Frontiers in Optics 2013 Day 1
Sunday, October 6

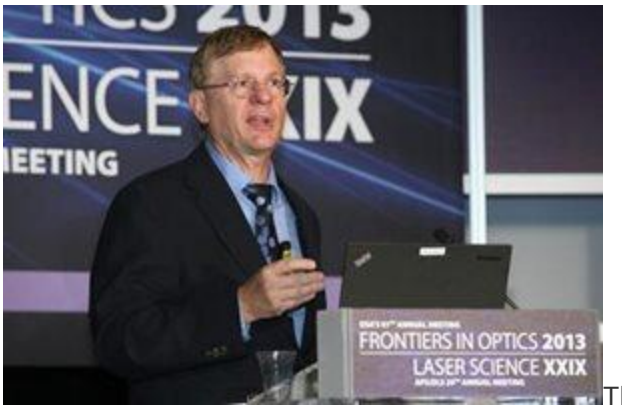
FIO Kicks off with Symposium, Student Leadership Meeting and Reception

Attendees began arriving in sunny Orlando, Florida today for the 97th annual Frontiers in Optics 2013. Kicking off the meeting was the OSA Student Leadership conference, a Symposium on the 100th anniversary of the Bohr atom, and the FIO welcome reception.

Heard before FIO: **@efcloos:**Today, I bought my first real suit for my presentation at #**FiO13**. Come check it out on Tuesday morning. LTu1H.1

More than 180 students representing OSA student chapters from over 25 countries participated in the Student Leadership conference. Presenters included Elizabeth Rogan (OSA CEO), Steve Fantone (OSA Treasurer) and Anthony Johnson (OSA Past President). Tingting Zhang (Nanjing University) gave an inspiring presentation on what they're doing for youth education outreach events. The winners of this year's Student Chapter Excellence Award were Universidad Autonoma de Nuevo León and Duke University. The award was presented by Monica Cynthia Fernandez-Luna (Universidad Autonoma de Nuevo León) and Mathew Lew (Stanford).

Heard at the Student Leadership Conference: **@senelra**: Steve Fantone: Secret to success: do what you say you are going to do. Keep your word. #**plenary** #**studentleadership** #**FiO13**



The Symposium on the 100th Anniversary of the Bohr Atom detailed atomic, nuclear, and particle physics and the relationship of these areas with optics and photonics. Charles Clark (NIST) gave an excellent overview of Bohr's seminal work that led to the quantization of the mechanics of atoms, including the prediction of the regular spacing of spectral lines of hydrogen, and its continued impact today. Chris Greene (JILA, Univ. of Colorado at Boulder) explained work on measurements on Rydberg electrons, the complexities introduced by, among others, molecular vibrations and rotations, and how these challenges have been overcome over the past half-century. Nadine Dorre (University of Vienna, Austria) presented impressive work on using far- and near-field interferometry to measure the wavelength of large molecules, including innovative approaches involving time-domain Talbot-Lau interferometry. Masaki Hori (Max-Planck Inst. for Quantum Optics) described how measurements using counter-propagating laser beams performed on helium atoms with an antiproton replacing an electron can be used in conjunction with the Standard Model to demonstrate proton and antiproton mass equivalence to a precision of 7e-10.


The FIO /LS Welcome Reception was also a huge hit with attendees mingling, planning, and networking throughout the evening.

Heard at the FIO Welcome Reception: @**senelra**: Ready to mingle? Almost time for the #**FiO13** Welcome Reception #**beer** #**networking** http://instagram.com/p/fJDegcuJ3B/

Be sure to download the conference mobile app so you can take the conference schedule, maps, Twitter and more with you on handheld device throughout the week. And remember: share the buzz from your

week on Twitter using the #FIO13 hashtag—best Tweets win a prize and you might even see yours featured in the next Daily Wrap Up.

Frontiers in Optics 2013 Day 2
Monday, October 7

Plenary Session, Technical Programming, and the BRAIN Initiative Take Center Stage

The FIO technical program opened today, with the plenary session taking center stage first thing in the morning. While the government shutdown kept David Wineland (NIST) from speaking as planned, Christopher Monroe (University of Maryland and NIST's Joint Quantum Institute) graciously stepped in at the last minute to take his place.

Heard before the plenary: **@babita2phy** : Plenary session is about to start within few secs....feeling excited to listen big shots #**FiO13**

Monroe's lecture entitled "Quantum Information Science with Atoms" explored the exciting possibilities of quantum systems and their entangled states as the next frontier for computing and information processing. In these systems, the fundamental element of quantum information is a qubit instead of the bit used in classical computing. Monroe discussed using the energy levels of trapped ions as qubits and using lasers to manipulate them. He also described the future possibility of exchanging photonic qubits over optical fibers.

Heard during Monroe's presentation: **@dnlgvnn**: Great overview on quantum information with trapped atoms by Christopher Monroe at #**FiO13** – stick around for the other plenary talks.

