than this and to 'get inside the wavelength' scientists have been seeking a deeper understanding of light and its component electric and magnetic fields. We can now give a theoretical prescription for the perfect lens that has no limits to resolution. I shall report on recent progress and describe some experiments that bring light to an intense focus very much smaller than the free space wavelength

Biography: John Pendry is a condensed matter theorist. He has worked at the Blackett Laboratory, Imperial College London, since 1981. He has worked extensively on electronic and structural properties of surfaces developing the theory of low energy diffraction and of electronic surface states. Another interest is transport in disordered systems where he produced a complete theory of the statistics oftransport in one dimensional systems. In 1992 he turned his attention to photonic materials and this project culminated in the proposal in 2000 for a 'perfect lens' whose resolution is unlimited by wavelength. These concepts have stimulated further theoretical investigations and many experiments which have confirmed the predicted properties. More recently in 2006, in collaborationwith David Smith at Duke University, he has proposed a recipe for a cloak that can hide an arbitrary object from electromagnetic fields. Several realisations of this concept have been built some operating at radar and others at visible wavelengths.

Awards Program

Ivan P. Kaminow, University of California Berkeley, USA

OSA's Frederic Ives Medal/Jarus W. Quinn Prize Recipient

Lightwave Modulators: Early Days

Abstract: The talk is a personal perspective on my early research at Bell Labs on telecommunications lightwave modulators, following the demonstration of the first laser by Ted Maiman. Experiments include a 9 GHz KDP (KH_2PO_4) electrooptic travelling-wave amplitude modulator, titanium-diffused $LiNbO_3$ strip waveguides and phase modulators, and electrooptic device physics.

Biography: During his 42-year career at Bell Labs, Ivan Kaminow developed several key aspects of lightwave communication systems. He did seminal studies on electrooptic modulators and materials, Raman scattering in ferroelectrics, integrated optics (including titanium-diffused lithium niobate modulators), semiconductor lasers (including the distributed Bragg reflector laser, ridge waveguide InGaAsP laser and multi-frequency laser), birefringent optical fibers, and wave division multiplexing (WDM) lightwave networks. Later, as head of the Photonic Networks and Components Research Department, Kaminow led research on WDM components (including the erbium-doped fiber amplifier and arrayed waveguide grating router), and on WDM local and wide area networks. Early in his career he did research on microwave antenna arrays at Hughes Aircraft Company.

After retiring from Bell Labs in 1996, Kaminow served as IEEE Congressional Fellow on the staffs of the House Science Committee and the Congressional Research Service in the Library of Congress. In 1999 he served as Senior Science Advisor to OSA in Washington. Later, he established Kaminow Lightwave Technology to provide consulting services to technology companies as well as patent and litigation law firms.

Currently, Kaminow is an adjunct professor of electrical engineering at the University of California Berkeley where he has been teaching since 2004. He has been a visiting professor at Princeton, UC Berkeley, Columbia, the University of Tokyo, and Kwangju University (Korea). Kaminow received a BSEE from Union College, an MSE from the University of California, Los Angeles (UCLA) and an AM and PhD from Harvard University. He was a Hughes Fellow at Hughes Aircraft Co. and UCLA (1952-1954) and a Bell Labs Fellow at Harvard (1956-1960).

He is a member of the National Academy of Engineering and recipient of Quantum Electronics, Townes, Tyndall and Photonics Awards and Ives Medal.

Jorge Rocca, Colorado State University, USA
APS Arthur L. Schawlow Prize Recipient

Table-top soft x-ray lasers: bright coherent light for the nanoworld
Abstract: Bright soft x-ray laser beams can be created on a table-top by amplification in dense plasmas heated by fast electrical discharges or intense optical laser pulses. Applications in nanoscale imaging and probing, nanoscale materials modification, and dense plasma diagnostics will be discussed.

Biography: Jorge J. Rocca is a University Distinguished Professor at Colorado State University, where he has been in the faculty since 1983 in the Departments of Electrical and Computer Engineering (ECE) and Physics. He received a Diploma in Physics from the University of Rosario in Argentina in 1978, and a Ph.D in ECE from Colorado State University in 1983. Professor Rocca's research work has been in the development and physics of compact soft x-ray

lasers and their applications. His group demonstrated the first gain-saturated table-top soft x-ray laser using a discharge plasma as gain medium, and later extended bright high repetition rate table-top lasers down to 10 nm using laser-created plasmas, achieving full phase coherence by injection seeding. He and his collaborators have demonstrated the use of these lasers in nano-scale imaging, dense plasma diagnostics, nano-scale material studies, and photochemistry. Early in his career he was a National Science Foundation Presidential Young Investigator. He is a Fellow of the American Physical Society, the Optical Society of America, and the Institute of Electrical and Electronics Engineers. He received a Distinguished Lecturer Award from IEEE in 2008.

Honors to be presented during the Award Ceremony

APS/Division of Laser Science Awards and Honors

APS/Division of Laser Science Fellowships

Herbert P. Broida Prize
Recipient: Warren S. Warren, Duke Univ., USA

Arthur L. Schawlow Prize
Recipient: Jorge Rocca, Colorado State Univ.,USA

OSA Awards and Honors

OSA Fellowships

OSA Honorary Member
Recipient: James P. Gordon, Alcatel Lucent Bell Labs, USA

Frederic Ives Medal/Jarus W. Quinn Prize
Recipient: Ivan P. Kaminow, Univ. of California, Berkeley, USA

Max Born Award
Recipient: Carlton M. Caves, Univ. of New Mexico, USA

Joseph Fraunhofer Award/Robert M. Burley Prize
Recipient: James H. Burge, Univ. of Arizona, USA

Paul F. Forman Engineering Excellence Award
Recipient: TBA

OSA Leadership Award
Recipient: Lluis Torner, ICFO-Institute of Photonic Sciences, Spain

Emmett N. Leith Medal
Recipient: Jean Pierre Huignard, Thales Research & Technology (retired), France

Adolph Lomb Medal
Recipient: Elizabeth M. C. Hillman, Columbia Univ., USA

William F. Meggers Award
Recipient: Steven T. Cundiff, JILA, NIST and the Univ. of Colorado, USA

David Richardson Medal
Recipient: Ishwar Aggarwal and Jas Sanghera, Naval Research Lab, USA

R. W. Wood Prize
Recipient: Demetrios N. Christodoulides, Univ. of Central Florida, USA

FiO Invited Speakers

FiO 1: Optical Design and Instrumentation

1.1 Coherence, Interferometry, Optical Testing, Diffractive and Holographic Optics

Impact of Digital Holographic on Microscopy and Nanoscopy, Christian Depeursinge, *Ecole Polytechnique, Switzerland*

Wavefront Sensing and Advanced Imaging, Rick Kendrick, *Lockheed Martin, USA*

Digital Holographic Interferometry and Microscopy for 3D Object Visualization, George Nehmetallah, Partha Banerjee, *University of Dayton, USA*

Computer-Generated Holography, Toyohiko Yatagai, *Utsunomiya University, Japan*

1.2 Three-Dimensional Structure Design, Fabrication, and Nanopatterning Digital Holographic

Three-Dimensional Fabrication below the Diffraction Limit *via* Two-Color Photo-Inhibition/Initiation Lithography, Robert McLeod, *Univ. of Colorado, USA*

Printing and Molding Approaches for 3D Metamaterials and Plasmonic Crystals, John Rogers, *University of Illinois at Urbana-Champian, USA*

Beyond the Rayleigh Limit in Optical Lithography, M. Suhail Zubairy, *Texas A&M Univ., USA*

1.3 Optical Design for Biomedical Systems

Imaging of the Human Retina by Polarization Sensitive and Cellular Resolution OCT, Christoph K. Hitzenberger, *Medical University of Vienna, Austria*

Micro-Optical Sectioning Tomography System for High Resolution Connectivity of the Mouse Brain, Qingming Luo, *Huazhong Univ. of Science and Technology, China*

Adaptive Optics Applied to 2-Photon Microscopy, Jerome Mertz, *Univ. of Boston, USA*

In Vivo and Three-Dimensional Imaging of Vasculature in the Eye by Optical Coherence Tomography, Yoshiaki Yasuno, *Univ. of Tsukuba, Japan*

1.4 Polarization in Imaging and Optical Design with Unconventional Polarization

Radiation Polarisation Beams in Nanophotonics, Min Gu, *Swinburne Univ. of Technology, Australia*

Imaging Spectrometers and Polarimeters, Michael Kudenov, *Univ. of Arizona,USA*

Plasmonic Focusing with Spatially Variant Polarization, Qiwen Zhan, *Univ. of Dayton, USA*

1.5 Beam Shaping and Propagation, Laser Cavity Design

Simple Models for Focused Fields, Miguel Alonso, *Univ. of Rochester, USA*

Optical Beam Propagation through the Oceanic Turbulence, Olga Korotkova, *Univ. of Miami, USA*

Validating Beam Propagation Algorithms, Bryan Stone, *Optical Res. Associates Inc., USA*

1.6 Image-Based Wavefront Sensing and Adaptive Optics

Commissioning and Optical Control for JWST, Scott Acton, *Ball Aerospace, USA*

Optimization Algorithms for Phase and Pupil Amplitude Recovery, Bruce Dean, *NASA Goddard Space Flight Center, USA*

Phase Retrieval with Broadband Light, James Fienup, *Univ. of Rochester, USA*

Probing Cellular Function in the Living Retina with Adaptive Optics, David Williams, *Univ. of Rochester, USA*

FiO 2: Optical Sciences

2.1 High Field Interactions in Plasmas

Optical Characterization of Laser-Driven Electron Acceleration, M. Kaluza, *Friedrich Schiller University, **Germany***

Attosecond Control of Collective Electron Dynamics in Plasmas, Rodrigo Lopez Martens, *Ecole Polytechnique, ENSTA LOA/ENSTA, France*

Ultra- high pulse Intensity Amplification and Compression in Plasma, Szymon Suckewer, *Princeton Univ., USA*

Manipulation of the laser focal volume through guiding in plasma channels, Jeroen van Tilborg, *LBNL, USA*

2.2 High Intensity Lasers in Radiation Therapy

Prospects for Laser-Driven Ion Beam Therapy, T. Cowan; *FZ Dresden-Rossendorf,* (Tutorial)

Laser Plasma Accelerators for Cancer Treatment, V. Malka; *Ecole Polytechnique, ENSTA LOA/ENSTA, France*

2.3 Laser Technology for Accelerator Science

High Energy Femtosecond Laser Sources at MHz Repetition Rates for Experiments with Picosecond-/Femtosecond-/Attosecond Electron Bunches, A. Apolonski, *MPQ, Germany*

Ultrafast, Plasmonically Enhanced Photoemission from Metals, P. Dombi, *Res. Inst. for Solid State Physics and Optics, Hungarian Academy of Sciences, Hungary*

Providing Thin-Disk Technology for High Laser Pulse Energy at High Average Power, J. Tuemmler, *Max Born Inst., Germany*

Laser for High Brightness X-FEL Photo Injectors, William White, *SLAC, USA*

2.4 Frequency Combs and Classical Coherence

Precision THz time-domain spectroscopy with Two Offset-Linked Frequency Combs, Albrecht Bartels, *Univ. of Konstanz, Germany*

Silicon-Chip-Based Optical Frequency Combs, Alex Gaeta, *Cornell Univ., USA*

Dual Comb-based Characterization of Rapidly Tuned Lasers, Fabrizio Giorgetta, *NIST, USA*

Femtosecond Operation and Self-Doubling of Cr:ZnS Laser, E. Sorokin and I.T. Sorokina, *Technische Universitat Wien, Austria*

FiO 3: Optics in Biology and Medicine

3.1 Optical Trapping and Manipulation

Optical Manipulation and Sizing of Aerosol Droplets using Bessel Beams, Toni Carruthers, *Bristol Univ., UK*

Towards Cooling of Optical Trapped Aerosels, David McGloin, *Univ. of Dundee, UK*

Optofluidic Manipulation of Particles for Separation, Purification, and Analysis, Sean Hart, *US Naval Res. Lab, USA*

Optically-Induced and Directed Manipulation on Surfaces, Michael Summers, *Oxford Univ., UK*

3.2 Optics for Diagnostics and Therapy

Integrated Micro-Fluorescence-Activated Cell Sorter (μFACS), Chun Hao Chen, *UC San Diego, USA*

Spectrally Encoded Imaging, Dongkyun Kang, Massachusetts General Hospital, USA

Ocular Imaging and Crystalline Lens Optical Properties, Susana Marcos, *Consejo Superior de Investigaciones Científicas, Madrid.*

Enabling Resolution with Gabor-Domain Optical Coherence Microscopy, and Applications, Jannick P. Rolland, *Univ. of Rochester, USA*

3.3 Integrated Optofluidics for the Life Sciences

Integration Methods for Raman spectroscopy and Passive Sorting in Optofluidics, Praveen Ashok, *Univ. of St Andrews, Scotland*

Dual-Function Metallic Nanohole Arrays: Electrohydrodynamic Concentration and Plasmonic Sensing, Carlos Escobedo, *Univ. of Victoria, Canada*

Silk Fibroin Optofluidics, Peter Domachuk, *University of Sydney, Australia*

Single-Molecule Biophysics with Optofluidic Trapping, David Erickson, *Cornell Univ., USA*

Chip Integrated Optical Manipulation of Single Airborne Particles, Marcel Horstmann, *Univ. of Münster, Germany*

Title to be Announced, Michal Lipson**,** *Cornell University, USA*

Optical Explorations of Single Biomolecules and Enzymes in Solution with an Anti-Brownian Electrokiinetic Trap, W.E. Moerner, *Stanford Univ., USA*

Holographic Control and High Speed Imaging for Studies of Hydrodynamic Coupling on a Micron Scale, Miles Padget, *Glasgow, UK*

Optofluidic Nanostructures for Concentration and Sensing, David Sinton, *Univ. of Victoria, Canada*

3.4 Single-Molecule Detection

Single Molecule Analysis of yeast Rrp44 Exonuclease reveals a Spring-Loaded Mechanism of RNA Unwinding, Gwangrog Lee, *Univ. of Illinois, USA*

Single Molecule Studies of Protein Function and Dynamics, Abhi Nath, *Yale, USA*

FiO 4: Optics in Information Science

4.1 Coherence and Quantum Imaging (Joint with FiO7)

Mechanical Consequences for Conservation of Light Angular Momentum, Aristide Dogariu, *Univ. of Central Florida, USA*

Entanglement and Propagation: Is there an equivalent of the Van Cittert-Zernike Theorem for Quantum Correlations?, Daniel James, *Univ. of Toronto, Canada*

Phase-Space Imaging of Partially Coherent Beams in Linear and Nonlinear Media, Laura Waller, *Princeton Univ., USA*

4.2 Computational and Mathematical Methods in Systems and Data Analysis

SVD for Imaging Systems with Discrete Rotational Symmetry, Eric Clarkson, *Univ. of Arizona, USA*

Extracting Absolute Phase and Amplitude from DIC Imagery, Donald Duncan; *Portland State Univ., USA*

Information-Optimal Adaptive Spectral Classification Imaging, Mike Gehm, *Univ. of Arizona, USA*

4.3 Image and Information Processing in Bio-optics (Joint with FiO3)

Extracting Information from Optical Fields through Spatial and Temporal Modulation, Randy Bartels, *Colorado State, Univ. USA*

SERS Nanodomes for In-Line Detection within Biomedical Tubing, Brian T. Cunningham, *Univ. of Illinois, USA*

Methods and Applications of X-ray Phase Nanotomography, Manuel Guizar-Sicairos, *Paul Scherrer Institut, Switzerland*

Optical Coherence Microrheology: Imaging Tissue Viscoelastic Properties, Amy Oldenburg, *Univ. of North Carolina at Chapel Hill, USA*

High Speed Optical Imaging for Biomedical Applications, Maciej Wojtkowski, Nicholas *Copernicus Univ., Poland*

Partial Coherence and the Transport of Intensity and Spectrum, Adam Zysk, *Univ. of Illinois at Urbana-Champaign, USA*

4.4 Generalized Imaging and Non-Imaging Techniques for Diagnostics and Sensing

Controlling Ultrashort Pulses in Scattering Media, Ori Katz, *Weizmann Inst., Israel*

Chip-scale Microscopy for Addressing Petridish Imaging Needs, Chaghuei Yang, *CalTech., USA*

4.5 Plasmonics in Sensing and Imaging (Joint with FiO6)

Plasmonics in Biological Imaging, Rohit Bhargava, *Univ. of Illinois, USA*

Lensless Microscopy and Sensing on a Chip, Aydogan Ozcan, *UCLA, USA*

Mapping the Spatial Distributions of Cell Surface Receptors with Plasmon Coupling Microscopy, Bjoern Reinhard, *Univ. of Boston, USA*

Compressed Sensing for Practical Optical Imaging Systems: A Tutorial, Rebecca Willett, *Duke Univ., USA* (tutorial)

FiO 5: Fiber Optics and Optical Communications

5.1 Novel Photonic Crystal Fibers, Effects and Applications

Towards Nanostructured Optical Fibres: New Properties and Applications, Tanya Monro, *Univ. of Adelaide, Australia*