Margaret Murnane (University of Colorado-Boulder and JILA) followed with a plenary speech entitled “Science at the Timescale of the Electron: Coherent keV X-Rays from Tabletop Femtosecond Lasers.” She focused on recent advancements in the nonlinear optical technique of high harmonic generation that have made bright, tabletop soft x-ray lasers possible. If commercialized as planned, these ultrafast lasers could enable imaging of electron motion, lead to next generation lithography, and enable new types of spectroscopic and materials studies at relatively affordable prices.

Heard during Murnane’s presentation:

@senelra : Excellent talk on table-top coherent x-ray sources by Margaret Murnane. Science at the timescale of the electron. **#FiO13 #plenary**

@ALargeaud : Dr Murnane gave best kind of talk: detailed, technical yet approachable. **#newfan #futureNobel**? **#fio13**


The final plenary speaker was John Bowers (University of California at Santa Barbara). His presentation “Silicon Photonic Integrated Circuits and Lasers” focused on the rapid growth of internet data and data centers, and photonic devices that can move data more efficiently than electronic devices. Silicon photonic integrated circuits have the potential to integrate photonics with electronics and enable the usage of the electronic industry’s infrastructure to create these devices. Unfortunately, silicon is not a good laser material. Bowers described the increasing number of hybrid devices that incorporate silicon with III-V semiconductors that have good properties for photonics.

Additionally, the Arthur L. Schawlow Prize, given by APS/DLS, was presented to Robert R. Alfano during the plenary session. Alfano gave the Schawlow Prize lecture entitled “Optical physics discoveries using ultrafast lasers.”

Heard after the plenary: **@LFOT_TRCC** : Great ideas from FiO plenary for next semester's courses. **#FiO13**



During the plenary session, there was also a short presentation by Matt Weed from OSA’s Public Policy Committee about the National Photonics Initiative (NPI). To learn more about NPI and how to get involved, visit the Public Policy booth located near the registration desk. He also announced a special NPI

event on Tuesday from 14:30 to 15:30 in the Floridian Ballroom.

The technical sessions throughout the day also drew crowds looking to learn more about current research trends.

Heard during the technical sessions: @**AlketMertiri** : Great talk right now by prof Alfano. #**fio13** @ Hilton Orlando Bonnet Creek http://instagram.com/p/fKptKpEjo7/

Of note, was the Silicon Photonics I session which focused on the advantages of the using silicon photonics including reduced size, cost and power particularly in telecommunications applications. The session opened with invited talks on silicon modulators, electronic-photonic integration on silicon, and photonic device integration to create coherent transmitters and receivers. Contributed talks followed describing novel photodiodes, mode division multiplexers, on-chips isolators, and nanowires, all made in silicon. Additional information on this session can be found on the FIO blog.

Heard at the Silicon Photonics I session: @**efcloos** : "Si photonics is not about Si. It's about using CMOS technologies to make photonic circuits" - John E Bowers #**FiO13**

At the Optics and Photonics of Disordered Systems I session, vibrant discussion circles were held around new experiments and ideas to tackle the drawbacks of disordered systems. Some of the discussions focused on incorporating quantum dots in the disordered systems or changing the wavefront and the intensity of the light to modulate the physical attributes of the disordered systems. Recent developments point to future applications in light transmission and imaging. In addition, the disordered chaos generated by semiconductor lasers can be put to use, such as in the field of physical random number generation and secure key distribution.

A session on Translational Biophotonics - Focus on Pathology and Diagnostics proved to be of great interest again. In-vivo high-resolution, high contrast images ranging from single organelle, to cancer cells, to blood vessels in brains were on tap for the day. Attendees also heard about how photo-acoustic microscopy (PAM) is playing a major role in this field. Additionally, second harmonic generation (SHG) signals of the tissues and/or confocal fluorescence microscopy are being used for clinical diagnosis, oxygen delivery and consumption in humans can be monitored by NIR and diffuse correlation spectroscopy. A key takeaway from this session was clear: more applications relying on optical techniques will prosper in the near future.

On Monday afternoon, attendees were treated to a special session on the BRAIN (Brain Research through Advancing innovative Neurotechnologies) Initiative, a White House-led initiative that aims to revolutionize our understanding of the human brain. The President’s fiscal year 2014 budget request includes more than $100 million in appropriations for the Initiative ($50 million to DARPA, $40 million to NIH and $20 million to NSF). The session was chaired by Chris Xu (Cornell University) and included speakers from government, industry, and academia. Prem Kumar (DARPA) gave a funding agent’s perspective on the initiative. Darcy Peterka (Columbia University), Doug Kim (Janelia Farms), Changhuei Yang (CalTech) and Mike Szulczewski (Bruker Corp.) rounded out the session. Discussion centered on the great potential for optical imaging to play a big role in the Initiative. Optics can enable non-invasive imaging and potential manipulation at the cellular level. Challenges include scaling up from studying a few neurons to studying a few billion neurons, and dealing with probe light scattering from tissue and causing poor spatial resolution.