Keeping Matter in Focus in Photonic Crystal Fibers, Philip Russell, *Max Planck Erlangen, Germany*

Novel Fibers for Telecom, Takashi Sasaki, *Sumitomo Electric, Japan*

5.2 Novel Fiber Sensors and Applications

New Class of Fiber Characterization Techniques Based on Spatial Gating of Nonlinearity, Evgeny Mylivets, *Univ. of California , USA*

Design and Fabrication of Photonic Crystal and Plasmonic Waveguides for Bio and Chemical Sensing; Applications from the Visible to THz Spectral Range, Maksim Skorobogatiy, *École Polytechnique de Montréal, Canada*

High Spatial and Spectral Resolution Long-Range Sensing Using Brillouin Echoes, Luc Thevenaz, *Ecole Polytechnique Federale de Lausanne, Switzerland*

5.3 Information Theory in Optics (joint with FiO7)

Elementary Information Theory Applied to Phase-(in)Sensitive Transmission Links, *Colin McKinstrie, Bell Labs, USA* (Tutorial)

Entanglement and Quantum Information Theory, Steven van Enk, *Univ. of Oregon, USA*

Information Theory and Digital Signal Processing in Optical Communications: Scaling Beyond the Imminent Single-Mode Fiber Capacity Limit, Pete Winzer, *Bell Labs, USA*

5.4 Fiber Sources for Non-Telecom Windows

Toward New Class of Fiber Communications Infrastructure: EXAT Initiatives, Yoshinari Awaji, *NICT, Japan*

5.5 Optical Information Theory

kW-level Tm-fiber amplifiers at 2um, Greg Goodno, *Northrop Grumman, USA*

New Developments in Fiber-Based Frequency Combs, *Ingmar Hartl, IMRA, USA*

Quantum Information Theory in Optics, Norbert Lütkenhaus, *Inst. for Quantum Computing, Univ. of Waterloo, Canada*

Supercontinuum Generation at Mid-IR Wavelengths in Chalcogenide Photonic Crystal Fibers, Curtis Menyuk, *UMBC, USA*

Tellurite Microstructured Fibers and Their Applications, Yasutake Ohishi, *Toyota Technological Inst., Japan*

Parametric generation of mid-IR light, *Stojan Radic, Univ. of California at San Diego, USA*

FiO 6: Integrated Photonics

6.1 Silicon Photonics

Monolithic Silicon Microphotonics: Devices, Process Integration and Circuits, Lionel Kimerling, *MIT, USA*

Optimizing Bandwidth Density and Power Efficiency with Silicon Photonic Interconnections, Ashok Krishnamoorthy, *Oracle Labs, USA*

Integrated Silicon Photonics Bridging Photonics and Computing, Mario Paniccia, *Intel, USA*

CMOS Integrated Nanophotonics – Enabling Technology for Exascale Computing Systems, Yurii Vlasov, *IBM , USA*

6.2 Hybrid Integrated and III-V Photonics

Integration of New Organic Electro-Optic Materials into Silicon and Silicon Nitride Photonics and into Metamaterial and Plasmonic Device Structures, Larry Dalton, *Univ. of Washington, USA*

Organic and Inorganic Crystalline Wires and Thin Films for Hybrid Integrated Optics, Peter Günter, *ETH Zürich, Switzerland*

Progress in Heterogeneously Integrated Silicon-InP Laser Diodes for On-Chip All-Optical Networks on Chip and Signal Processing, Geert Morthier, Univ. of Gent, Belgium

6.3 Optical Signal Processing

Ultrahigh-Speed Signal Processing using Temporal Imaging, Mark Foster, *Johns Hopkins Univ., USA*

Device Challenges and Opportunities for Optical Interconnects, David A. B. Miller, *Stanford Univ., USA*

Novel Functionalities and Devices Based on Non-linear Frequency Conversion in Low-Loss, CMOS-Compatible Integrated Waveguide Structures, Roberto Morandotti, *Univ. Quebec, Canada*

Silicon Photonic Devices for Modulation, Switching, and Tuning, Michael Watts, *MIT, USA*

6.4 Nonlinear, Active and Tunable Plasmonics and Metamaterials (joint with FiO7)

Active and Tunable Plasmonics and Metamaterials, Harry Atwater, *Caltech, USA*

Recent Progress in Plasmonic Metamaterials, Xiang Zhang, *UC Berkeley, USA*

Tunable and Nonlinear Microwave and Terahertz Metamaterials, Hou-Tong Chen, *Los Alamos Nat'l Labs, USA*

Towards Metamaterials with Engineered Nonlinear Optical Properties, Martti Kauranen, *Tampere Univ., Finland*

6.5 Plasmonics and Metamaterial Devices

Bio-Inspired Photonic Nanostructures and Lasers, Hui Cao, *Yale Univ., USA*

Complex Plasmonic Oligomers and Metamaterials and their Applications, Harald Giessen, *Univ. Stuttgart, Germany*

Coherent and Broadband Plasmonic Nanocavities, Stefan Maier, *Imperial College, UK*

Advances in Metamaterials and Transformation Optics, David Smith, *Duke Univ., USA*

FiO 7: Quantum Electronics

7.1 Order, Disorder and Symmetry in Photonic Structures

Unidirectional Invisibility of Photonic Periodic Structures Induced by PT-Symmetric Arrangments, Tsampikos Kottos, *Wesleyan Univ., USA*

Quantum Electrodynamics in Disordered Photonic Crystals, P. Lodahl, *Danmarks Tekniske Univ., Denmark*

Laser Emission and Coherent Control of Absorption in Complex and Random Systems, Douglas Stone, *Yale Univ., USA* (Tutorial)

7.2 Opto-Mechanics

GaAs Disks Optomechanics, Ivan Favero, *Univ. Paris, France*

Opto-Mechanics and Quantum Dot-Nanocavity QED, Jelena Vuckovic, *Stanford Univ., USA*

7.3 Nonlinear Optics in Micro/Nano-Optical Structures

Optofluidic Lasers and Their Applications in Highly Sensitive Intra-Cavity Biomolecular Detection, Xudong Fan, *Univ. of Michigan, USA*

Optical Combs and Photonic RF Qscillators with Whispering-Gallery Mode Microresonators, Vladimir Ilchenko, *JPL and Oewaves Inc., USA*

Ultra-high-quality Whispering-Gallery-Mode Resonators for Single Nanaparticle Detection and Measurement, Lan Yang, *Washington Univ. St Louis, USA*

7.4 Quantum Computation and Communication

Quantum Optical Interface for Atoms and Electro-Mechanical Systems, Eugene Polzik, Copenhagen Univ.., *Denmark* (Tutorial)

Quantum Entanglement Between an Optical Photon and a Solid-State Spin Qubit, Mikhail Lukin, *Harvard Univ., USA*

Ion-Photon Networks for Scalable Quantum Computing, Chris Monroe, *Univ. of Maryland, USA*

Experimental Demonstration of Continuous Variable Quantum Discord, Thomas Symul, Ping Koy Lam, *Australian Nat'l. Univ., Australia*

FiO 8: Vision and Color

8.1 Optical Design of Animal Eyes

Multifocal Optics of the Fish Lens for Clear Color Vision, Ronald, Kröger, *Lund Univ., Sweden*

The Optics of Linear and Circular Polarization Vision: Recent Discoveries in Fish and Stomatopods, Nicholas Roberts, *Univ. of Bristol, UK*

8.2 Looking into the Eyes of Animal Models of Disease

High Resolution Imaging of the Living Mouse Eye: A Model for Retinal Diseases, Ying Geng, *Univ. of Rochester, USA*

The Guinea Pig as a Model of Myopia, Sally McFadden, *Univ. of Newcastle, Australia*

8.3 Fluorescence Techniques for Safe Non-Invasive in vivo Imaging (Joint with FiO3)

In vivo Imaging of Tumors Using Multiphoton Fluorescence and Second Harmonic Generation, Edward Brown; Univ. of Rochester, USA

In Vivo Particle Bombardment and Viral Methods for Specific Cellular and Subcellular Labeling, Ken Greenberg, *Spiral Genomics, USA*

LS Invited Speakers

1. Coherence and Control in Energy Transfer

Beyond Third-Order Response: Strong-Pulse and N-Wave-Mixing Optical Spectroscopies, Maxim Gelin; *Technical Univ., Munich, Germany*

Chemical Dynamics with Emphasis on Coherence and Control, Greg Engel; *Univ. of Chicago, USA*

Towards Molecular Modeling of the Dynamics and Structure Molecular Aggregates in Liquid Solution and its Spectroscopic Signature, Eitan Geva; *Univ. of Michigan, USA*

Exploiting Coherence to OPtimize Energy Redistribution in Stimulated Raman Microscopy, Jennifer Herek; *Twente Univ., Netherlands*

The Role of Nuclear Modes in Coupled Electronic Systems: Quantum Coating, Vibronic Modulation, or Quantum- Dissipative Energy Flow? Harald Kauffmann; *Univ. of Vienna, Austria*

Making the Molecular Movie: First Frames - Coming Features, Dwayne Miller; *1Max Planck Res. Dept. for Structural Dynamics, Hamburg; 2 Univ. of Toronto, Canada*

Electronic Coherence and Structure of Biological Aggregates Probed by Coherent Multidimensional Spectroscopy, Shaul Mukamel; *Univ. of California at Irvine, USA*

Following Energy Transfer from Carotenoid to Retinal in Xanthorhodopsin, Sandy Ruhman; *Hebrew Univ., Israel*

Investigating Energy Transfer in the Bacterial Reaction Center with 2-D Electronic Spectroscopy, Gabriela Schlau-Cohen, *Univ. of California at Berkeley, USA*

Comparison of Electronic and Vibrational Coherence Measured by Two-Dimensional Electronic Spectroscopy, Daniel Turner, *Univ. of Toronto, Canada*

2. Techniques and Applications of Ultrafast X-Rays to Studies of Atomic, Molecular, and Condensed Matter Systems

Ultrafast X-ray Diffraction using Synchrotrons and Plasma Sources, Matias Bargheer, *Univ. of Potsdam, Germany*

Imaging Airborne Particulate Matter with X-Ray Lasers, Mike Bogan; *SLAC Natl. Accelerator Lab, USA*

Ultrafast Imaging of Nanoclusters with Intense X-Ray Laser Pulses, Christoph Bostedt; *Linac Coherent Light Source, USA*

Femtosecond Spin State Changes: Implications for Photocatalysis, Christian Bressler; European XFEL Facility, *Germany*

The X-Ray View of Ultrafast Nanomagnetism, Hermann Durr; *SLAC Natl. Accelerator Lab, USA*

X-Ray / Optical Wave Mixing, Ernie Glover; *Lawrence Berkeley Natl. Lab, USA*

Ultrafast Non-thermal Dynamics of Striped Nickelate via Femtosecond Resonant Soft XRray Diffraction Using X-Ray Free Electron Laser at LCLS,Wei-Sheng Lee; *SLAC Natl. Accelerator Lab, USA*

Multi Photon Physics at the LCLS, Christoph Roedig; *Ohio State Univ., USA*

Nonequilibrium Phonon Dynamics, Mariano Trigo; *SLAC Natl. Accelerator Lab, USA*

3. Advances in Nano-Scale Spectroscopy

Controlling Plasmonic Interactions with Nanometer-Scale Precision, Jeremy Baumberg; *Univ. of Cambridge, UK*

The Nano-Optics of Plasmonic Optical Tweezers, SERS Substrates and Multi-Colored Silicon Nanowires, Ken Crozier; *Harvard Univ., USA*

Ultrafast Optical Probing of Topological Insulators, Nuh Gedik; *MIT, USA*

Impedance of a Nanoantenna and a Quantum Emitter, Jean-Jaques Greffet; *CNRS and Ecole Centrale Paris, France*

Cascaded Plasmon Resonances for Enhanced Ultrafast Nonlinear Optical Switching, Pieter Kik; *CREOL, Univ. of Florida, USA*

Control and Tracing of Attosecond Electron Dynamics in Nanosystems, Matthias Kling; *Max-Planck Inst. for Quantum Optics, Germany*

A Local View of Slow Light, Kobus Kuipers; *FOM Inst. for Atomic and Molecular Physics (AMOLF), Netherlands*

Plasmons in Reduced Dimensions and on Atomic Scale, Tadaaki Nagao; *Natl. Inst. for Materials Science, Tsukuba, Japan*

Gold Nanoparticles as Optical and Mechanical Resonators, Matthew Pelton; *Argonne Natl. Lab, USA*

4. Techniques and Applications in Nonlinear Microscopy

Technology Development for Multiphoton Endoscopy: Superresolution, Min Gu; *Swinburne Univ., Australia*

Zonal Adaptive Optical Microscopy, Na Ji; *Janelia, USA*

Microprisms for Chronic *in vivo* Multiphoton Microscopy of Cortex, Michael Levene; *Yale Univ., USA*

Surface-mediated Four-wave Mixing Microscopy, Eric Potma, *Univ. of California at Irvine, USA*

Title to Be Announced, Peter So*; MIT, USA*

Volumetric Multiphoton Microscopy: Simultaneous Imaging in 3-D, Jeff Squire; *Colorado School of Mines, USA*

Advances in STED Nanoscopy, Volker Westphal, *Max Planck Inst. for Biophysical Chemistry, Germany*

Ultrashort-Pulse Lasers for Nonlinear Microscopies, Frank Wise; *Cornell Univ., USA*

Non-Linear Optical Microscopy with Coherent Raman Contrast for Brain Tumor Diagnosis and

Resection Guidance, Geoffrey Young; *Brigham and Woman's Hospital, USA*

Applications of Multiphoton Microscopy - Lessons from the 90's and Where It's All Headed, Warren Zipfel; *Cornell Univ., USA*

5. Attosecond and Strong Field Physics

Time-Dependent Electronic Dynamics in Atoms, Molecules, and Solids Probed by Ultrashort Pulses, Joachim Burgdorfer; *Technische Univ. Wien,Vienna, Austria*

Transient Absorption Spectroscopy with Attosecond Pulse Trains, Lukas Gallmann; *ETH Zurich, Switzerland*

Ionic State Superposition in the Strong Field Ionization of Water, Markus Guehr; *Stanford Univ., USA*

High-Harmonic Generation: From Microscopic to Macroscopic World, Anh Thu Le; *Kansas State Univ., USA*

Theory of Attosecond Transient Absorption in Laser-Dressed Atoms, Ken Schafer; *Louisiana State Univ. USA*

Attosecond Electron Dynamics in Atoms and Solids, Martin Schultze; *Max Planck Inst. fuer Quantenoptik, Germany*

Toward *ab initio* Modeling of Strong Field Molecular Ionization, Michael Spanner; *NRC, USA*

Title to Be Announced, Michal Tarana; *JILA, Univ. of Colorado, USA*

6. Optics and Alternative Energy Sources

The Potential for Single-walled Carbon Nanotubes in Renewable Energy: Photovoltaics and Fuel Production, Jeffrey Blackburn, *NREL, USA*

Plasmonic and High Index Nanostructures for Efficient Solar Energy Conversion, Mark Brongersma, *Stanford Univ., USA*

Optimization of Carrier Multiplication in Quantum Dots for More Efficient Solar Cells: Theoretical Aspects, Christophe Delerue; *IEMN, France*

Title to Be Announced, Shanhui Fan, *Stanford Univ., USA*

Light Trapping in Plasmonic Solar Cells, Vivian Ferry; *Caltech, USA*

Polymer Solar Cell as an Emerging PV Technology, Gang Li, *Solarmer, USA*

Exploration of Optimization-based Surface Textures for High Efficiency Thin-Film Si Solar Cells, Jurgen Michel, *MIT, USA*

Light Guide Concentrating Photovoltaics System, Duncan Moore, *Univ. of Rochester, USA*

7. Applications of the Orbital Angular Momentum of Light

Entanglement of Very High Orbital Angular Momentum, Robert Fickler; Univ. of Vienna, Austria

Electron Beams Carrying Quantized Orbital Angular Momentum, Ben McMorran; *NIST, USA*

X-Ray Orbital Angular Momentum, Ian McNulty; *Argonne Natl. Lab, USA*

Using Cascaded Moiré DOEs to Generate Spiral Phase Plates of Continuously Adjustable Helical Charge, Monika Ritsch-Marte; *Univ. of Innsbruck, Austria*

Optical Angular Momentum in Optical Tweezers – Quantitative Measurement and Applications, Halina Rubinsztein-Dunlop; *Univ. of Queensland, Australia*

On the use of Photon Orbital Angular Momentum in Studies of Space, Bo Thide; *Uppsala Univ., Sweden*

Angular Momentum in Optics and Acoustics: Complementary Studies, Karen Volke-Sepúlveda; *Univ. Nacional Autonoma de Mexico, Mexico*

Non-Specular Reflection and Angular Momentum of Light, Han Woerdman; *Leiden Univ., Netherlands*

8. Information in a Photon

Multi-bit-per-photon, Spectrally-efficient Optical Communications Architectures, Sam Dolinar; *JPL , USA*

Quantum Optics on Photonic Chips, Dirk Englund, *Columbia Univ., USA*

Spatial Entanglement and Orbital Angular Momentum, Martin van Exter; *Leiden Univ., Netherlands*