The Minorities and Women at OSA Networking Reception was also held on Monday with close to 80 members in attendance. Peter Delfyett from CREOL introduced the guest speaker Jie Qiao (Rochester Institute of Technology). Qiao discussed promoting women leadership in Science, Technology, Engineering, and Entrepreneurship; bridging the gap between Science and Business; and providing a forum to learn, connect and lead. Event attendees included OSA CEO Liz Rogan, OSA President Donna Strickland, OSA Past President Anthony Johnson and other OSA board members.

Frontiers in Optics 2013 Day 3
Tuesday, October 8

Exhibit Hall Opens, Attendees Dig Even Deeper into the Science

The sun may not be shining much this week in Florida, but the science is sure heating things up at FIO!

During the session on “Electron and Molecule Attosecond Dynamics,” attendees heard about extremely fast electron dynamics where N^+, phenylalanine, and noble gas is observed, investigated, and fervently compared with theoretical simulation. In a nutshell, attosecond transient absorption spectroscopy allows the researchers to detect the time evolution of the interference pattern, caused by electrons dancing between different excited states. New methodology of generating isolated attsosecond pulses (such as double optical gating) and exciting technique called “attoclock” were also topics of discussion.

On Tuesday morning, there was a technical session on Optical Atomic Clocks. Speakers from around the world discussed the ever increasing stability of optical frequency standards. As the most accurate clocks in the world, optical lattice clocks have strong potential to become the new standard for the international definition of the second. This session included talks comparing optical clock accuracy to atomic fountain clocks, which form the basis for the current definition of the second. Vladan Vuletic (MIT) ended the session by giving a presentation about all-optical transistors and the future possibility of optical circuits analogs to electronic circuits.

Heard at FIO: **@magnes123** : **#FiO13** brings everything to light

As heard in the session on “Ultrafast X-Ray Spectroscopy in Condensed Matter”: Ultrafast X-Ray spectroscopy is “energetic” in many application fields, including zeptosecond pulse synthesis, attosecond chemistry, coherent control of molecular dynamics, and controlling ferromagnetism. Combing new light sources (X-rays) with established spectroscopic technique (transient grating) brings new insight to the electronic structures of the transition metals. These branches are all emerging fields that broadening our scientific frontiers.

Later a session on “X-Ray Spectroscopy of Complex Systems” there was discussion on how bombarding complex molecules with strong X-ray photons gives researchers not only the fun of destroying the complex molecules but also helps them gain new scientific insight. The interaction between complex

molecules and strong X-rays results in an interesting phenomena, such as removal of multiple electrons from clusters or fragmentation of the molecules. These scenarios give us the ability to see the microscopic world in better detail.

Heard at FIO: **@efcloos** : The best part of **#FiO13** is realizing how interconected the Optics world is. **#ItsASmallWorldAfterall #2ndFamily**

On Tuesday afternoon, Steven Prawer (University of Melbourne, Australia) delivered a presentation on the remarkable properties of diamonds during the New Technologies for Quantum Information Science session. Research on diamonds with nitrogen vacancy (NV) defects has shown the material's potential usage for quantum biosensing and retinal implants. Bionic Vision Australia (a national consortium of researchers) have demonstrated using NV diamond to stimulate the retina via electrical pulses and have created a bionic eye prototype that enables impaired sight patients to locate and interpret basic shapes in their environment. This device offers promise to people who have lost their sight due to eye diseases, such as macular degeneration and retinitis pigmentosa.

Heard at FIO: **@benlochocki** : The talk about subretinal implants was stunning **#FiO13**

At a session on hybrid integrated photonics, several speakers emphasized that hybrid photonics, which is creating photonic devices in multiple materials that are then combined into a single chip, provides flexibility as well as allows one to choose the best materials for each photonic component. The first talk explained how grayscale lithography can be used to make vertical couplers for links to modulators bonded to silicon. It was described how such a material-diverse approach has significant link budget advantages. Second was a presentation on making hybrid photonics more cost-effective, since a large amount of the expense is sunk in the integration and packaging. By creating a "toolbox" of capabilities, such as a photonic lightwave circuit platform and selective placement of individual lasers for pitch and crosstalk flexibility, they can simplify the process of making hybrid photonics. Finally, the third invited talk described the integration of silicon with organic photonic materials and the development of photonic "wire bonds" for chip-to-chip integration. The organic materials allow the functionalization of silicon for light generation and improved modulation. The "wire bonds" allow for simple, flexible, and reliable interconnects between chips, basically creating an analog to the conventional bond wires used for electronics and significantly reducing the need for difficult alignment procedures.