Compressive Imaging and the 1-Pixel Camera: Extracting Information from Multiplexed Photons, Kevin Kelly, *Rice Univ., USA*

Hyper-Entanglement: How to Enlarge Your Hilbert Space without Really Trying, Paul Kwiat; *Univ. of Illinois, USA*

Optimal Photonic Measurements for Metrology and Entanglement Verification, Geoff Pryde; *Griffith Univ., Australia*

Mastering Pulsed Quantum Light, Christine Silberhorn; *Max Planck Res. Group, Germany*

Building Multimode Quantum Networks, Ian Walmsley; *Oxford Univ., USA*

Time-Energy Entangled Waveguide Source for High Dimensional QKD, Franco Wang, *MIT, USA*

9. Optical Metamaterials

Affine Transformational Optics, George Barbastathis, *MIT, USA*

Amplification and Lasing with Surface Plasmons: Review of Recent Progress, Pierre Berini, *Univ. of Ottawa, Canada*

Graphene Plasmonics, Javier Garcia de Abajo; *Inst. de Optica-CSIC, Spain*

Title to Be Announced, Harald Geissen; *Univ. of Stuttgart, Germany*

Nonlinear Optical Response of Nanoantennas, Hayk Harutyunyan; *Rochester Univ., USA*

Slow Light Amplification and Nano-Lasing in Active Plasmonic Metamaterials, Ortwin Hess, *Imperial College London, UK*

Control of Emission and Reflection with Hyperbolic Metamaterials, Mikhail Noginov, *Norfolk State Univ., USA.*

Radiative Heat Transfer in Hyperbolic Metamaterials, Evgenii Narimanov; *Purdue, USA*

Plasmonic Nanowire Networks: From Waveguiding to Passive and Active Nanoscale Optical Devices, Peter Nordlander; *Rice Univ., USA*

A Negative Index Metamaterial Operating at UV / Visible, James Parsons; *FOM Inst. AMOF, Amsterdam*

Title to Be Announced, Costas Soukoulis, *Iowa State Univ., USA*

Recent Progress in Optical Metamaterials, Xiang Zhang; *Univ. of California at Berkeley, USA*

10. Absolute Metrology Based on Quantum Information Science

New Directions in Force Detection: Entanglement, Noise Cancellation, and Quantum Nondemolition, Carlton Caves; *Univ. of New Mexico, USA*

Title to Be Announced, John Howell; *Univ. of Rochester, USA*

Absolute Calibration of Optical Detectors Using Two-Mode Squeezed Light, Jeff Lundeen; *Natl. Res. Council, Canada*

Nonorthogonal State Discrimination below the Homodyne Limit, Alan Migdall; *NIST, USA*

Quantum Metrology from Sub-Poissonian to Super-Heisenberg, John Rarity; *Univ. of Bristol, UK*

Dispersion Cancellation and Precise Measurement with Quantum Interferometry, Alexander Sergienko; *Boston Univ., USA,* Nina Rohringer*; Lawrence Livermore Natl. Lab, USA*

Special Symposia

50 Years of Measuring the Eye's Aberrations

This year marks the 50th anniversary of Mikhail S. Smirnov's classic publication that provided the first measurements of the eye's monochromatic wave aberration and articulated the potential for its clinical correction [Measurement of the wave aberration of the human eye. Biofizika. 1961;6:687-703.]. Significant advances have been made in our ability to measure ocular aberrations, allowing for their rapid correction and manipulation. This symposium will highlight

the history of measuring and describing optical aberrations while detailing clinical and scientific achievements made possible through understanding the eye's wave aberration.

Moderator: Howard Howland; *Cornell Univ., USA*

Tutorial Speaker:

An Historical Understanding of the Normal Eye's Monochromatic Aberrations, Howard Howland; *Cornell Univ., USA*

Invited Speakers:

Factors Affecting Visual Performance after Customized Wavefront Manipulation, Geunyoung Yoon; *Univ. of Rochester Medical Ctr., USA*

Customized Clinical Correction of the Eye's Aberrations, Ian Cox; *Bausch and Lomb, USA*

Adaptive Optics Techniques Used for *in vivo* Examination of the Retina and Visual System, Robert J. Zawadzki; *Health System Eye Ctr., Univ. of California at Davis, USA*

Using Adaptive Optics to Create Finer Tools for Probing Visual Function, Austin Roorda; *Univ. of California at Berkeley, USA*

Probing Cellular Function in the Living Retina with Adaptive Optics, David Williams; *Univ. of Rochester, USA*

Understanding the Normal and Diseased Retina Using Adaptive Optics Imaging, Joseph Carroll; *Medical College of Wisconsin, USA*

Ultrashort Pulses: 20th Anniversary of Frequency-Resolved Optical Gating Symposium

In the 1960s, laser pulses became shorter than available measurement devices, and a new field was born: Ultrashort laser pulse measurement. Researchers quickly realized that the shortest event available with which to measure such pulses was the pulse itself, and autocorrelation was born. Alas, the pulse is only as short as itself, not shorter, and, as a result, autocorrelation only yielded only a rough measure of the pulse length. In 1991, however, Kane and Trebino introduced Frequency-Resolved Optical Gating (FROG), a spectrally resolved autocorrelation coupled with a two-dimensional phase-retrieval algorithm, which solved the problem, yielding the complete intensity and phase of arbitrary ultrashort laser pulses. Since then FROG has found many applications, and it continues to be the gold standard of ultrashort-pulse measurement. This symposium celebrates the anniversary of its introduction—twenty years ago at this conference.

Organizers:

Dan Kane; *Mesa Photonics, USA*

Rick Trebino; *Georgia Tech, USA*

Invited Speakers:

Complex Pulses and New Physics: How FROG Has Led to New Paradigms for Ultrafast Nonlinear Optics, John Dudley; *Univ. de Franche-Comté, France*

Advances in Attosecond Metrology and Spectroscopy, Reinhard Kienberger; *Technische Univ. München and Max-Planck-Inst. für Quantenoptik, Germany*

Frequency Resolved Optical Gating of Atomic and Molecular Coherence: From Weak to Strong Field Regimes, Valery Milner; *Univ. of British Colombia; Canada*

Ultrafast Coherent X-Rays - from Femtoseconds to Zeptoseconds, Margaret Murnane; *Univ. of Colorado, Boulder and JILA, USA*

Generation and Characterization of Isolated Attosecond Pulses for Atomic and Molecular Physics, Mauro Nisoli, *Politecnico di Milano, Italy*

Spectrograms for Probing Nonlinear Pulse Propagation, Selcuk Akturk; [1]*Istanbul Technical Univ., Turkey;* [2]*École Polytechnique, France*

FROG at high NA: Quantifying the Excitation Fields for Multiphoton Microscopy, Jeff Squier; *Colorado School of Mines, USA*

Interferometric FROG for Few-Cycle Pulse Characterization and as a Spectroscopic Tool, Gunter Steinmeyer; *Max Born Inst., Germany*

Special Symposium on Integrated Optofluidics for the Life Sciences

Organizer: Carlos Lopez-Mariscal; *Navy Res. Labs, USA*

Invited Speakers:

Integration Methods for Raman spectroscopy and Passive Sorting in Optofluidics, Praveen Ashok; *Univ. of St Andrews, UK*

Silk for Diagnostics, Peter Domachuk; *Univ. of Sydney, Australia*

Single-Molecule Biophysics with Optofluidic Trapping, David Erickson; *Cornell Univ., USA*

Optical Explorations of Single Biomolecules and Enzymes in Solution with an Anti-Brownian Electrokinetic Trap, W.E. Moerner; *Stanford Univ., USA*

Quantum Imaging, Miles Padgett; *Univ. of Glasgow, UK*

Pulse-Less Microfluidic Flow Control, Alex Terray; *NRL, USA*

Laser Science Symposium on Undergraduate Research

This special DLS annual symposium is rapidly becoming one of the most successful DLS traditions (this year's is the 11th of a series that began at the Long Beach meeting in 2001). 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 sessions.

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

Novel X-ray and EUV Light Sources and Sciences

Novel light sources producing temporally and spatially coherent electromagnetic radiations in the extreme wavelength regimes are becoming available to the scientific communities, affording them unprecedented capabilities for probing and manipulating natural processes occurring in the ultrasmall length scale and ultrafast time scale. The special symposia explore the recent advances in both table-top and accelerator-based light sources for EUV and X-ray generation, and new and exciting sciences and technological applications made possible by the technological breakthroughs.

Extreme Ultraviolet and Soft X-Ray Small-Scale Sources: Science and Applications

Organizer: Carmen Menoni, *Colorado State Univ., USA*

Invited Speakers:

Laser-based Gamma-rays and the Emergence of Nuclear Photonics, Christopher Barty; *Lawrence Livermore Natl. Lab; USA*

Strong Field Physics with Long Wavelength Lasers, Anthony DiChiara; *Ohio State Univ., USA*

Table-top Short Pulse Driver for sub-10 nm soft X-ray Lasers, Bradley Luther; *Colorado State Univ., USA*

Phase Matching of Coherent Attosecond X-ray Supercontinua, Tenio Popmintchev; *JILA, USA*

Inductively Driven, Electrodeless Z-pinch Sources for EUV and Soft X-ray Applications, Matthew Partlow, Steve Horne, Donald Smith; *Energetiq Tech. Inc., USA*

Accelerator-based X-ray Free-Electron Lasers and Science

Organizer: Roger Falcone; *Univ. of California at Berkeley, USA*

Invited Speakers:

Applications of the LCLS X-ray Free Electron Laser for High-Energy Density Science, Richard Lee; *Lawrence Livermore Natl. Lab, USA*

A Next Generation X-ray Laser Array at the Berkeley Lab: Science Drivers and Facility Overview, Robert Schoenlein; *Lawrence Berkeley Natl. Lab, USA*

X-ray Lasers for Molecular-Resolution Time-Resolved Nanocrystallography in Biology, John Spence; *Arizona State Univ., USA*

Ultrafast Dynamics in Surface Chemical Reactions Probed with Free-Electron Lasers, Wilfried Wurth; *Univ. Hamburg, Germany*

Submissions

Author Timeline

22 February 2011	**1 Call for Papers**
24 May 2011 12:00 p.m. noon EDT (16.00 GMT)	**2 Papers Submissions Deadline**
June 2011	**3 Peer Review**
July 2011	**4 Postdeadline Submissions Open**
22 July 2011	**5 Program Committee Meeting**
July 2011	**6 Author Notificaiton Sent**
August 2011	**7 Program Available**
3 October 2011 12:00 p.m. noon EDT (16.00 GMT)	**8 Postdeadine Submissions Deadline**
11 October 2011	**9 Postdeadline Author Notification Sent**
16-20 October 2011	**10 Present at Meeting**

Submission Categories

FiO 1: Optical Design, Fabrication and Instrumentation

General description: This section covers general optical design, fabrication, algorithms, devices and systems, and instrumentation. Topics include but are not limited to

- Design of new optical elements and systems
- Aberrations, wavefront sensing, wavefront correction
- Coherence, interferometry, design, fabrication, and applications of diffractive and holographic optical elements and systems
- Three-dimensional structure design, fabrication, and nanopatterning
- Optical imaging, optical design for biomedical systems
- Adaptive optics for eye imaging
- Optical design with unconventional polarization
- Laser beam shaping and propagation, optical design of laser cavity
- Optical technologies for display and astronomical instruments

1.1 Coherence, Interferometry, Optical Testing, Diffractive and Holographic Optics

Topics include: coherence, interferometry, applications of interferometers, optical testing, digital holography for biomedical or nanophotonics applications, holographic micro- and nano-fabrication methods, 3-D holographic microscopy, 3-D optical image processing, 3-D display, computer generated holograms, dynamic holography, beam shaping, diffractive polarizing

elements, polarization-independent diffractive elements, broadband diffractive elements, active diffractive elements, subwavelength optics, fabrication of diffractive and micro-optical elements, hybrid design with diffractive-refractive optics.

1.2 Three-Dimensional Structure Design, Fabrication, and Nanopatterning

The field of optical materials has been rapidly developing in recent years, promising to deliver new materials with exotic properties generally unattainable in nature. Full exhibition of their properties and functionalities relies on 3D control of metallic or dielectric structures in the nanoscale. This theme is focused on the design and fabrication of 3D optical materials and integrated circuits, which may include 3D photonic crystals, 3D metamaterials, and 3D optical circuits. Recent progress may bring new synthesis techniques that enable nanoscale spatial control in three dimensions. On the other hand, scalable, fault-tolerant designs and architectures that can lead to large-scale fabrication are also of great interest. The theme also includes optical nanolithography, EUV lithography, maskless lithography, plasmonic imaging and metamaterials, nanoimprint technology, self-assembly nanopatterning, organic electronic device patterning, lithography for display technology, flexible electronic devices, etc.

1.3 Instrumentation for Optical Microscopy and OCT (Joint with FiO3)

Themes include novel optical design for improving the resolution, speed, depth range of various biomedical imaging modalities such as confocal, optical coherence tomography, photoacoustic imaging, stimulated emission-depletion microscopy (STED), fluorescence lifetime imaging (FLIM), etc., optical design and fabrication of microfluidic devices for biomedical instrument.

1.4 Optical Design with Unconventional Polarization

Scope includes but not limited to:

1. Polarizing in tissue scattering, biomedical imaging, and bio-optics
2. Retrieval techniques in imaging polarimetry
3. The interaction of nanostructures with polarized light
4. Active unconventional polarization source
5. Description and characterization of unconventional polarization states (including radial polarizations, azimuthal polarizations, and other types of polarization vortices)
6. Creation of unconventional polarization states
7. Ray tracing and optical design with spatially variant polarizations
8. Polarization aberrations in optical design and instrumentation

1.5 Beam Shaping and Propagation, Laser Cavity Design

Scope includes but not limited to:

1. Beam shaping techniques
2. Experimental measurement of propagating beams
3. Theoretical development of beam descriptions including Gaussian, bessel, etc.

4. Propagation methods including FFT, Gaussian Beam Decomposition, SAFE, etc.
5. Paraxial and non-paraxial propagation of unconventional polarizations through various media (free space, turbulence, optical waveguide, optical fiber) and optical system
6. Design of the resonator and pump cavities using optical design techniques and/or software
7. Coherent ray propagation design principles (possibly joint with the Division that includes lasers)

1.6 Image-Based Wavefront Sensing and Adaptive Optics

Future light-weight and segmented primary mirror systems such as NASA's JWST (James-Webb-Space-Telescope) require active optical control to maintain mirror positioning and figure to within nanometer tolerances. Image-based "wavefront sensing" (e.g., phase-retrieval and phase-diversity) may offer a simpler solution for applications where conventional sensing hardware can be replaced by a computational approach. Various estimation approaches are distinguished by the specific data processing and constraints that are incorporated. This theme is intended to promote technical exchange on image-based algorithm developments, applications, and theory.

1.7 General Optical Design and Instrumentation

Scope includes but not limited to: Design of new optical elements and systems, aberrations, adaptive optics, wavefront sensing, wavefront correction, adaptive optics for the eye, design, testing, and systems analysis of displays, including backlit LCD/LED, 3D, OLED, projection, novel methods, etc. applications of displays, Optical technologies for display and astronomical instruments.

FiO 2: Optical Sciences

2.1 High Field Interactions in Plasmas

Contributions are solicited on the following topics: Novel optical diagnostic methods to study high field interaction, interferometry and spectroscopy of the interaction region in strongly focused arrangements, spatio-temporal coupling, effects of the target material for the optical properties of the driving laser pulses, plasma based technologies for pulse compression and amplification.

2.2 High Intensity Lasers in Radiation Therapy

Contributions are solicited on the following topics: Development of intense lasers and laser-based sources for medical applications. Laser and particle beam parameters required for various therapies, methods for testing the biological effects and efficiency of new, laser-based sources.

2.3 Laser Technology for Accelerator Science

Contributions are solicited on the following topics: Development of high average power, intense pulsed lasers for accelerators, including drivers for photocathodes and plasma wake-fields. New methods to overcome bottlenecks in scaling average power and size of optics. New laser

materials for OPAs, disk and fiber amplifiers. Limitations and novelties in Chirped Pulse Amplification.

2.4 Frequency Combs and Classical Coherence

Contributions are solicited on the following topics: High precision optical spectroscopy, novel methods to improve resolution in space, time, and frequency domains, precision metrology.

FiO 3: Optics in Biology and Medicine

3.1 Optical Trapping and Manipulation

The field of optical manipulation has evolved greatly since its first implementation several decades ago. Novel optical technologies coupled with deep understanding of the physical mechanisms involved in optical trapping have produced instruments of delicate sensitivity and control that allow the quantitative observation of biophysical phenomena down to the nanometer-scale, such as molecular interactions and on-demand assembly of microscopic structures.This theme covers advances in harnessing the interaction of light and matter in the context of optical forces at the microscopic scale in biology and medicine, including cell and protein interactions. Submissions are also encouraged for novel methods that result in improved spatial and temporal resolution, specimen tracking, discrimination, control and increased throughput for automation.