After a day chocked full of science, attendees had their first chance to visit the FIO exhibit hall which featured more than 80 leading optics and photonics companies. Also on the show floor, was the first ever "Enabled by Optics" event where attendees got to hear firsthand from the CEO of the winning company, Trojan Technology.

Also in the Exhibit Hall was a session on the National Photonics Initiative (NPI) entitled “Making Photonics Innovations a Reality”. There, Elizabeth Rogan (CEO of OSA), Tom Hausken (Senior Adviser to OSA and OIDA), and Jason Eichenholz (Founder of Open Photonics Inc) spoke about the NPI and how the open innovation model illustrates what the success of the NPI could look like – a viable bridge over the valley of death for emerging technologies**.** Elizabeth gave an overview of the NPI and the ways industry has already been involved in putting together and defining the NPI. Tom discussed the changing landscape of R&D funding in photonics market. Jason gave an overview of open model innovation. His company, Open Photonics, helps accelerate the commercialization of photonics technologies by facilitating unprecedented collaboration between established companies with channels to market and researchers and inventors who have new ideas about what they want to see commercialized.

Heard at the FIO Exhibit: **@babita2phy** : Visited exhibition ...its quite interesting..one must go #**FiO13**

@senelra : First look at the #**FiO13** Exhibition & it is buzzing! Looking forward to meeting exhibitors.

Later in the evening, OSA members danced, laughed and ate the night away, “prohibition style” at the OSA member reception. Be sure to check out the videos of members kicking up their heels on Instagram!

Heard at the member’s reception: **@senelra: @opticalsociety** What happens at the members party stays at the members party ;) #**osa** #**FiO13**

Frontiers in Optics 2013 Day 4
Tuesday, October 9

Another Science Filled Day

On Day 4 of FIO, the science and show floor activities showed no signs of slowing.

On Wednesday morning, in the Integrated Quantum Optics session, Alex Clark (University of Sydney, Australia) presented a talk entitled “The Quantum Utility: Comparing Single Photon Sources.” Attendees learned that single photon sources are valuable for areas like quantum metrology, quantum communications, and quantum computing. Clark also discussed a novel technique for modeling nonlinear loss of single photon sources that enable the direct comparison of these sources. This utility could prove to be an important measurement tool for the development of more efficient single photon sources and thus for the advancement of quantum applications.

 At the Symposium on Advanced Distributed Optical Fiber Sensor Systems for Security and Safety Applications, attendees heard that distributed sensors can be much more cost effective than point sensors, but a principal challenge for fiber sensors is working with a tradeoff between resolution and total detection length. Some of the solutions presented include breaking the sensors into multiple sections by various means, including using hybrid schemes that utilize some combination of Raman, Brillouin, fiber Bragg grating, or Rayleigh scattering, and employing advanced pulse coding techniques. These fiber sensors can be used for structural defects or stresses (possibly the most mentioned application), intrusion detection (including actual detection of the shape in which a fiber is moved around), or measuring very high plasma currents. Also mentioned during the opening of the panel discussion was that a market estimate predicts a 300% growth for distributed fiber sensors over the period of 2013-2017.

In a session on “Three-Dimensional Optical Structures” nano-scale artistic work was the focus. A myriad of eye-opening 3D structures in nano-scales made by direct laser writing (DLW) were shown to attendees. Structures shown included micrometer-sized parabolic mirror arrays, nano-helix metamaterials, nano-scale chiral composites, black silicon surfaces, and photonic crystals with new patterns. Attendees also heard about new techniques like stimulated-emission-depletion (STED) and “dip in DLW” that are being used to create even finer objects.

Rounding out the day’s highlighted sessions was one on “Ultrafast Chemical Dynamics.” The session featured two interesting fields -- optical science and chemistry – and the ways in which they are closely collaborating. Attendees learned about the exciting ways that the gigantic light source – Linac Coherent Light Source (LCLS) – is being utilized to study the electron dynamics in complex systems like charge transfer in dye-sensitized semiconductor nanocrystals. A key takeaway from this session: collaboration is key to the advancement of science.

 Attendees also had a chance to visit the internationally renowned CREOL, The College of Optics and Photonics at the University of Central Florida. There, participants

heard from Dean of CREOL, Bahaa Saleh and also went on a special guided tour of the labs.

Heard at CREOL: **@safa704** : Very good news from Prof. B. Saleh in CREOL tour; they've started to offer bachelor's degree in Optics. **#fio13**

Also on Wednesday was the postdeadline paper session where attendees got to hear the newest breakthroughs in rapidly advancing areas. Only those papers judged to be truly excellent and compelling in their timeliness were accepted.