3.2 Optics for Diagnostics and Therapy

Optical interrogation is a key tool in the development of novel instruments for the early diagnosis of degenerative diseases. From blood glucose level monitoring to antibody detection, the field has seen a dramatic increase in activity in recent times. The use of Raman spectroscopy, fluorescence-lifetime-imaging microscopy (FLIM), Förster resonance energy transfer (FRET) and other advanced techniques paves the way for efficient discrimination of pathologies in their early development stage. As new photonic-based therapies become available, the number of candidates for treatment of cancer and other degenerative diseases increases accordingly. Submissions are encouraged for progress in both areas.

3.3 Special Symposium on Integrated Optofluidics for the Life Sciences

This Special Symposium highlights recent progress in optofluidics towards lab-on-a-chip devices. The use of microfluidic structures and active control of flow within involves a combination of engineering and scientific creativity fueled by available fabrication techniques and ingenuity. Submissions are encouraged covering research on the use of optical tools within microfluidics for fluid interrogation and control, the use of fluid properties for increased optical performance, and methods for combining optical, viscous and capillary forces into functional machines. While integration and miniaturization have proven to be tractable problems, actual low-cost, thumb-sized instruments capable of unsupervised, stand-alone operation still represent a major challenge in the area. Submissions addressing this challenge are also encouraged.

3.4 Single-Molecule Detection

A profound understanding of single-molecule interactions including their quantitative evaluation is of vital importance for modern molecular and systems biology. This theme encompasses the study of protein-enzyme, protein-DNA, and other bio-molecular interactions at the single-molecule level. Submissions portraying progress towards quantitative evaluation - besides from discrimination of species presence alone -- using optical methods are strongly encouraged.

FiO 4: Optics in Information Science

4.1 Coherence and Quantum Imaging (Joint with FiO7)

Classical and quantum optical correlation effects are becoming integral part of applied optical sciences. At the same time quantum optics is inspiring the development of novel concepts for classical optical information processing. Methods to encode information on the classical or quantum statistics of light provide a means to transmit information in novel and robust ways, to encode and to process that information. The effects of interaction with the environment are also encoded in the quantum and classical correlations of light and so the correlations may be the basis of imaging the medium. Examples include variable coherence imaging and ghost imaging.

Contributions are solicited on topics in coherence and quantum optics that pertain to imaging. Examples include but are not limited to spatial coherence imaging, ghost imaging, and propagation in random media.

4.2 Computational and Mathematical Methods in Systems and Data Analysis

Contributions are sought in analysis of optical systems in the context of information capacity, image analysis and image quality assessment, computed imaging and inverse problems. The theme also encompasses new theoretical tools and mathematical transforms to represent and analyze optical signals, such as phase space optics.

4.3 Image and Information Processing in Bio-optics (Joint with FiO3)

Interrogation of biological systems with light presents unique opportunities and challenges. The issues involved in x-ray analysis of soft tissues are markedly different than those of bone imaging or crystallography. Dispersion for some broad classes of tissues is well understood and allows for the use of methods that leverage that understanding. The challenges of working with living or delicate samples places limits on spectra and dosage.

Contributions are sought that address the particular issues of imaging, diagnosing, and otherwise interrogating biological samples and the subsequent analysis and processing of data from biological samples. Examples include phase retrieval in bioimaging, and image analysis.

4.4 Generalized Imaging and Non-Imaging Techniques for Diagnostics and Sensing

Traditionally, optical information referred to the information contained in an image gathered by a standard geometrical imaging system. Modern techniques, however, have been developed to extract additional information from an optical signal, to form images in unconventional ways, and to probe specific questions without imaging. The combination of imaging methods with nonimaging methods or even the combination of multiple modalities can offer much more useful information than isolated techniques. These techniques provide additional information that can be used for applications such as sensing and diagnostics, but also introduce additional challenges in interpretation and data collection.

Contributions are solicited on optical information outside of the usual paradigm of image formation. This can include techniques that incorporate or reconstruct phase information from a signal such as holography, interferometry, and transport of intensity. It encompasses non-imaging diagnostic techniques, such as spectroscopy, novel tomographic techniques and inverse problems, and techniques that use unconventional strategies to extract an image from an otherwise noisy data set, such as acousto-optics imaging, classical ghost imaging and ballistic imaging, and sensing paradigms such as feature specific imaging and compressed sensing. Hybrid method that combine these emerging methods with conventional imaging are also sought.

4.5 Plasmonics in Sensing and Imaging (Joint with FiO6)

Progress in the design of micro- and nano-optical structures to support and tailor the behavior of plasmons, together with advances in manufacture of three-dimensional microstructures, have opened to avenues in the control of the electronic-electromagnetic field. Plasmonic interactions offer means to enhance local fields and transport energy in ways that enable new sensing and imaging technologies.

Contributions are solicited that describe the design and application of plasmonics to imaging and sensing.

FiO 5: Fiber Optics and Optical Communications

5.1 Novel Fibers and Applications

The optical fibers have made a momentous impact on every day's life ever since the introduction of the low loss silica fiber some 25 years ago. The recent years have seen significant, long awaited breakthroughs in fiber fabrication and design, new materials, momentous non-linearity enhancements, as well as low losses, bordering physical material limitations, all of which will lead to a continuous expansion of the field. This theme covers the most recent advances in optical fiber design, including micro-structured , step, and graded index designs, as well as their applications to e.g. nonlinear optics, sensing, amplification, as well as telecommunications.

5.2 Fiber Sensors and Applications

Fiber based sensors have been a subject of research since the introduction of the optical fibers. The advances in fiber desing and fabrication, joined with signal processing are continuously enabling new sensing applications with ever increasing accuracies and resolution. This theme focuses on sensing applications employing fiber based devices and effects including, but not necessarily limited to: fiber-Bragg gratings, stimulated Brillouin and Raman scatterings, Rayleigh scattering, plasmonic waveguide interactions, and LIDAR applications.

5.3 Fiber Optic Transmission and Optical Communications

This theme covers a broad range of topics associated with optical communications: from the physical effects enabling and hampering the transmission of information in single and/or multimode fibers. to the mitigation methods based either on optical or electronic approaches (or a combination thereof) of the transmission impairments, as well as components for communication systems, network design and wavelength routing architectures, performance monitoring and the design and implementation of data-centers.

5.4 Fiber Sources for Non-Telecom Windows

Although traditionally optical fibers have been associated with the near IR 1550 nm window, this wavelength range is by no means the only one of either interest, or applicability pertinent to the optical fibers. Indeed, the maturation of fabrication processes and advances in material science, often reinforced by nonlinear optics, are opening new opportunities for fiber based sources covering a wide wavelength range from the visible spectrum to the mid-infra-red band. This theme is open to all aspects of non-telecom sources' generation: coherent and super-continuum sources, frequency combs, LIDAR sources and applications residing outside of the common telecom window.

5.5 Optical Information Theory

The last five years in optics have been marked with a significant change in the approach to the field of optics in almost all its aspects: A long outstanding questions of the true capabilities of optical systems in terms of their disposition to convey, or store information to its full capability are finally beginning to be elucidated. Indeed, the applications of Information Theory whose foundations were laid by Claude E. Shannon in the 40's, are finally being applied to the optical systems: from optical communications, to quantum optics and teleportation. This symposium will gather the most prominent researchers in the field, whose recent contributions, have marked significant breakthrough to the Optical Information Theory and its applications, the developments and consequences of which, we shall witness in the years to come. The symposium talks are intended to familiarize the general FiO audience with basic and advanced concepts of the information theory and its applications to different aspects of optical systems, recent developments in the field, as well as the outlook and the future directions.

FiO 6: Integrated Photonics

6.1 Silicon Photonics

Silicon has emerged as a preeminent building material for photonic devices and integration, offering advantages such as reduced footprint and power consumption, wide functionality, and the possibility of integration with electronics. The focus of the theme will be on silicon passive and active devices, silicon integrated photonics, silicon micro- and nano-photonics.

6.2 Hybrid Integrated and III-V Photonics

Heterogeneous materials or components can be separately optimized for distinct functions, thus a hybrid integrated circuit or device could surpass monolithically integrated photonic circuits or devices, in performance or functionality. The theme will focus on novel integrated photonic devices or circuits which consist of dissimilar components or material platforms in order to provide optimized functionality or characteristics. Some examples include, but are not limited to, integration of silica lightwave circuits and semiconductor active emitters or detectors, organic/inorganic photonic integration, or silicon/III-V photonic circuit integration.

6.3 Optical Signal Processing

Processing or routing of data in the optical domain can offer advantages compared to electronic solutions as data rates increase. Optical processing and routing of data may be used to alleviate speed, power, and throughput constraints imposed by current electronics, or could take advantage of the inherent parallelism of optics. The theme will welcome submissions in the areas of highly integrated photonics for communications, active, passive, or all-optical signal or data processing devices, and devices and materials for optical interconnects.

6.4 Nonlinear, Active and Tunable Plasmonics and Metamaterials (joint with FiO7)

Advances in the design and fabrication of plasmonic structures and metamaterials have enabled the demonstration of novel capabilities in shaping and controlling the behavior of light. Current rapid progress is taking place in the area of active compensation of propagation losses, demonstration of tunability, and nonlinear and switching properties of metamaterial and plasmonic devices. The theme will focus on advances in gain-assisted metamaterials, plasmonic lasers, tunable metamaterials and plasmonics, and nonlinear plasmonic and metamaterial structures.

6.5 Plasmonics and Metamaterial Devices

Varied functionalities such as negative refraction, lensing, chirality, cloaking, and transformation optics have been demonstrated in the artificially structured media known as metamaterials, while plasmonic interactions have been used both for the manipulation of electromagnetic fields on sub-wavelength length scales as well as for the enhancement of linear and nonlinear effects. The theme solicits contributions focused on the design, fabrication, and properties of plasmonic and metamaterial structures or devices.

FiO 7: Quantum Electronics

7.1 Order, Disorder and Symmetry in Photonic Structures

Interplay between order and disorder and associated spatiotemporal symmetries in photonic devices and structures significantly affects their transport characteristics and enable new phenomena such as localization, self-similarity, nonreciprocity and others. Ability to control these effects may lead to improved functionality, reliability and energy efficiency of respective devices. Topics of interest include: light-matter interaction in aperiodic structures, random lasers and coherent absorbers, imaging and transmission through disordered media, topologically protected transmission and disorder tolerant structures, symmetry and optical nonreciprocity in periodic and aperiodic structures.

7.2 Opto-Mechanics

With the reduction of optical- and mechanical-dissipation in micro-devices; more of these structures enter the regime where the mechanical and optical degrees of freedom are coupled and affect each other. Optomechanics, is nowadays joining electroptics to allow controlling of light and positioning. This theme focuses on new types of opto-mechanical phenomena including novel forces, optical- and mechanical-resonances, cooling mechanisms, and operation at the quantum regime.

7.3 Nonlinear Optics in Micro/Nano-Optical Structures

Concentration of light to small regions in space allow many systems to operate in a ragtime where nonlinear phenomena like harmonic generation show themselves. This theme focuses on fabrication, efficient light coupling, and observation of optical effects in a micron- and nano-scale devices.

7.4 Quantum Computation and Communication

Quantum-enhanced technologies in the photonic realm have shown considerable promise. Likewise, at a more fundamental level, interest in non-locality and non-realism remains high. This is a broad theme, which will accept experimental and theoretical reports ranging in subject from enabling technologies such as detectors and sources to implementations of light-based quantum-information processing and communication protocols. This theme will also accept fundamental studies on non-classical aspects of light.

FiO 8: Vision and Color

8.1 Optical Design of Animal eyes

The optical designs of animal eyes are diverse and have long been a source of fascination and attempted emulation by man. These optical designs include refractive gradient index optics, reflective optics, specialized pupils and polarization imaging. Maxwell first published on the ideal gradient of refractive index for a lens after contemplating his breakfast herring. Active

areas of investigation include optical models of animal eyes and optical factors in the continuing evolution of the eye.

Contributions are solicited that discuss the optical design of eyes and factors in the evolution of eye design.

8.2 Looking into the Eyes of Animal Models of Disease

Animals are studied in order to understand the structure and function of the eye in normal and abnormal development and to test and track new therapies for eye diseases. Many of these diseases affect the retina at the rear of the eye and many therapies would be enhanced by image guidance. There are many recent, novel tools and therapies which can cure blindness including gene transfer to induce fluorescence and to cure disease. In conjunction with the study of the retinas as new animal models are developed, it is important to understand the optical properties which may limit the detail that can be viewed as the disease develops. Contributions are solicited that discuss advantages of novel animal models for the study of disease and eye conditions, the optical properties of animal models and improvements in optical techniques for measuring and imaging animal eyes.

8.3 Fluorescence Techniques for Safe Non-Invasive in vivo Imaging (Joint with FiO3)

Fluorescence imaging techniques are revolutionizing biological and medical research, by allowing visualization of structures and processes with unprecedented spatial and temporal resolution. This session will focus on the techniques that can currently be implemented with light levels and fluorescent labels that are not toxic to either humans or animal models. These techniques have an immediate potential for application as research and diagnostic tools.

Contributions are solicited that discuss the use of fluorescent markers to study living systems. This may include, but is not limited to, methods of introduction and tracking and novel fluorophores for functional assays.

Laser Science Topics

1. **Coherence and Control in Energy Transfer**
2. **Techniques and Applications of Ultrafast X-Rays to Studies of Atomic, Molecular, and Condensed Matter Systems**
3. **Advances in Nano-Scale Spectroscopy**
4. **Techniques and Applications in Nonlinear Microscopy**
5. **Attosecond and Strong Field Physics**
6. **Optics and Alternative Energy Sources**
7. **Applications of the Orbital Angular Momentum of Light**
8. **Information in a Photon**
9. **Optical Metamaterials**
10. **Absolute Metrology Based on Quantum Information Science**
11. **General Laser Science**

Science Educators' Day

EDAY 2011: Special FREE event for Middle and High School Educators

Wednesday, 19 October
5:00 p.m. - 8:00 p.m.
Sainte Claire Hotel

What is EDAY?

This annual event focuses on effective and innovative approaches to science education, with an emphasis on hands-on, interactive classroom lessons. Please contact opticseducation@osa.org for more information.

Recorded Sessions

FiO 2011 Exclusive Recorded Sessions: Complimentary to Technical Attendees

Can't be in two places at once? Don't worry. FiO 2011 is providing you with the added benefit of access to a pre-determined selection of 50 Sessions and 250 Talks, 40% of the oral presentations at FiO 2011!

The select presentations will be available for viewing online within 24 hours of the presentations. *All recordings will contain audio synchronized with the PowerPoint presentation.*

Couldn't attend the Technical Conference this year? Purchase and view the best of FiO 2011 at your convenience.

FiO 2011 is providing you with access to the best of FIO 2011, a pre-determined selection of 40% of all oral presentations. It's not too late to gain the valuable knowledge offered through the FiO technical program including access to plenaries, symposia, oral presentations, featured What's Hot in Optics topics & the all-popular postdeadline papers. Choose from 5 value packages or the full conference suite.

Technical Attendees

New Conference Enhancement for Technical Attendees

Technical sessions on demand!

We are delighted to announce a new enhancement to the value of your registration to this year's conference! More than 40% of FiO sessions are being recorded for on-demand viewing! The pre-selected content represents the full breadth of the FiO program including plenaries, symposia, oral presentations, featured What's Hot topics and the all popular postdeadline papers. Session content will be available for on-demand viewing until December 31, 2011. All captured session content will be live for viewing within twenty four hours of being recording.

Who can access the recorded sessions?

If you have registered for any of the following 2011 registration types, you are eligible to view the recorded sessions:

- Full Registration (Member, Non-Member)
- Student (Member, Non-Member)
- Emeritus
- Exhibitor Technical
- Press/Media

How do I access the recorded sessions?

Technical Registrants
As a technical registrant of the conference, access to the online library of recorded sessions is included with your registration. To this year's valuable digital content, you will need your conference Primary Email and Meeting Code. This information is provided to all technical registrants in a pre-conference confirmation email, as well as onsite with your conference materials. Recorded sessions are available online for on-demand viewing 24 hours from the time they are recorded.Visit the On Demand Recorded Sessions Log-in site to access exclusive pre-selected content.

Non-Technical/Non-Attendee Registrants
If you do not fall in one of the categories eligible for complimentary access or are unable to attend the 2011 FiO/LS Conference in San Jose, California but would like to purchase access to the online session content, we welcome your interest. You may purchase the complete suite of captured session recordings, or choose from six value-packages.

For additional information or assistance, contact help.osa.org

What sessions are available for viewing?

***Please note**: Final session recording schedule is subject to onsite changes and speaker permission.*

Sunday 16 October 2011

What's Hot in Optics Today?

- **What's Hot in Bio-Medical Optics,** *Adam P. Wax*, Duke University, United States
- **What's Hot in Fabrication, Design and Instrumentation,** *Qiwen Zhan*, University of Dayton, United States
- **What's Hot in Information Acquisition, Processing and Display,** *David Brady*, Duke University, United States*
- **What's Hot in Photonics and Opto-Electronics,** *Aref Chowdhury*, Alcatel-Lucent Bell Labs, Germany*
- **What's Hot in Vision and Color,** *Joseph Carroll*, Medical College of Wisconsin, United States
- **What's Hot in Mid-Infrared Laser Technology: Highlights and Applications,** *Irina Sorokina*, Norwegian Univ. of Science & Technology, Norway*

Monday 17 October 2011

Plenary Session

- **Lightwave Modulators: Early Days,** *Ivan Kaminow*, University of California Berkeley, United States
- **Table-Top Soft X-Ray Lasers: Bright Coherent Light for the Nanoworld,** *Jorge Rocca*, Colorado State University, United States
- **Seeing is Believing: Capturing Electrons in Real Time,** *Ferenc Krausz*, Max-Planck-Institut für Quantenoptik & Ludwig-Maximilians-Universität München, Germany
- **Inside the Wavelength-Seeing Really Small Objects with Light,** *John Pendry*, The Blackett Lab, Imperial College, United Kingdom

*Pending Author Approval

Special Symposium on Integrated Optofluidics for the Life Sciences

FMA1 - Optofluidic Manipulation Of Particles For Separation, Purification, and Analysis, *Sean Hart*, Intel Capital, United States

FMA2 - Single-Molecule Biophysics with Optofluidic Trapping, *David Erickson*, Cornell University, United States

FMA3 - Integration Methods for Raman spectroscopy and Passive Sorting in Optofluidics, *Praveen Ashok*, University of St Andrews, United Kingdom

FMA4 - Optofluidic Tomography, *Serhan Isikman*, UCLA, United States

FMA5 - Compact and Cost-effective Lensfree Reflection and Transmission Microscopy on Chip, *Aydogan Ozcan*, UCLA, United States

Special Symposium on Novel X-ray and EUV Light Sources and Sciences; Accelerator-based X-ray Free-Electron Lasers and Science

FMC2 - A Next Generation X-ray Laser Array at the Berkeley Lab: Science Drivers and Facility Overview, *Robert Schoenlein*, Lawrence Berkeley National Laboratory, United States

FMC4 - Applications of the LCLS X-ray Free Electron Laser for High-Energy Density Science, *Richard Lee*, Lawrence Livermore National Lab, United States
Pending author approval.

Optomechanics I

FMD1 - Near Threshold Optomechanical Backaction Amplifier, *Warwick Bowen*, University of Queensland, Australia

FMD2 - Mechanical Squeezing via Parametric Amplification and Weak Measurement, *Warwick Bowen*, University of Queensland, Australia

FMD3 - Observation of Backaction of Ultracold Atoms onto a Mechanical Oscillator, *Matthew Rakher*, Universität Basel, Switzerland

FMD4 - Opto-Mechanics and Quantum Dot-Nanocavity Qed, *Jelena Vuckovic*, Stanford University, United States

FMD5 - Feedback Enhanced Sensitivity in Cavity Optomechanics: Surpassing the Parametric Instability Barrier, *Warwick Bowen*, University of Queensland, Australia

FMD6 - Optomechanical Coupling in a Two Dimensional Photonic Crystal Cavity, *Remy Braive*, LPN-CNRS, Université Paris 7, France

FMD7 - Analysis of Harmonic Generation and RF Frequency Mixing in Optomechanical Oscillators, *Mani Hossein-Zadeh*, University of New Mexico, United States

Phase

FME1 - Methods and Applications of X-ray Phase Nanotomography, *Manuel Guizar-Sicairos*, Paul Scherrer Institut, Switzerland

FME2 - Task-Based Assessment of Phase-Contrast Mammography, *Adam Zysk*, Illinois Institute of Technology, United States

FME3 - Extracting Absolute Phase and Amplitude from DIC Imagery, *Donald Duncan*, Portland State University, United States

FME4 - Phase Resolved Imaging of Nonlinear Focal Fields Using Heterodyne Four-Wave Mixing Microscopy, *Varun Raghunathan*, University of California Irvine, United States

FME5 - Phase Retrieval through Nonlinear Media, *Chien-Hung Lu*, Princeton University, United States

Special Symposium on Integrated Optofluidics for the Life Sciences II

FMH1 - Chip Integrated Optical Manipulation of Single Airborne Particles, *Marcel Horstmann*, Institute of Applied Physics, Westfälische Wilhelms-Universität, Germany

FMH2 - Holographic Control and High-Speed Imaging for Studies of Hydrodynamic Coupling on A Micron Scale, *Miles Padgett*, University of Glasgow, United Kingdom

FMH3 - Label-free Cytometry via Wavefront Sensing, *James Jacob*, CytoRay, Actinix, United States

FMH5 - Adaptive Nanodispenser Microrobot for Lab-On-A-Chip in Microfluidic Platform, *Pietro Ferraro*, Istituto Nazionale di Ottica, Italy

Novel Metamaterials and Plasmonic Structures

FMI1 - Advances in Metamaterials and Transformation Optics, *David Smith*, Duke University, United States

FMI2 - Carpet Cloak Device for Visible Light, *Christopher Gladden*, University of California Berkeley, United States

FMI3 - Demonstration of Temporal Cloaking, *Moti Fridman*, Cornell University, United States

FMI4 - Conversion of Polarization State to Visible Color by Anisotropic Plasmonic Cross Antenna Arrays, *Tal Ellenbogen*, Harvard University, United States

FMI5 - Plasmonic Nano-Bubble Cavity Probed by Cathodoluminescence, *Jun Xu*, MIT, UIUC, United States

FMI6 - Surface Plasmons at Graded Metal-Dielectric Interfaces, *Brett Kruger*, University of Toronto, Canada

Special Symposium on Novel X-ray and EUV Light Sources and Sciences; Extreme Ultraviolet and Soft X-Ray Small-Scale Sources: Science and Applications

FMJ1 - Laser-based Gamma-Rays and the Emergence of Nuclear Photonics, *Christopher Barty*, Lawrence Livermore National Lab, United States

FMJ2 - Strong Field Physics with Long Wavelength Lasers, *Anthony DiChiara*, The Ohio State University, United States

FMJ3 - Table-top Short Pulse Driver for Sub-10 nm Soft X-ray Lasers, *Bradley Luther*, Colorado State University, United States

FMJ4 - Inductively Driven, Electrodeless Z-pinch Sources for EUV and Soft X-ray Applications, *Matthew Partlow*, Energetiq Technology Inc., United States

FMJ5 - Phase Matching of Attosecond-to-Zeptosecond Kiloelectronvolt X-ray Supercontinua from High Harmonic Generation, *Tenio Popmintchev*, University of Colorado at Boulder, United States

Fluorescence and Other Imaging Techniques

FML1 - In Vivo Imaging of Tumors Using Multiphoton Fluorescence and Second Harmonic Generation, *Ed Brown*, Univ. of Rochester, United States

FML2 - Second-Harmonic Microscopy for Cornea Collagen Fibril Imaging: Theoretical and Experimental Optimization, *Brian Vohnsen*, University College Dublin, Ireland

FML3 - Imaging Spectroscopy Without a Spectrometer, *Thomas Kohlgraf-Owens*, CREOL, The College of Optics and Photonics, University of Central Florida, United States

FML4 - In Vivo Particle Bombardment and Viral Methods for Specific Cellular and Subcellular Labeling, *Ken Greenberg*, Spiral Genomics LLC,

FML5 - How to Enhance the Two-Photon Brightness of Fluorescent Proteins?, *Mikhail Drobizhev*, Montana State University, United States

FML6 - Spectrally Encoded Imaging, *Dongkyun Kang*, Massachusetts General Hospital and Harvard Medical School, United States

Tuesday 18 October 2011

Three-Dimensional Structure Design, Fabrication, and Nanopatterning III

FTuAA1 - Three-Dimensional Fabrication below the Diffraction Limit via Two-Color Photo-Inhibition/Initiation Lithography., *Robert McLeod*, University of Colorado at Boulder, United States

FTuAA2 - 2D and 3D Writing of Silver Nanostructures through Multiphoton Photoreduction, *Kevin Vora*, Harvard University, United States

FTuAA3 - Photolithography and Direct Three-Dimensional Writing (and Erasing) Based

on Silver Nanoparticles Formation (and Oxidation) within a Polymer, *Antonio Silva*, Centro de Tecnologias Estratégicas do Nordeste, Brazil

FTuAA5 - Three-Dimensional Light Modulation Using a Piecewise Implementation of the Gerchberg-Saxton Algorithm, *Giovanni Tapang*, University of the Philippines Diliman, Philippines

Ultrashort Pulses: 20th Anniversary of Frequency-Resolved Optical Gating Symposium I

FTuB2 - Ultrafast Coherent X-Rays - from Femtoseconds to Zeptoseconds, *Margaret Murnane*, Univ. of Colorado Boulder, United States.
Pending author approval.

FTuB3 - Generation and Characterization of Isolated Attosecond Pulses for Atomic and Molecular Physics, *Mauro Nisoli*, National Research Council of Italy, Institute of Photonics and Nanotechnologies (CNR-IFN), Italy

FTuB4 - Interferometric FROG for Few-Cycle Pulse Characterization and as an Ultrafast Spectroscopy Tool, *Gunter Steinmeyer*, Max-Born-Insitut für

Information Theory in Optics I: Classical Information Theory

FTuBB2 - Information Theory and Digital Signal Processing in Optical Communications: Scaling Beyond the Imminent Single-Mode Fiber Capacity Limit, *Peter Winzer*, Alcatel-Lucent, United States

Nonlinear Optics in Micro/Nano Optical Structures I

FTuD1 - Ultra-High-Quality Whispering-Gallery-Mode Resonators for Single Nanoparticle Detection and Measurement, *Lan Yang*, Washington University, United States

FTuD2 - Multi-photon State Generation from Strongly Coupled Quantum Dot-Cavity System, *Michal Bajcsy*, Stanford University, United States

FTuD3 - Time-Resolved Vibrational Nanospectroscopy Using Femtosecond Infrared Scattering Scanning Near-field Optical Microscopy, *Xiaoji Xu*, University of Colorado, United States

FTuD4 - Highly Coherent, Microcavity Brillouin Laser on Silicon, *Jiang Li*, California Institutute of Technology, United States

FTuD5 - Ultrafast Dynamics of Nucleation and Growth of Metallic Domains in VO^2, *Nathaniel Brady*, University of Alabama at Birmingham, United States

FTuD6 - Generation of Continuous-Wave UV, Visible, and Near-IR Waves in a Whispering-Gallery Resonator, *Jeremy Moore*, University of Michigan, United States

FTuD7 - Optical Arbitary Waveform Generation from an On-Chip Microresonator Frequency Comb, *Fahmida Ferdous*, Purdue University, United States

Digital Holographic Interferometry and Microscopy I

FTuF1 - Impact of Digital Holography on Microscopy and Nanoscopy, *Christian Depeursinge*, STI, Switzerland

FTuF2 - Region-of-Interest Sharpness Correction, *Abbie Tippie*, University of Rochester, United States

FTuF3 - Sub-pixel Movement Detection with Compressive Holography, *Yi Liu*, MIT, United States

FTuF4 - Phase Conjugating Interferometer for Optical Vortices in Rotating Frame, *Alexey Okulov*, Russian Academy of Sciencies, Russian Federation

FTuF6 - Digital Holographic Interferometry and Microscopy for 3D Object Visualization, *Georges Nehmetallah*, University of Dayton, United States

Plasmonic Metamaterials

FTuG2 - Theory of Near-IR Metatronic Nanocircuits Using Transparent Conducting Oxides (TCO), *Humeyra Caglayan*, University of Pennsylvania, United States

FTuG3 - Mapping Surface Plasmon Propagation by Collection-Mode Near-Field Microscopy, *Maria Allegrini*, Universà di Pisa, Italy

FTuG4 - Internal Homogenization: Effective Permittivity of Multilayered Spheres, *Uday Chettiar*, University of Pennsylvania, United States

FTuG5 - Wall-Avoiding Field Distributions in Plasmonic Waveguides, *Francisco Rodríguez-Fortuño*, University of Pennsylvania, Universidad Politécnica de Valencia, United States, Spain

Fiber Sources in Non-Telecom Windows I

FTuI3 - An All Fiber Mode-Locked Tm/Ho Fiber Laser Employing C-band Components, *Rajesh Kadel*, Kansas State University, United States

FTuI4 - Tellurite Microstructured Fibers and Their Applications, *Yasutake Ohishi*, Toyota Technological Institute, Japan

Optofluidics for Enhanced Sensing

FTuJ1 - Optofluidic Nanostructures for Concentration and Sensing, *David Sinton*, University of Victoria, Canada

FTuJ2 - Title to be Announced, *Michal Lipson*, Cornell University, United States

FTuJ3 - Determination of Microdroplet Contact Angles Using Electrically Eriven Droplet Oscillations, *Yasin Karadag*, Koç Universty, Turkey

FTuJ4 - Enhancing the Sensitivity of Whispering Gallery Mode Biosensors Using Plasmons, *Jon Swaim*, University of Queensland, Australia

Three-Dimensional Structure Design, Fabrication, and Nanopatterning II

FTuM1 - Beyond the Rayleigh Limit in Optical Lithography, *M. Suhail Zubairy*, Texas A&M University, United States

FTuM2 - High Precision Matrix Laser Lithography for Fabrication of Novel Types of Optical Security Elements, *Marek Skeren*, Czech Technical University, Czech Republic

FTuM3 - Adaptive Optical Methods for Parallelized Laser Fabrication, *Martin Booth*, University of Oxford, United Kingdom

FTuM4 - Performance of Double-Groove Grating with +1st-Order Diffraction Angle Larger than Substrate-Air Critical Angle, *Hideo Iizuka*, Toyota Motor Engineering & Manufacturing North America, Toyota Central R&D Labs, Japan

FTuM5 - Novel Optical Document Security Elements Based on Waveguide Effect, *Jakub Svoboda*, Czech Technical University In Prague, Faculty of Nuclear Sciences and Physical Engineering, Czech Republic

Optomechanics II

FTuN1 - GaAs Disks Optomechanics, *Ivan Favero*, Université Paris, France

FTuN2 - A Cavity Effect on Optical Forces, *Joel Rubin*, Queens College of CUNY, United States

FTuN3 - Single-input Spherical Microbubble Resonator, *Jonathan Ward*, Quantum Optics Group, Ireland

FTuN4 - Cavity Optomechanics with Silicon Nitride Membrane Gratings, *Utku Kemiktarak*, NIST / JQI, United States

FTuN5 - Mechanical Motion of a Microspherical Pendulum, *Jonathan Ward*, Quantum Optics Group, Ireland

Ultrashort Pulses: 20th Anniversary of Frequency-Resolved Optical Gating Symposium II

FTuP1 - Complex Pulses and New physics: How FROG has Led to New Paradigms for Ultrafast Nonlinear Optics, *John Dudley*, CNRS, France

FTuP2 - Frequency Resolved Optical Gating of Atomic and Molecular Coherence: From Weak to Strong Field Regimes, *Valery Milner*, University of British Columbia,

FTuP3 - FROG at High Na: Quantifying the Excitation Fields for Multiphoton Microscopy, *Jeff Squier*, Colorado School of Mines, United States

FTuP4 - Spectrograms for Probing Nonlinear Pulse Propagation, *Selçuk Aktürk*, Istanbul Technical University, Turkey

Lasers and Photoemission for Accelerator Science

FTuR1 - Lasers for High Brightness X-Fel Photo Injectors, *William White*, , United States

FTuR2 - High-energy Femtosecond Laser Sources at MHz Repetition Rates for Experiments with Picosecond-/Femtosecond-/Attosecond Electron Bunches, *Alexander Apolonski*, MPQ, Ludwig-Maximilians-Universitaet Muenchen, Germany

FTuR3 - Ultrafast, Plasmonically Enhanced Photoemission from Metals, *Péter Dombi*, Research Institute for Solid-State Physics and Optics, Hungary

FTuR4 - Spectral Control of Supercontinuum Generated by Intense Femtosecond Pulses with Diffractive Optics, *Rocio Borrego Varillas*, Universidad de Salamanca, Spain

Optical Communications I

FTuT1 - Demonstration of 2-Tbit/s Data Link using Orthogonal Orbital-Angular-Momentum Modes and WDM, *Irfan Fazal*, University of Southern California, Los Angeles, United States

FTuT2 - Enhanced Dynamic Equalization Performance of a 112 Gb/s PM-QPSK Coherent Receiver by Gain Adaptation in CMA, *Aldario Bordonalli*, Universidade de Campinas - UNICAMP, Japan

FTuT3 - Toward New Class of Fiber Communications Infrastructure: EXAT Initiatives, *Yoshinari Awaji*, NICT, Japan

FTuT4 - Fiber Transmission of Picosecond Pulsed Laser Beam, *Chunning Huang*, Oak Ridge National Lab, United States

FTuT5 - Optical A/D using Oversampling by Second-Order DSM, *Azad Siahmakoun*, Rose-Hulman I. T., United States

FTuT6 - Spatial Multiplexer and Experimental Attenuation of a Four Channel Spatial Domain Multiplexed System in Multimode Fibers Using Fiber Taper Technology, *Syed Murshid*, Florida Institute of Technology, United States