OSA works hard to equip science educators with the resources necessary to inspire the next generation of scientists. To do this, Science Educators Day (EDAY) was held on Wednesday with nearly 70 local educators and 20 OSA members in attendance. There, David R. Sokoloff discussed Active Learning and had the audience captivated with his fun optics magic tricks. Attendees received goodie bags filled with free educational materials and OSA Foundation donated “Gallileoscopes” for them to use in their schools. Mike McKee (CREOL) also gave the teachers diffraction grating glasses and mugs.

Frontiers in Optics 2013 Day 5
Thursday, October 10

Frontiers in Optics 2013 Wraps Up After Week of Cutting Edge Research, Applications and New Products in Optics and Photonics

Frontiers in Optics concluded in Orlando, Fla. on October 10 after five days of technical sessions, special symposia, tutorials, business programming, exhibits and special events—all highlighting the latest research and applications of optical technologies. Attendees heard presentations from leading experts on hot topics such as biomedical optics, silicon photonics, fiber optics, lasers, hybrid integrated photonics, and more.

The vital role of optics and photonics was evident in the more than 740 technical presentations in eight core areas: Optical Design, Fabrication & Instrumentation, Optical Sciences, Optics in Biology and Medicine, Optics in Information Processing, Fiber Optics & Optical Communications, Integrated Photonics, Quantum Electronics, and Vision and Color, as well as on the exhibit floor at FIO 2013—featuring 80 participating companies—and in the business-focused programming at the Enabled by Optics inaugural event.

Join us again next year in Tucson for Frontiers in Optics 2014, October 19 – 23.

Conference Program

2013 Agenda of Sessions, Itinerary Planner, Abstracts and more:

- **Download the Agenda of Sessions** (pdf)
- Agenda of Sessions
- Key to Authors
- Program Front Matter
- Subject Index
- LS Symposium on Undergraduate Research Abstracts
- FiO Postdeadline Papers

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FiO 5: Fiber Optics and Optical Communications

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FiO 6: Integrated Photonics

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- **Optical and Laser-Based Approaches in Chemical and Biological Sensing,** Sharon Weiss, *Vanderbilt University, USA,* Organizer
- **Solid-State Quantum Optics,** Philip Hemmer, *Texas A&M University, USA,* Organizer
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- **Precision Measurements and Metrology Using Lasers**, Jun Ye, *University of Colorado at Boulder JILA, USA,* Organizer
- **Quantum Information with Photons,** Benjamin Sussman, *National Research Council Canada, USA,* Organizer
- **Nano-opto-mechanics,** Michal Lipson, *Cornell University, USA,* Organizer

- See more at: file:///O:/FiO/2014/Website/Archived%20Pages/About/Committees.mht#sthash.B2Qga1gC.dpuf

Location Information

Orlando is home to some of the nation's greatest theme parks, but there's a lot more that the City has to offer visitors!

Orlando is nicknamed "The City Beautiful" and its symbol is the fountain at Lake Eola. The city is also sometimes nicknamed, "The Theme Park Capital of the World", as it is best known for its many parks like the world-famous Walt Disney World Resort, Universal Studios Florida and Islands of Adventure, SeaWorld and other attractions.

With the exception of Walt Disney World, most major attractions are located along International Drive. The city's famous attractions form the backbone of Orlando's tourism industry, making the city the most visited American city in 2009. The city is also one of the busiest American cities for conferences and conventions.

Today, the historic core of "Old Orlando" resides in Downtown Orlando along Church Street, between Orange Avenue and Garland Avenue. Urban development and the Central Business District of downtown have rapidly shaped the downtown skyline during recent history. The present-day historic district is primarily associated with the neighborhoods around Lake Eola where century old oaks line brick streets. These neighborhoods, known as "Lake Eola Heights" and "Thornton Park," contain some of the oldest homes in Orlando.

Plenary Session

Margaret Murnane
Kapteyn-Murnane Group, JILA, University of Colorado at Boulder, USA

Science at the Timescale of the Electron: Coherent keV X-Rays from Tabletop Femtosecond Lasers

Abstract
Since the invention of the laser, scientists have been striving to extend coherent light into the X-ray region. Very recently, because of a new ability to manipulate electrons on their natural, attosecond, time-

scales, the dream of realizing bright, laser-like, X-ray beams on a tabletop with photon energies >1.6keV (wavelengths <8) has become a reality.

Biography

Margaret Murnane is a Fellow of JILA and a Distinguished Professor in Physics at the University of Colorado. She runs a joint, multi-disciplinary, research group with her husband, Prof. Henry Kapteyn. She received her B.S and M.S. degrees from University College Cork, Ireland, and her Ph.D. degree from UC Berkeley. She was a faculty member in physics at Washington State University, in EECS at the University of Michigan, and in 1999 she moved to the University of Colorado. Prof. Murnane with her students and collaborators uses coherent beams of laser and x-ray light to capture the fastest dynamics in molecules and materials at the nanoscale. She is a Fellow of the Optical Society of America, the American Physical Society, and the AAAS. She was elected to the National Academy of Sciences in 2004, and the American Academy of Arts and Sciences in 2006. She was awarded a John D. and Catherine T. MacArthur Fellowship in 2000. As well as the Lamb Award, Margaret and Henry also shared the 2009 Ahmed Zewail Award of the American Chemical Society, the 2010 Schawlow Prize of the American Physical Society, and the 2010 R.W. Wood Prize of the Optical Society of America. Margaret is very interested in increasing diversity in science and engineering, and currently chairs the President's Committee for the Medal of Science.