FTuT7 - Analysis of Spatially Multiplexed Helically Propagating Channels in Step Index Optical Waveguides, *Syed Murshid*, Florida Institute of Technology, United States

Tunable and Active Plasmonics

FTuU1 - Active and Tunable Plasmonics and Metamaterials, *Harry Atwater*, California Institute of Technology, United States

FTuU2 - Electrically Induced Harmonic Generation with Plasmonics, *Wenshan Cai*, Stanford University, United States

FTuU3 - Tunable Metal Optics through Circuit Analysis, *Etai Rosenkrantz*, Ben-Gurion University, Israel

FTuU4 - Tunable and Nonlinear Microwave and Terahertz Metamaterials, *Hou-Tong Chen*, Los Alamos National Laboratory, United States

FTuU5 - Tunable Coupling between Magnetic Plasmon Polaritons and Bloch Surface Waves, *Xiudong Sun*, Harbin Institute of Technology, China

FTuU6 - Triangular Metal Wedge/Groove Based Hybrid Plasmonic Structures for Low-Threshold Deep-Subwavelength Lasing, *Zheng Zheng*, Beihang University, China

Photonics for Switching and Interconnects

FTuV1 - Device Challenges and Opportunities for Optical Interconnects, *David A. B. Miller*, Stanford University, United States

FTuV2 - Non-volatile Bistable All-Optical Switch from Mechanical Buckling, *Varat Intaraprasonk*, Stanford University, United States

FTuV3 - Silicon Photonics for Modulation, Switching, and Tuning, *Michael Watts*, Massachusetts Institute of Technology, United States

Fiber Sources in Non-Telecom Windows II

FTuW1 - Supercontinuum Generation at Mid-IR Wavelengths in Chalcogenide Photonic Crystal Fibers, *Curtis Menyuk*, University of Maryland Baltimore County, United States

FTuW2 - Raman Amplifier with > 200 W Average Power Based on a Step-index Fused Silica Fiber, *Miroslaw Rekas*, Fraunhofer Institute for Applied Optics and Precision Engineering, Germany

FTuW3 - Relative Intensity Noise Characterization of a Linear Polarized 1.1 kW Fiber-Amplified Narrow-Band ASE Source, *Andrea Kliner*, Institute of Applied Physics, Germany

FTuW4 - Coherence-Preserving kW-Level Tm Fiber Amplifiers At 2mm, *Gregory Goodno*, Northop Grumman, United States

Wednesday 19 October 2011

Special Symposium on 50 Years of Measuring the Eye's Aberrations I

FWA1 - An Historical Understanding of the Normal Eye's Monochromatic Aberrations, *Howard Howland*, Cornell Univ., United States

FWA3 - Customized Clinical Correction of the Eye's Aberrations, *Ian Cox*, Bausch and Lomb, United States

FWA4 - Adaptive Optics Techniques Used for In Vivo Examination of the Retina and Visual System, *Robert Zawadzki*, Univ. of California at Davis, United States

Frequency Combs-I-Sources

FWB1 - Silicon-Chip-Based Optical Frequency Combs, *Alexander Gaeta*, Cornell University, United States

FWB2 - Chip-based Frequency Comb with Microwave Repetition Rate, *Jiang Li*, California Institutute of Technology, United States

FWB3 - Dual-Comb-Based Characterization of Rapidly Tuned Lasers, *Fabrizio Giorgetta*, National institute of standards and technology, United States

FWB4 - Hybrid 2-μm Er:Fiber/Tm:Fiber Frequency Comb, *Florian Adler*, National Institute of Standards and Technology, University of Colorado, United States

FWB5 - Spectral Broadening of Femtosecond Mid-IR Pulses Coupled into Quantum Cascade Lasers, *Sheng Liu*, UMBC, UMBC, United States

Hybrid-Organic Integrated Photonics

FWBB1 - Integration of New Organic Electro-Optic Materials into Silicon and Silicon Nitride Photonics and into Metamaterial and Plasmonic Device Structures, *Larry Dalton*, University of Washington, United States

FWBB2 - Photophysics of a Near IR Nonlinear Absorber for Waveguide Applications, *San-Hui Chi*, United States Naval Research Laboratory, United States

FWBB3 - Hybrid Multilayered Heterostructures for High-Performance Near-Infrared LEDs, *Sylvain Cloutier*, University of Delaware, United States

FWBB4 - Progress in Heterogeneously Integrated Silicon-InP Laser Diodes for On-chip All-optical Networks and Signal Processing, *Geert Morthier*, Ghent University - imec, Belgium

Plasmonic Waveguides and Cavities

FWC1 - Coherent and Broadband Plasmonic Nanocavities, *Stefan Maier*, Imperial College London, United Kingdom

FWC2 - An Integrated Hybrid Nanophotonics Platform, *Volker Sorger*, UC Berkeley, United States

FWC3 - Coupled Nanowire Array Based Long-Range Hybrid Plasmonic Waveguide for Subwavelength Mode Confinement, *Zheng Zheng*, Beihang University, China

FWC4 - Channeled Photonic-Crystal-Surface-Plasmon-Coupled Waveguide at Terahertz Frequency, *Triranjita Srivastava*, Delhi Technological University, India

FWC5 - Plasmon Dynamics in Coupled Optical Microcavities, *Norberto Lanzillotti-Kimura*, University of California - Berkeley, United States

FWC6 - Experimental Characterization of Plasmonic Modes in a Multimode Metal-Insulator-Metal Waveguide by Attenuated Total Reflection, *Chien-I Lin*, Georgia Tech, United States

Order, Disorder and Symmetry in Photonic Structures I

FWF1 - Laser Emission and Coherent Control of Absorption in Complex and Random Systems, *A. Douglas Stone*, Yale University, United States

FWF2 - Photonic Network Laser, *Heeso Noh*, Yale University, United States

FWF3 - Isotropic Structural Color of Nanostructured Metal Surfaces, *Sylvanus Lee*, Boston Univ, Boston University, United States

FWF4 - Transmission Channels through Random Media, *Zhou Shi*, City University of New York, United States

Special Symposium of 50 Years of Measuring the Eye's Aberrations II

FWH1 - Using Adaptive Optics to Create Finer Tools for Probing Visual Function, *Austin Roorda*, University of California at Berkeley, United States

FWH2 - Probing Cellular Function in the Living Retina with Adaptive Optics, *David Williams*, University of Rochester, United States

Electron Dynamics in Intense Fields

FWI1 - Attosecond Control of Collective Electron Dynamics in Plasmas, *Rodrigo Lopez Martens*, CNRS - ENSTA ParisTech - Ecole Polytechnique, France

FWI2 - Optical Characterization of Laser-Driven Electron Acceleration, *Malte Kaluza*, Friedrich-Schiller-Universität, Helmholtz-Institute Jena, Germany

FWI3 - Tunable Laser-Driven Electron Acceleration via Shock Front Injection, *Alexander Buck*, Max Planck Institute of Quantum Optics, Ludwig-Maximilians-Universität, Germany

FWI4 - Ultrafast X-ray Absorption Spectroscopy of Isochorically Heated Copper Plasmas at Solid Density, *Byoung-ick Cho*, Lawrence Berkeley Natl Lab, United States

Bioplasmonics

FWL1 - Mapping the Spatial Distribution of Cell Surface Receptors with Plasmon Coupling Microscopy, *Bjoern Reinhardt*, Boston University, United States

FWL2 - Plasmonics in Biological Imaging, *Rohit Bhargava*, Univ. of Illinois, United States

FWL3 - Ultrasensitive Label Free Biosensors Enables Seeing Protein Monolayers with The Naked Eye, *Ahmet Yanik*, Boston Univ, Boston University, United States

FWL4 - Controlled Synthesis of Gold Nanorods and Application to Brain Tumor Delineation, *Kevin Seekell*, Duke University, United States

FWL5 - Fluorescent Dye and OLED Based Plasmonic Dark Field Microscopy, *Feifei Wei*, University of California, San Diego, United States

Order, Disorder and Symmetry in Photonic Structures II

FWN1 - Quantum Information Theory in Optics, *Norbert Lutkenhaus*, University of Waterloo, Canada

FWN2 - Entanglement and Quantum Information Theory, *STeven van Enk*, Univ. of Oregon, United States

Looking into the Eyes of Animal Models of Disease

FWO1 - The Guinea Pig as a Model of Myopia, *Sally McFadden*, University of Newcastle, Australia

FWO3 - High Resolution Imaging of the Living Mouse Eye: A Model for Retinal Diseases, *Ying Geng*, University of Rochester, University of Rochester, United States

FWO4 - Wavefront Tomography of the Human Eye Assisted with Corneal Topography and Optical Path Measurements, *Chris Dainty*, National University of Ireland Galway, Ireland

FWO5 - Probing Global Aging Changes to Photoreceptors, *Ann Elsner*, Indiana University/Aeon Imaging, United States

FWO6 - Visual Performance of the Human Eye - Combining Optical modeling and Square Root Integral Method, *Krishnakumar Venkateswaran*, Alcon Laboratories, Inc, United States

High Fields and Plasmas

FWP1 - Application of a Multi-Terawatt 3ps CO2 Laser for Monoenergetic Proton Beam Generation, *Dan Haberberger*, UCLA, United States

FWP2 - Development of a 0.5 PW high contrast Ti:Sapphire laser system at OSU to achieve peak focal intensities exceeding 1022 W/cm2, *Patrick Poole*, The Ohio State University, United States

FWP3 - Ultra- High Pulse Intensity Amplification and Compression in Plasma, *Szymon Suckewer*, Princeton University, United States

FWP4 - Manipulation of the Laser Properties through Guiding in Plasma Channels, *J. van Tilborg*, Lawrence Berkeley National Laboratory, United States

FWP5 - Modelling Intense Laser Plasma Processes - Bridging the Gap Between Microscopic and Macroscopic Phenomena, *Charles Varin*, Université d'Ottawa, Canada

FWP6 - Seeded Femtosecond Supercontinua in Various Media, *David Hagan*, University of Central Florida, United States

Beam Shaping and Propagation, Laser Cavity Design III

FWR1 - Simple Models for Focused Fields, *Miguel Alonso*, University of Rochester, United States

FWR2 - Airy beams: the (1+1)D non-diffracting Bessel beams, *Sabino Chavez-Cerda*, ESFM-IPN, INAOE, Mexico

FWR3 - Sub-wavelength Focal Dark Channel Generated in Tight Focusing of Azimuthally Polarized Beams, *Jixiong Pu*, Huaqiao Univ, China

FWR4 - Generation of Vortex Beams by Twisted Nonlinear Photonic Crystals, *Noa Bloch*, Tel Aviv University, Israel

FWR5 - All-Optical Shaping of Nonlinear Vortex Beams, *Keren Simhony*, Tel Aviv University, Israel

FWR6 - Phase Locking Large Arrays of Lasers via a Single Degenerate Cavity, *Micha Nixon*, Weizmann Institute of Science, Israel

FWR7 - Closed Loop Feedback Beam Shaping Using the Thermo-Optic Effect, *Zhanwei Liu*, University of Florida, United States

Novel Sensors and Applications I

FWT1 - New Class of Fiber Characterization Techniques Based on Spatial Gating of Nonlinearity, *Evgeny Myslivets*, University of California San Diego, United States

FWT3 - Infiltration-free Photonic Bandgap Fiber Sensor, *Mandy Yu*, SIMTech, Singapore

FWT4 - New Developments in Fiber-Laser Frequency Combs, *Ingmar Hartl*, IMRA America, United States

Novel Photonic and Plasmonic Nanostructures

FWW1 - Bio-Inspired Photonic Nanostructures and Lasers, *Hui Cao*, Yale University, Yale University, United States

FWW2 - Design Methodology for Compact Photonic Crystal Wavelength Division Multiplexers, *Victor Liu*, Stanford University, United States

FWW3 - Hybridization of Photonic Crystal Cavities and Surface Plasmons, *Xiaodong Yang*, University of California, Berkeley, Lawrence Berkeley National Laboratory, United States

FWW4 - Enhancement of Light Absorption in Subwavelength Plasmonic Slits by Optical Microcavities, *Georgios Veronis*, Louisiana State University, United States

FWW5 - Electrically-Injected Nano-Spin Vcsels: Design Principles and Applications, *Alan*

Shore, Bangor University, United Kingdom

Quantum Computation and Communication I

FWY2 - Parity Detection for Heisenberg-limited Metrology with Coherent and Squeezed Vacuum Light, *Kaushik Seshadreesan*, Louisiana State University, United States

FWY3 - From the Parametric Down-Conversion to the Raman Scattering: Nonlinear and Quantum Phenomena in Lossy Media, *Radoslaw Chrapkiewicz*, University of Warsaw, Poland

FWY4 - Perfect Quantum Communication with Very Noisy Gaussian Optical Fiber Channels, *Laszlo Gyongyosi*, Budapest University of Technology and Economics, Hungary

Thursday 20 October 2011

Nonlinear Optics in Micro/Nano Optical Structures II

FThA1 - A Quantum Theory of Four-Wave Mixing in Grapheme, *Zheshen Zhang*, Georgia Tech Lorraine, Georgia Institute of Technology, France

FThA2 - Nanoscale Coherent Perfect Absorber of Light, *Heeso Noh*, Yale University, United States

FThA3 - 1- and 2-Photon Absorption with Cold Rubidium Using an Optical Nanofiber, *Laura Russell*, University College Cork, University of Kwazulu-Natal, Ireland

FThA4 - Optofluidic Lasers and Their Applications in Highly Sensitive Intra-Cavity Biomolecular Detection, *Xudong Fan*, University of Michigan, United States

FThA5 - Second Harmonic Generation In CVD Graphene Induced by DC Electric Current, *Anton Bykov*, M.V. Lomonosov Moscow State University, Russian Federation

FThA6 - Size Distribution Effects on the Optical Properties of Gold Nanoparticles Synthesized by Polyol Process, *Arun Thirumurugan*, National Institute of Technology, India

FThA7 - Observation of Self-Trapping of Light in "Air-Bubble"-Type Nonlinear Nano-Suspensions, *Weining Man*, San Francisco State Univ, United States

Laser-Based Radiation Therapy and Enabling Sources

FThB1 - Prospects for Laser-Driven Ion Beam Therapy, *T. Cowan*, FZ Dresden-Rossendorf, Germany

FThB2 - Laser Plasma Accelerators for Cancer Treatment, *Victor Malka*, ENSTA, X,

CNRS, France

FThB3 - Providing Thin-Disk Technology for High Laser Pulse Energy at High Average Power, *Robert Jung*, Max Born Institute, Germany

FThB4 - Comparative Study on the Temperature Dependent Emission Cross Section of Nd:YAG, Nd:YVO4, and Nd:GdVO4, *Yoichi Sato*, Institute for Molecular Science, Japan

Quantum Computation and Communication II

FThE1 - Quantum Optical Interface for Atoms and Electro-Mechanical Systems, *Eugene S. Polzik*, Copenhagen University, Denmark

FThE2 - Non-Markovian Spontaneous Emission from a Single Quantum Dot, *Kristian Madsen*, Technical University of Denmark, Denmark

FThE3 - A Study of Multipartite Entanglement Using Hyperentangled Photons, *Aditya Sharma*, University of Illinois at Urbana-Champaign, United States

FThE4 - Quantum Random Bit Generation Using Degenerate Optical Parametric Oscillator, *Alireza Marandi*, Stanford University, United States

FThE5 - On-chip Spectrally-Bright Photon-Pair Source from SiN Ring Micro-cavity, *Alessandro Farsi*, Cornell Uniuversity, United States

FThE6 - Direct Measurement of the Wavefunction of a Single Photon, *Charles Bamber*, National Research Council Canada, Canada

Progress in Digital Holography I

FThG2 - Sub-Diffraction Limited Pattering via Optical Saturable Transformations, *Precious Cantu*, University of Utah, United States

FThG3 - Creating 3D Lattice Patterns Using Programmable Dammann Gratings, *Jeffrey Davis*, San Diego State University, United States

FThG4 - Experimental Realization of 3D Clustered Speckle Field Simulation: An Approach to Optical Trapping, *Juan Pablo Staforelli*, Center for Optics and Photonics (CEFOP), Chile

FThG5 - Vortex Sensing Diffraction Gratings, *Jeffrey Davis*, San Diego State University, United States

FThG7 - Measuring the Orbital Angular Momentum Density for a Superposition of Bessel Beams, *Andrew Forbes*, CSIR National Laser Centre, University of KwaZulu-Natal, South Africa

Frequency Combs-II-Applications

FThH3 - Absolute Distance Measurement Using Long-Path Heterodyne Interferometer with Optical Frequency Comb, *Xiaonan Wang*, The University of Tokyo, Japan

FThH4 - Mid-IR Frequency Combs: Transforming Molecular Spectroscopy as we know it, *Evgeni Sorokin*, Vienna University of Technology, Germany

FThH5 - Theory of Molecular Cooling Using Optical Frequency Combs in the Presence of Decoherence, *Svetlana Malinovskaya*, Stevens institute of Technology, United States

FThH6 - Interferometric Estimation of the Offset-Frequency of Optical Frequency Comb, *Hirokazu Matsumoto*, The University of Tokyo, Japan

Metamaterials

FThI2 - Plasmonic Metamaterials for Optical Wavefront Control, *Ann Roberts*, The University of Melbourne, Australia

FThI3 - Parametric Maps of Extraordinary Optical Transmission through Arrays of Metallic Nanoscale Slits, *Jaewoong Yoon*, University of Texas at Arlington, Hanyang University, United States, Republic of Korea

FThI4 - Fabrication of Large Periodic Arrays of Plasmonic Nanostructures Applying Inverse Templates, *Jaewoong Yoon*, University of Texas at Arlington, Hanyang University, United States, Republic of Korea

FThI5 - Light Focusing by Planar Array of Antennas, *Babak Memarzadeh*, Northeastern University, United States

Optical Design with Unconventional Polarization II

FThJ1 - Radial Polarisation Beams in Nanophotonics, *Min Gu*, Swinburne University of Technology, Australia

FThJ2 - Polarization Properties of Suspended Si:Ga Nanowires, *Michael Theisen*, University of Rochester, University Of Rochester, United States

FThJ4 - The Pancharatnam-Berry Phase for Non-Cyclic Polarization Changes, *Taco Visser*, Delft University of Technology, VU University, Netherlands

FThJ5 - Phase Anomaly and Phase Singularities of the Field in the Focal Region of High-Numerical Aperture Systems, *Taco Visser*, Delft University of Technology, VU University, Netherlands

Image-Based Wavefront Sensing and Adaptive Optics II

FThK1 - Commissioning and Optical Control for JWST, *Scott Acton*, , United States
Pending author approval.