John E. Bowers
Dept. of ECE, Univ of California, USA

Silicon Photonic Integrated Circuits and Lasers

Abstract

A number of important breakthroughs in the past decade have focused attention on Si as a photonic platform. We review here recent progress in this field, focusing on efforts to make lasers, amplifiers, modulators and photodetectors on or in silicon. We also describe progress in silicon photonic integrated circuits. The impact active silicon photonic integrated circuits could have on interconnects, telecommunications and on silicon electronics is reviewed.

Biography

John Bowers holds the Fred Kavli Chair in Nanotechnology, and is the Director of the Institute for Energy Efficiency and a Professor in the Departments of Electrical and Computer Engineering and Materials at UCSB. He is a cofounder of Aurrion, Aerius Photonics and Calient Networks. Dr. Bowers received his M.S. and Ph.D. degrees from Stanford University and worked for AT&T Bell Laboratories and Honeywell before joining UC Santa Barbara. Dr. Bowers is a member of the National Academy of Engineering and a fellow of the IEEE, OSA and the American Physical Society. He is a recipient of the OSA/IEEE Tyndall Award, the OSA Holonyak Prize, the IEEE LEOS William Streifer Award and the South Coast Business and Technology Entrepreneur of the Year Award. He and coworkers received the EE Times Annual Creativity in Electronics (ACE) Award for Most Promising Technology for the hybrid silicon laser in 2007.

Bowers' research is primarily in optoelectronics and photonic integrated circuits. He has published ten book chapters, 600 journal papers, 900 conference papers and has received 54 patents. He has published 180 invited papers and conference papers, and given 16 plenary talks at conferences.

Robert Alfano
CUNY-CCNY, USA

2013 Arthur L. Schawlow Prize in Laser Science Recipient

Optical physics discoveries using ultrafast lasers

Abstract

The talk will review some salient breakthrough contributions in three topics in the field of ultrafast laser science, including the discovery of supercontinuum generation, discovery of new laser tunable Cr materials, as well as the study of pulse propagation, the key lengths of absorption, scattering ,and transport scattering and imaging of objects in strongly scattering media using several optical gates.

Biography

Robert R. Alfano, Distinguished Professor of Science and Engineering at The City College of the City University of New York, has contributed significantly to the field of ultrafast laser science and is a pioneer in the application of light and photonics technologies to the study of biological, biomedical and condensed matter systems. His contributions to these fields are documented in over 730 research articles, 111

patents, several edited volumes and proceedings, and over 12,400 citations. His crowning research achievements include discovery of supercontinuum, development of new tunable Cr3+/Cr4+ lasers, advance of laser spectroscopic and optical imaging techniques, and study of ultrafast optical pulse propagation and imaging in scattering media. He is a fellow of APS, OSA, IEEE, NY Academy of Science, and Alfred P. Sloan fellow. He has received his B.S. and M.S. in physics in 1963 and 1964 from Fairleigh Dickinson University and Ph.D. in physics from New York University in 1972. He spent 8 years at GTE Labs (now Verizon) from 1964 to 1972 before joining CCNY at 1972. He has received OSA Charles Hard Townes Award in 2008, Association of Italian American Educators Lifetime Achievement Award in 2012, and SPIE Britton Chance Biomedical Optics Award in 2012.

APS/Division of Laser Science Awards and Honors

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

APS/Division of Laser Science Fellowships

Arthur L. Schawlow Prize
Recipient: Robert R. Alfano, CUNY City College, U.S.A.

OSA Awards and Honors

OSA Fellowships

OSA Honorary Member
Donald B. Keck

Esther Hoffman Beller Medal
Recipient: Vasudevan Lakshminarayanan, University of Waterloo, Canada

Michael S. Feld Biophotonics Award
Recipient: Brian C. Wilson, University of Toronto, Canada

Joseph Fraunhofer Award/Robert M. Burley Prize
Recipient: Wade Thomas Cathey, Jr., University of Colorado, U.S.A.

Paul F. Forman Engineering Excellence Award
Recipient: TBA

Robert E. Hopkins Leadership Award
Recipient: Mustafa Abushagur, Libyan Policy Institute, Libya

Emmett N. Leith Medal
Recipient: James R. Fienup, University of Rochester, U.S.A.

Adolph Lomb Medal
Recipient: Andrea Alù, University of Texas at Austin, U.S.A.

C. E. K. Mees Medal
Recipient: Bahaa E. A. Saleh, University of Central Florida, U.S.A.

William F. Meggers Award
Recipient: Louis F. DiMauro, The Ohio State University, USA

R. W. Wood Prize
Recipient: Milton Feng, University of Illinois at Urbana-Champaign, USA –

FiO Invited Speakers

FiO 1: Optical Design and Instrumentation

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

- **Optical Reconstruction of Computer Generated Holograms by a Binocular Holographic Projection 3D Display**, Hwi Kim; *Korea Univ., Korea*

- **Computational Imaging On a Chip,** Aydogen Ozcan; *UCLA, USA*

- **Acceleration Techniques for Computer Holography**, Tomoyoshi Shimobaba; *Chiba Univ, Japan*

1.2: Three-Dimensional Optical Structure Design, Fabrication and Nanopatterning

- **Pattern-Integrated Interference Lithography for 2D and 3D Photonic Crystals,** Thomas K. Gaylord; *Georgia Tech, USA*

- **Three-Dimensional Optical Structure Design and Fabrication by Laser Means**, Minghui Hong; *National Univ. of Singapore, Singapore*

- **Status and Challenges of Three-dimensional Optical Laser Lithography,** Martin Wegener; *Karlsruhe Inst. of Technology, Germany*

1.3: Optical Design with Unconventional Polarization and Complex Optical Fields (Joint with FiO 8)

- **Spinoptical Metamaterials: Spin-controlled Photonics,** Erez Hasman; *Technion-Israel Inst. of Technology, Israel*

- **Light that Spins Inside Fibers: Applications from Microscopy to Telecommunications,** Siddarth Ramachandran; *Boston Univ., USA*

- **Vector Beams and Vector Fields: A Look at Methods of Generation and Potential Applications,** Kimani Toussaint; *UIUC, USA*

- **Multiplexing Information-Carrying Orthogonal Beams using Orbital Angular Momentum States,** Alan Willner; *USC, USA*

1.4: Wavefronts and Aberrations: Engineering, Sensing and Applications

- **Novel Schemes for Modeling and Measuring Coherence and Polarization,** Miguel Alonso; *Univ. of Rochester, USA*

- **Image-based Wavefront Sensing for Telescope Aberrations**, Jim Fienup; *Univ. of Rochester, USA*

1.5: Optical design of Ophthalmic Instruments for Retinal Imaging (Joint with FiO 8)

- **Challenges of High-resolution Ophthalmic Imaging using Multiple Wavelengths,** Alf Dubra, *Medical College of Wisconsin, USA*

- **Structured Illumination for In-Vivo Retinal Imaging,** Steve Gruppetta; *City Univ. of London, UK*

- **Design and Performance of the Indiana Adaptive Optics OCT System,** Donald Miller; *Indiana Univ., USA*

- **Imaging Human Rod and Cone Photoreceptors with Adaptive Optics SLO/OCT**, Michael Pircher; *Medical Univ. of Vienna, Austria*

- **Perils, Pitfalls, Precautions and Possibilities of Building Advanced Optical Systems for Ophthalmic Applications,** Austin Roorda; *University of California, Berkeley, USA*

1.6: General Optical Design and Instrumentation

3.3 Microscopy and OCT (Joint with FiO 3)

FiO 2: Optical Sciences

2.1 Frequency Comb Science and Technology

- **Tutorial: Optical Frequency Combs from A to Z**, Scott Diddams, *National Inst of Standards & Technology, USA*

- **Low-Noise, GHz Repetition-rate Femtosecond Lasers and Combs: Implementation and Applications,** Franz X. Kärtner; *Massachusetts Inst. of Technology, USA and DESY Hamburg, Germany*

- **Microresonator Based Optical Frequency Combs: Soliton Mode Locking and Extension to the Mid-IR,** Tobias Kippenberg; *Ecole Polytechnique Federale de Lausanne, Switzerland*

2.2 Extreme Light Sources and Laser-driven Particle Accelerators

- **Compton Scattering Gamma-ray Sources and Applications in Nuclear Photonics,** Felicie Albert; *Lawrence Livermore National Laboratory, USA*

- **Challenges and Progress of Laser-driven Ion Acceleration Beyond 100 MeV/amu,** Daniel Jung; *Los Alamos National Laboratory, USA*

- **X-ray Generation via Laser Compton Scattering Using Electron Beam Driven by Laser-Plasma Acceleration**, Eisuke Miura, *AIST*

- **Dynamics of Relativistically Oscillating Mirrors**, Matt Zepf; *Queen's University of Belfast, UK*

2.3 Peak and Average Power Bottlenecks for Fiber Lasers (Joint with FiO 5)

- **Recent Progress in the Understanding and Mitigation of Mode Instabilities,** Cesar Jauregui; *Friedrich Schiller University in Jena, Germany*