FThK2 - Iterative Transform Phase Diversity: An Object and Wavefront Recovery Algorithm, *Jeffrey Smith*, NASA Goddard Space Flight Center, United States

Hybrid and III-V Integrated Optics

FThO1 - Organic and Inorganic Crystalline Wires and Thin Films for Hybrid Integrated Optics, *Peter Gunter*, Nonlinear Optics Laboratory, Swiss Federal Institute of Technology (ETH-Z), Switzerland
Pending author approval.

FThO2 - Fabrication of AlN-GaN-AlN sub-micron waveguide with cleaved facets, *Vivek Krishnamurthy*, Data Storage Institute, Singapore

FThO3 - Photoluminescence from In0.5Ga0.5P/GaP quantum dots coupled to photonic crystal cavities, *Kelley Rivoire*, Stanford, United States

FThO4 - Optimised GaN Directional Couplers with Mode Converters, *Loyd McKnight*, Institute of Photonics, United Kingdom

Nonlinearities in Metamaterials

FThP1 - Ultra-low Energy Optical Self-Amplitude and Phase Modulation in Gold Nano-Apertures, *Arash Joushaghani*, University of Toronto, Canada

FThP2 - Plasmonic Nanocomposits for Enhanced Four-Wave Mixing Generation, *Ekaterina Poutrina*, Duke University, United States

FThP3 - Towards Metamaterials with Engineered Nonlinear Optical Properties, *Martti Kauranen*, Tampere University of Technology, Finland

FThP4 - Second Harmonic Generation for UV Emission from Left Handed Material, *Monika Rajput*, Delhi Technological University, India

FThP5 - Polarization Properties Of SHG From Chiral G-shaped Nanostructures, *Evgeniy Mamonov*, Moscow State University, Russian Federation

FThP6 - Metallic Annular Apertures Arrays filled by Lithium Niobate to Enhance Nonlinear Conversion:Theory and Fabrication, *Elsie Barakat*, FEMTO-ST, UMR 6174 CNRS, France

Optical Design with Unconventional Polarization III

FThQ1 - Imaging Spectrometers and Polarimeters, *Michael Kudenov*, The University of Arizona, United States

FThQ3 - Collapse and Revival of the Degree of Polarization, *Amber Beckley*, University of Rochester, United States

FThQ4 - Vector Beam Representation on a Higher Order Poincare Sphere and Higher Order Stokes Parameter Measurement through Optical Angular Momentum Decomposition, *Giovani Milione*, City College New York, United States

FThQ5 - Vectorial Polarimeter Using An Inhomogeneous Polarization State Generator, *Fiona Kenny*, National University of Ireland, Galway, Ireland

Quantum Computation and Communication IV

FThS1 - Anderson co-Localization of Spatially Entangled Photons, *Bahaa Saleh*, University of Central Florida, United States

FThS2 - Interaction-Free All-Optical Switching via Quantum Zeno Blockade, *Abijith Kowligy*, Northwestern Univ., United States

FThS3 - An Equation of Motion for the Concurrence of 2 Qubit Pure States, *Nicolas Quesada*, University of Toronto, Canada

FThS4 - Two-Photon Anti-Correlation and Interference with Incoherent Thermal Radiations, *Hui Chen*, UMBC/GEST, United States

FThS5 - Combined Photon Pair Generation and Quantum Walks in Quadratic Nonlinear Waveguide Arrays, *Alexander Solntsev*, Australian National University, Australia

FThS6 - Efficient Algorithm for Optimizing Adaptive Quantum Metrology, *Barry Sanders*, University of Calgary, Canada

FThS7 - Ion-Photon Networks for Scalable Quantum Computing, *Susan Clark*, University of Maryland, United States

Nonlinear Optics in Micro/Nano Optical Structures III

FThW1 - Two-photon Absorption Spectra of a Near-IR Polymethine Molecule with a Broken Ground-State Symmetry, *Honghua Hu*, University of Central Florida, United States

FThW2 - BiFeO3 Heterostructures for Electro-Optic Modulators, *Daniel Sando*, Unité Mixte de Physique CNRS/Thales, France

FThW3 - Diffraction Free Edge States in Optical Graphene, *Mikael Rechtsman*, Technion - Israel Institute of Technology, Israel

FThW4 - Photonic Crystal Waveguide Electro-Optic Modulator for Ghz Bandwidth Applications, *Jianheng Li*, Northwestern University, United States

FThW5 - Optical Combs and Photonic RF Oscillators with Whispering-Gallery Mode Microresonators, *Vladimir Ilchenko*, OEwaves Inc, United States

Short Courses

Short Courses are designed to increase your knowledge of a specific subject while offering you the experience of experts in industry and academia. Top-quality instructors stay current on the subject matter required to advance your research and career goals. An added benefit of attending a Short Course is the availability of continuing education units (CEUs).

Continuing Education Units (CEUs)

Demonstrate your commitment to continuing education and advancement in the optical field by earning continuing education units (CEUs). The CEU is a nationally recognized unit of measure for continuing education and training programs that meet established criteria. Certificates awarding CEUs are presented to all individuals who complete a Short Course, CEU form and course evaluation. Forms will be available on-site and certificates will be mailed to participants.

Registration

Each Short Course requires a separate fee. Paid registration includes admission to the course and one copy of the Short Course Notes. Advance registration is advisable. The number of seats in each course is limited, and on-site registration is not guaranteed.

Free Offer to Student Members. The FiO sponsoring organizations will offer student members of APS or OSA limited free Short Course registration. Free student member course registration will begin immediately after the pre-registration deadline. There will not be free student registration for sold-out courses, and on-site registration is not guaranteed. Register early to guarantee your seat at a Short Course.

Short Courses - Schedule

Sunday, 16 October, 09:00-12:30

SC189 - Photonic Quantum-Enhanced Technologies

SC274 - Polarization Engineering

SC366 - Coherence and Optical Imaging

Sunday, 16 October, 13:30-17:00

SC235 - Nanophotonics: Design, Fabrication and Characterization

SC324 - Plasmonics

Please note that the following short courses have been cancelled:
SC306 Canceled - Exploring Optical Aberrations

SC367 Canceled - Active Silicon Photonic Devices
SC368 Canceled - Illumination: From Solid-State Lighting to Solar Energy

SC189 Photonic Quantum-Enhanced Technologies

Sunday, October 16, 2011
9:00 AM - 12:30 PM

Instructor:

Ian Walmsley; *Univ. of Oxford, UK*

Description:

This course will provide a tutorial overview of the sorts of enhancements that quantum physics can provide for technology, and a short survey of applications and potential applications. These will include quantum interferometry and metrology, microscopy, communications, cryptography, frequency standards and clock synchronization, as well as computation and information processing. The rudiments of quantum mechanics needed to understand the technology will be covered, focusing particularly on quantum interference and entanglement, as well as laboratory measurement methods.

The ideas concerning the application of these principles to the enhancement of important technologies will then be discussed. One of the critical issues in this area is how to design schemes that are robust with respect to unavoidable environmental noise. The critical practical issues that confront real-world implementation of these concepts are many, and important performance parameters that might limit the utility of quantum-enhanced technologies will also be examined.

Benefits:

This course should enable you to:

- Understand some basic ideas of quantum mechanics relevant to technology.
- Describe key issues related to several classes of applications.
- Explain fundamentals of the technological applications that can benefit from quantum enhancement.
- Discuss the limitations to performance.
- Follow the progress of the field in the future.

Audience:

The course is intended for those would like to gain a basic understanding of the ways and means by which quantum mechanics can be used to enhance technologies that are critical to the modern world. Some knowledge (a college course at an intermediate level) of quantum mechanical concepts and optics is recommended.

Instructor Biography:

Ian Walmsley is the Hooke Professor of Experimental Physics at the University of Oxford, and is head of atomic and laser physics. He was educated at Imperial College, University of London, and the Institute of Optics, University of Rochester. His research is in the area of quantum optics and quantum control, using the tools of ultrafast optics.

SC274 Polarization Engineering

Sunday, October 16, 2011
9:00 AM - 12:30 PM

Instructor:

Russell Chipman; *Univ. of Arizona, USA*

Description:

This course provides a survey of issues associated with calculating polarization effects in optical systems using optical design programs. Many optical systems are polarization-critical and require careful attention to polarization issues. Such systems include liquid crystal projectors, imaging with active laser illumination, very high numerical aperture optical systems in microlithography and data storage, DVD players, imaging into tissue and turbid media, optical coherence tomography, and interferometers. Polarization effects are complex: Retardance has three degrees of freedom; diattenuation (partial polarization) has three degrees of freedom; and depolarization, the coupling of polarized into partially polarized light, has nine degrees of freedom. Because of this complexity, polarization components and the polarization performance of optical systems are rarely completely specified. The polarization aberrations introduced by thin films and uniaxial crystals can be readily evaluated in several commercial optical design codes. These routines are complex and most optical engineers are unfamiliar with the capabilities and the forms of output, but these polarization ray tracing routines provide better methods to communicate polarization performance and specifications between different groups teamed on complex optical problems. Better means of technical communication speed the development of complex systems. The emphasis is on the practical aspects of polarization elements and polarization measurements. The basic mathematics of the Poincare sphere, Stokes vectors and Mueller matrices are presented to describe polarized light and polarization elements. Polarizers and retarders are introduced and their principal uses explained. The nonideal characteristics of polarization elements, liquid crystals, and birefringent films are discussed with examples.

Benefits:

This course should enable you to:

- Discuss how to follow the polarization changes along a ray path through a series of lenses, mirrors, polarization elements and anisotropic materials.
- Explain the “instrumental polarization” or polarization aberrations associated with ray paths.

- Compute polarization state dependent point spread functions and modulation transfer functions.
- Visualize the Maltese cross and other fundamental polarization aberration pattern which occur in many systems.

Audience:

This class is intended for optical engineers, scientists and managers who need to understand and apply polarization concepts to optical systems. Prior exposure to optical design programs and polarization elements would be helpful.

Instructor Biography:

Russell Chipman is a professor of optical sciences at the University of Arizona in Tucson. He runs the Polarization Lab, which performs measurements and simulations of polarization elements, liquid crystals and polarization aberrations. He has developed many unique spectropolarimeters and imaging polarimeters and conducted studies into polarization in fiber components, waveguides, liquid crystals, polarization elements and natural polarization signatures. He received his bachelor's of science from MIT and his doctorate in optical science from the University of Arizona. He is a Fellow of OSA and SPIE. He won the 2007 G. G. Stokes Award for research in polarimetry.

SC366 Coherence and Optical Imaging

Sunday, October 16, 2011
9:00 AM - 12:30 PM

Instructor:

Thomas Brown; *Rochester Univ., USA*

Description:

The spatial and temporal coherence of the light that illuminates an object can have a profound impact on the characteristics of the image. This course will cover concepts in modern coherence theory that are essential to understanding how illumination impacts image contrast in projection imaging, including microscopy and UV lithography. We will end with a discussion of the interplay between coherence and polarization.

Benefits:

This course should enable participants to define the essential features of partially coherent illumination, predict the general impact that the degree of coherence will have on the resolution of an imaging system, estimate the coherence volume of an illumination field, and compare the coherence effects produced by a selection of optical sources.

Audience:

Optical Engineers and Scientists working in areas such as microscopy, semiconductor lithography, projector design, coherence-based biomedical optics, and laser systems.

Instructor Biography:

Thomas Brown has been on the faculty of the Institute of Optics, University of Rochester, since 1987. His research and teaching experience include polarized light, image formation, coherence, optical metrology, optical waveguides and photonics, nonlinear optics, optical detectors, and spectroscopy. He is a fellow of the Optical society of America and currently serves as director of the Robert E. Hopkins Center for Optical Design and Engineering.

SC235 Nanophotonics: Design, Fabrication and Characterization

Sunday, October 16, 2011
1:30 PM - 5:00 PM

Instructor:

Joseph Haus, *Univ. of Dayton, USA*

Description:

Nanophotonics is an emerging multidisciplinary field that deals with optics on the nanoscale. Recent progress in nanophotonics has created new and exciting technological opportunities. The interaction of light with nanoscale matter can provide greater functionality for photonic devices and render unique information about their structural and dynamical properties.

This nanophotonics course examines the key issues of optics on the nanometer scale. The course covers novel materials, such as photonic crystals, quantum dots, plasmonics, and metamaterials and their applications; it then identifies and explains selected fabrication and synthesis techniques. Photonic devices that exploit nanoscale effects, such as nonlinear optical effects and quantum confinement, will be discussed. Finally, various nanocharacterization techniques used in metrology, nondestructive evaluation and biomedical applications will be explained.

Benefits:

This course will enable you to:

- Explain the basic linear and nonlinear optical properties of photonic crystals, metals and metamaterials.
- Learn how nanoscale effects are exploited in photonic devices.
- Discuss nanofabrication and design tools.
- Learn the principles of nanocharacterization tools.
- Describe computational and modeling techniques used in nanophotonics.
- Identify the latest advances in the field of nanophotonics.

Audience:

This course is intended for optics professionals who are interested in learning the fundamentals of nanoscale materials and light-matter interactions, nanophotonic devices, fabrication, synthesis and nanocharacterization techniques

Instructor Biography:

Joseph W. Haus is professor and director of the Electro-Optics Program at the Univ. of Dayton. He is an OSA, APS and SPIE fellow. His current research is concentrated on the linear and nonlinear optical properties of heterogeneous materials, especially pulse propagation and nonlinear effects in metamaterials and metallodieletrics, coherent laser radar imaging, and coherent light sources from THz to UV based on electromagnetic parametric conversion and resonance effects.

Andrew M. Sarangan is a professor of the Electro-Optics Graduate Program at the Univ. of Dayton. His research interests are in the general area of semiconductor devices, integrated optics and computational electromagnetics. His current research is focused on metallodielectric materials fabrication, nanorod fabrication by oblique incident growth techniques, and the design of detectors and IR focal plane arrays.

Qiwen Zhan is an associate professor of the Electro-Optics Graduate Program at the Univ. of Dayton. He received his M.S. and Ph.D. in electrical engineering from the Univ. of Minnesota. Dr. Zhan's research interests are in the general area of physical optics, including nanophotonics, optical metrology and sensors techniques. His current research focuses on developing new polarization sensing and manipulation techniques for nanotechnology applications.

SC324 Plasmonics

Sunday, October 16, 2011
1:30 PM - 5:00 PM

Instructor:

Javier Aizpurua; *Donostia International Physics Center, Spain*

Description:

The course aims to provide an overview over the basics and fundamentals of Plasmonics. The course will begin with a description of plasmonics in terms of a classical dielectric approach, focusing in the excitation of localized surface plasmons (LSP) in finite metallic nanoparticles, acting as effective optical nanoantennas. We will describe how these nanoscale antennas can localize propagating electromagnetic energy into subwavelength dimensions, with the corresponding increase of the local fields in their proximity. The course will discuss the main possibilities to modify and control the properties of surface plasmons, such as the intrinsic properties of the material, the influence of the environment, the geometry or the interaction with neighboring structures. We will also review many physical properties arising from the strong

interaction in plasmonic systems such as quantum aspects of the plasmonic response or interference effects between the resonances producing Fano-like optical spectra. The course will end with a review of the main applications of surface plasmons in a variety of fields such as in field-enhanced spectroscopies, sensing, optoelectronic interfacing, improved photovoltaics, energy transfer, or biomedical diagnosis and therapy, to cite a few.

Benefits:

This course should enable you to:

- Understand the basic principles of the optical response in metallic nanostructures
- Gain insight into the properties of surface plasmons
- Acquire a perspective of nanoscale optics based on surface plasmons
- Identify the critical properties that govern the properties of surface plasmons
- Learn about the current plasmon-based technological applications
- Gain a perspective of current state of the art and recent developments in the field.

Audience:

This course is intended for students and researchers who would like to get a deeper understanding of plasmonics, to know about the current trends and state of the art in this field, and the state of the art in this field.

Background required:

Minimal background in electromagnetism is desirable but not strictly necessary to understand the course material. The course will be self-content.

Instructor Biography:

Javier Aizpurua achieved his Ph. D. at the University of the Basque Country on the theory of Plasmon excitation by fast electron beams. After research positions at Chalmers University of Technology (Sweden) and NIST (USA), he worked at the Donostia International Physics Center DIPC as a research Fellow. He currently holds a position as a senior scientific researcher of the Spanish Council for Scientific Research (CSIC) at the Materials Physics Center in San Sebastián, Spain where he leads the research line on theory of Nanophotonics.

Javier Aizpurua has studied the excitation of localized surface plasmons in metallic particles induced by a variety of external probes, including light. Among others he has developed theory to understand the excitation of surface plasmons in Scanning Transmission Electron Microscopy

(STEM), in Scanning Tunneling Microscopy (STM), in Surface-Enhanced Raman Scattering (SERS), in Surface-Enhanced Infrared Absorption (SEIRA), or in Scattering-type Near-field Optical Microscopy (s-SNOM), among others. The understanding of the optical response of metallic nanoantennas in all these situations has been the main focus of his research.

Special Events

OSA Division and Technical Group Meetings

Network with peers, meet group leaders, and get involved in planning future group activities by attending technical group and/or division meetings during FiO. The division meetings will encompass the technical groups affiliated with the division.

Schedule of Meetings

- Thin Films Technical Group, Sunday, 16 October, 19:00 – 19:30
- Holography and Diffractive Optics Technical Group, Sunday, 16 October, 19:30 – 20:00
- Information Acquisition, Processing and Display Division, Sunday, 16 October, 19:30 – 20:30
- Biomedical Optics Division, Sunday, 16 October, 19:30 – 21:00
- Optical Interaction Science Division, Monday, 17 October, 20:00 – 21:00

What's Hot in Optics Today?

Sunday, 16 October, 16:00 - 18:00
Regency Ballroom, Fairmont

What's hot in optics today? Find out what scientific and technical advances are being made over the entire field of optics. The division Chairs of OSA's technical groups will be presenting recent advancements in their respective technical areas. The overviews highlight recent developments in optics and are designed to be informative and accessible even to the nontechnical attendee.

- What's Hot in Bio-Medical Optics
  Adam P. Wax, *Duke University, United States*
- What's Hot in Fabrication, Design and Instrumentation
  Qiwen Zhan, *University of Dayton, United States*
- What's Hot in Information Acquisition, Processing and Display
  David Brady, *Duke University, United States*
- What's Hot in Photonics and Opto-Electronics
  Aref Chowdhury, *Alcatel-Lucent Bell Labs, Germany*
- What's Hot in Vision and Color
  Joseph Carroll, *Medical College of Wisconsin, United States*
- Mid-Infrared Laser Technology: Highlights and Applications
  Irina Sorokina, *Norwegian Univ. of Science & Technology, Norway*

FIO/LS Welcome Reception

Sponsored by:
THORLABS

Sunday, 16 October, 18:00 - 19:30
Ballroom, Sainte Claire Hotel

Complimentary to all Technical Conference Attendees: Get the FiO 2011/LS XXVII meeting off to a great start by attending the welcome reception! Meet with colleagues from around the world and enjoy light hors d'oeuvres.

Plenary Session and Awards Presentation

Monday, 17 October, 8:00 - 12:00
Regency Ballroom, Fairmont

The 2011 Joint FiO/LS Awards Ceremony and Plenary Session will feature two world-renowned speakers. See the plenary page for detailed descriptions of the speakers and their presentations.

VIP Industry Leaders Networking Event: Connecting OSA Corporate Members and Young Professionals

Tuesday, 18 October, 8:00 - 9:30
Courtyard Atrium, Sainte Claire Hotel
Free of Charge and includes a Hot Buffet Breakfast

Join OSA Corporate Members for an event that puts Young Professionals in contact with highly successful OSA members. After an informal networking session, each participant will have the opportunity for a brief visit with each corporate member to discuss careers, industry trends or any other topic.

Space is limited. Members of OSA's Young Professionals program will be given registration priority, but any recent graduate is welcome to RSVP.

To RSVP or to join the Young Professionals program, email April Zack at azack@osa.org.

An OIDA Workshop/Roadmap Report Session

Optical Communications in Networks Workshop: **FUTURE DIRECTIONS AND METRICS in AGGREGATION NETWORKS**

Tuesday, 18 October, 8:30 – 18:00
Wednesday, 19 October, 8:30 – 16:30
San Jose, CA - Collocated with FiO/OSA Annual Meeting 2011

Regency 1 & 2, Fairmont
In partnership with the Center for Integrated Access Networks (CIAN)

The goal of this timely workshop is to establish a roadmap for optical access aggregation networks with an emphasis on quantitative metrics at the system level. In addition to specifying goals for individual links and network nodes, this program will focus on establishing metrics for end-to-end transmission.

Discussion topics will include transmission and switching capacity, latency, bandwidth utilization, power/energy consumption, cost, network adaptability (static versus dynamic) and network transparency (opaque versus transparent).

Content from the presentations and group discussion sessions will be published in a roadmap report which will be freely available to workshop participants and OIDA member companies.

For more information visit www.oida.org/events/OCN2011

Space permitting, FiO/LS technical registrants may audit the invited speaker sessions during the Workshop. FIO/LS registrants are not permitted to join the lunch or the afternoon break-out sessions.

OSA Network of Entrepreneurs (ONE) Workshop

Tuesday, 18 October, 10:00 - 12:00
Courtyard, Room, St. Claire Hotel
Free of Charge - immediately following the VIP Industry Leaders Networking Event

If you've ever wondered what it takes to start your own company, or if you have innovative ideas that have business applications, join OSA for the first Network of Entrepreneurs (ONE) Workshop!

OSA Network of Entrepreneurs (ONE) events provide young professionals from around the globe with a forum to discuss the challenges and opportunities of start-up enterprises and to hear first-hand from successful optics entrepreneurs. This inaugural meeting will feature high-powered speakers, a panel session and lots of time for attendee participation!

Confirmed speakers include **Dr. Greg Quarles**, President and Chief Operating Officer of B.E. Meyers; **Michelle Holoubeck**, Director in the Electronics Group at intellectual property specialty law firm Sterne, Kessler, Goldstein & Fox and **Dr. Tom Baer**, Executive Director of the Stanford Photonics Research Center at Stanford University, co-founder of Arcturus Bioscience, Inc. and 2009 OSA President.

To join the Young Professionals program, email yp@osa.org. To register, visit http://ow.ly/5ckVA.

Joint FiO/LS Poster Sessions

Tuesday,18 October, 12:00 - 13:30
Wednesday, 19 October, 12:00 - 13:30
Imperial Ballroom - Exhibit Hall, Fairmont

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. Please stop by to enjoy the poster sessions.

OSA Fellow Members Luncheon at FiO 2011 in San Jose, California

Tuesday, 18 October, 12:00 – 13:30
Ballroom, Sainte Claire Hotel

Mark your calendar to attend the OSA Fellow Members Lunch, planned for Tuesday, 18 October 2011 from 12.00 – 13.30. In September, invitations will be sent to Fellow, Fellow Emeritus and Honorary Members.

Minorities and Women in OSA (MWOSA) Tea

Tuesday, 18 October, 16:00 – 17:30
Sainte Claire Room, Sainte Claire Hotel
Free of Charge

Every year OSA features a speaker who discusses current issues and trends in the field. Everyone is welcome to attend; refreshments will be served! Questions? Email mwosa@osa.org.

Meet the Editors of the APS Journals

Tuesday, 18 October, 15:30 - 17:00
Imperial Ballroom - Exhibit Hall, Fairmont

The Editors of the APS journals cordially invite you to join them for conversation and refreshments. Your questions, criticisms, compliments, and suggestions about the journals are welcome. We hope you will be able to join us.

Division of Laser Science Annual Business Meeting

Tuesday, 18 October, 18:00 – 19:00
Hillsborough Room, Fairmont

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, 18 October, 18:00 – 19:00
Empire Room, Fairmont

Learn more about OSA and join the OSA Board of Directors for the Society's annual business meeting. The 2010 activity reports will be presented and the results of the Board of Directors election will be announced.

OSA Member Reception

Tuesday, 18 October, 19:00 - 20:30
Ballroom, Sainte Claire Hotel
Complimentary for all OSA Members

The Optical Society cordially invites all OSA Members to attend the complimentary Frontiers in Optics Member Reception. This year's event will be a "Masquerade Ball" featuring great food, music and dancing. **Costumes and/or masks are encouraged. View the Invitation.**

Please bring your conference registration badge or OSA Membership card; if you join OSA on-site, please bring your receipt. More details to come! Please check back soon.

Laser Science Banquet

Tuesday, 18 October, 19:00 – 22:00
Gordon Biersch, 33 East San Fernando Street, San Jose, CA

Join your colleagues for the annual LS Banquet. Tickets are required for this event and can be purchased when you register for the conference for $50. There is a limited quantity of tickets, get your tickets soon.

Science Educators' Day

Wednesday, 19 October, 17:00 - 20:00
Ballroom, Sainte Claire Hotel

This annual event focuses on effective and innovative approaches to science education, with an emphasis on hands-on, interactive classroom lessons. Please contact opticseducation@osa.org for more information.

FiO Postdeadline Papers

Wednesday, 18 October, 18:30 – 20:00
TBD

The FiO 2011 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.

Post deadline Paper Submission Deadline: 3 October 201112:00 PM noon EDT (16:00 GMT)

Student Information

MWOSA Tea

Minorities & Women in OSA Tea
Tuesday, 18 October, 16:00 - 17:30
Sainte Claire Room, Sainte Claire Hotel
San Jose, California, USA

 Elizabeth Rogan, Optical Society's CEO	 Laura Weller-Brophy, FluoroLogic, Inc.
 Donna Strickland, University of Waterloo	 Jannick Rolland, University of Rochester

Please join us for the annual Minorities and Women in OSA (MWOSA) Tea! This year's event offers a panel discussion featuring The Optical Society's CEO, Elizabeth Rogan, and esteemed OSA Board of Directors members Jannick Rolland, University of Rochester, Donna Strickland, University of Waterloo and Laura Weller-Brophy, FluoroLogic, Inc. The discussion will focus on current issues and trends for women and minorities in science. Everyone is welcome to attend; refreshments will be served!

Please register online by 9 October. This event is free for all who are interested in attending.

Student Awards and Grants

Jean Bennett Memorial Student Travel Grant

Applications for the program were due by 12 August 2011.

This program was established in memory of Jean M. Bennett, a highly decorated research physicist who was recognized for her contributions to the studies of optical surfaces and served as OSA's first female president. One grant of $1,000 USD will be awarded to a student presenting their work at FiO in recognition of their research excellence. This program is administered by the OSA Foundation and made possible through the generous support of Nanoptek Corporation, the Pennsylvania State University Department of Physics and individual contributors.

Criteria for Eligibility

•Applicant must be the presenter of a paper accepted at FiO

•Applicant must be an undergraduate or graduate student of an educational institution of collegiate grade who is devoting more than half-time to studies within the institution, at the time the paper was written.

Application Requirements

•Copy of the paper abstracted submitted to FiO

•Letter of support from your advisor or professor

•Statement explaining the value of attending FiO

•Your resume/CV

Applications for the program were due by 12 August 2011. Please email all the required documents to BennettGrant@osa.org

Robert S. Hilbert Memorial Student Travel Grants

Applications for the program were due by 12 August 2011.

Established in 2009 by Optical Research Associates (ORA), now the Optical Solutions Group at Synopsys, as a memorial to ORA's former President and Chief Executive Officer Robert S.

Hilbert, this program recognizes the research excellence of students in the areas of optical engineering, lens design and illumination design. Two grants of $1,100 USD will be awarded to a student presenting their work at Frontiers in Optics. This program is administered by the OSA Foundation.

Applicant Criteria

•Applicant must be the presenter of an accepted paper; preference is given to oral presentations, but posters are eligible as well.

•Applicant must be an undergraduate or graduate student of an educational institution of collegiate grade who is devoting more than half-time to studies within the institution, at the time the paper was written.

•Accepted paper/poster must include research in the areas of optical engineering, lens design and/or illumination design.

•Applicants are encouraged to include graphics created using either CODE V® or LightTools®

Application Requirements

•Copy of the paper abstract submitted to FiO

•Letter of support from advisor or professor

•Statement explaining the value of attending FiO

•Your resume/CV

Applications for the program were due by 12 August 2011. Please email all the required documents to HilbertGrant@osa.org.

Emil Wolf Outstanding Student Paper Competition

The Emil Wolf Outstanding Student Paper Competition recognizes the innovation and research excellence of students presenting their work during Frontiers in Optics (FiO) and honors Emil Wolf for his many contributions to science and the Optical Society. This program is administered by the OSA Foundation and sponsored by Optics Communications published by Elsevier. Additional support has also been provided by Physical Optics Corporation, the University of Rochester Physics Department, the Institute of Optics, and individual contributors.

Finalists are selected based on scores received during the standard FiO Technical Program Committee review. Status notification will be sent via email following the Committee's decision. A separate notification regarding paper acceptance will also be sent.

Finalists are judged based on their work's technical advances and value to the technical community of interest, and their skill of public presentation. The Emil Wolf Outstanding Student Paper Competition Review Committee will select one winner per submission category. Each winner will receive a complimentary OSA student membership, an award stipend of $300 USD and an award certificate. Results are announced after the conference.

Criteria for Eligibility

•The submitting author must be an undergraduate or graduate student of an educational institution of collegiate grade who is devoting more than half-time to studies within the institution, at the time the paper was written.

•The student must be listed as the presenting author of the paper, and if accepted must present the paper at the conference.

•The submitting author must opt-in to the competition during the regular submission process and follow all the instructions provided on the submission site.

•The paper must be submitted and accepted during the regular "call for papers" process. (Note: postdeadline papers are not part of this competition.)

Review/Selection Process

All papers submitted to the competition will be reviewed during the standard Technical Program Committee (TPC) review process.

•Each subcommittee will select 2–3 finalists.

•The Emil Wolf Outstanding Student Paper Competition Review Committee will attend the presentations of finalists in each subcommittee and select one winner per subcommittee.

•Announcement of the winners will be posted on the OSA Foundation website and in a press release following the conference.

OSA Foundation Student Travel Grants

The OSA Foundation is pleased to offer travel grants to students working or studying in a qualifying developing nation who plan to attend Frontiers in Optics 2011. Travel grants will average $1,000 US per award.

Application Deadline: 5 August 2011

All grant program applicants must:

1. Work or study in a qualifying developing nation.

2. Be enrolled in an accredited undergraduate or graduate program

3. Demonstrate need for travel support and state the value of attending the conference

4. Agree that if they are selected as a grant recipient the OSA Foundation (OSAF) may use their name, photo and the information provided in their trip report to promote OSAF programs and solicit donations. This information may be used online, in print and email, and in other OSAF communication vehicles.

It is not required that the applicant is a conference presenter, but we encourage interested students to submit a paper for oral or poster presentation. Please visit the Submissions page for additional information and to submit your paper. You are not required to be an OSA Student Member to apply for a grant, but preference is given to members. View more information on OSA Membership.

Important: Travel grant applications are separate from the submissions process. Including your paper title and abstract on your travel grant application does not constitute a submission to Frontiers in Optics 2011. Receiving a travel grant does not indicate that your paper was submitted or accepted. Please visit the Submissions page for additional information and to submit your paper.

Please note: Applicants must apply for a visa, if required. OSA can send a letter of invitation for US meetings, but has no influence on the process. To request a letter of invitation please visit the invitation letters page and follow the instructions. Requests may be made online, via fax, or mail.

If you have any questions please contact us at foundationgrants@osa.org.

The meeting chairs will review all qualified applications and applicants will be notified of the results via email.

Incubic/Milton Chang Travel Grant

Application Deadline: 22 August 2011

Funded by an endowment from Milton and Rosalind Chang, this program provides 10 grants of up to $500 USD to enable students who present papers to travel to the Frontiers in Optics/OSA Annual Meeting. Grants are usually awarded to the presenter and/or first author of the paper.

All of the following information MUST be included in the grant application:

1. Letter of support from the student

2. Letter of support from the student's advisor

3. Estimated budget for the trip

4. Copy of the paper abstract

5. Mailing address and email address

Please note: Both letters of support should describe the importance of the applicant's work and must clearly demonstrate the need for the grant. Incomplete applications will not be accepted (sample application for reference).

Please e mail your application to: incubicmiltonchangtravelgrant@osa.org

If you do not have email access, you may mail your application to:

Incubic/Milton Chang Student Travel Grant Committee

The Optical Society

2010 Massachusetts Ave., NW

Washington, DC 20036

For more information: Member Services at +1 202.416.1430 or chaptersandsections@osa.org.