- **Tutorial: Stimulated Brillouin Scattering in Optical Fibers and Amplifiers: Theory, Applications and Implications,** Marc Mermelstein; *OFS Laboratories, USA*

- **High Peak and Average Power Ultrafast Fiber Lasers,** Andreas Tünnermann; *Univ. of Jena, Germany*

- **The Optical Phase and Single Frequency Fiber Amplifiers: Coupling Mechanisms and their Application**, Henrik Tunnermann; *Laser Zentrum Hannover, Germany*

2.4 High-field Physics

- **Towards the Experiments on High Field Physics**, Stepan Bulanov; *Lawrence Berkeley National Laboratory, USA*

- **Tutorial: Attosecond Light Switches,** Zenghu Chang; *Univ. of Central Florida CREOL, USA*

2.5: General Optical Sciences

- **High Pulse Repetition Rate Lasers Modelocked with Quantum Dot SESAMs**, Bojan Resan; *Time-Bandwidth Products, Switzerland*

FiO 3: Optics in Biology and Medicine

3.1 Translational Biophotonics – Focus on Pathology and Diagnostics

- **Title to be Announced**, Andrew Rollins; *Case Western Reserve University, USA*

- **Multi-scale and Multi-contrast Photoacoustic Microscopy,** Junjie Yao; *Washington Univ. in St. Louis, USA*

- **Feasibility of using Nonlinear Excitation in Human Clinical Imaging Applications**, Warren Zipfel; *Cornell Univ., USA*

3.2 Microscopy and OCT (Joint with FiO 1)

- **Compressive X-ray Tomography,** David Brady; *Duke Univ, USA*

- **Dissecting Tumor Biology Using Intravital Microscopy and Optical Frequency Domain Imaging,** Dai Fukumura; *Harvard Medical School, USA*

3.3 Optical Trapping and Manipulation

- **Plasmonics on Nanostructures for Cell Manipulation,** Alexander Heisterkamp; *Friedrich-Schiller-University Jena, USA*

- **Optical Tweezers and Single Molecule Techniques**, Matthew Lang; *Massachusetts Institute of Technology, USA*

3.4 Lab-on-a-chip and Optofluidics

- **Plasmonic Biophotonics,** Luke Lee; *University of California Berkeley, USA*

- **High-throughput C. Elegans Screening,** Mehmet Fatih Yanik; *Massachusetts Institute of Technology, USA*

3.5 Experimental Methods for Tissue Imaging and Therapy

- **Morphological and Functional Imaging of the Cochlea with Optical Coherence Tomography**, Brian Applegate; *Texas A&M University, USA*

- **Optical Imaging of Cerebral Oxygen Delivery and Consumption Across Length Scales,** David Boas; *Harvard Medical School, USA*

3.6 General Optics in Biology and Medicine

- **Biomaterial Photonics,** Andy Yun; *Harvard Medical School, USA*

5.2 Fibers for Biomedical Applications (Joint with FiO 5)

FiO 4: Optics in Information Processing

4.1 Optical System Design for Information Optics

- **System Optimization of Compact Monocentric Lens Imagers,** Joe Ford; *UCSD, USA*

- **Optical Design for Computational Imaging Instruments,** Dan Marks; *Duke University, USA*

- **Tutorial: Transformation Optics for Imaging,** David Schurig; *University of Utah, USA*

4.2 Coherence and Quantum Imaging

- **Recent Progress in Quantum Imaging and Ghost Imaging,** Robert Boyd, *University of Rochester, USA*

- **Stochastic Sensing in Random Electromagnetic Fields,** Aristide Dogariu, C*REOL, Univ. of Central Florida, USA*

- **Wigner Distribution: Friend to Biophotonics**, Adam Wax, *Duke University, USA*

4.3 Image and Information Processing in Bio-optics (Joint with FiO 3)

- **Ultrahigh Throughput Single Cell Imaging**, Bahram Jalali; *UCLA, USA*

- **Deep Focusing of Light in Tissues by Optoelectronic Time-reversal,** Changhuei Yang; *Caltech, USA*

4.4 Imaging/Sensing Over Non-spatial Dimensions

- **Compressive Phase Space Tomography**, George Barbastathis; *MIT, USA*

4.5 Analysis Techniques, Signal Recovery, and Synthesis

- **Ptychography and High Dimensional Phase Retrieval,** Stefano Marchesini, *Lawrence Berkeley National Laboratory, USA*

- **Scattered and Stray Light as Scene Encoding,** Yoav Schechner; *Technion, Israel*

4.6 General Optics in Information Science

FiO 5: Fiber Optics and Optical Communications

5.1 Optical Fibers from Novel Materials

- **Tutorial: Multimaterial Fibers in Photonics and Nanotechnology,** Ayman Abouraddy; *UCF*

- **Intrinsically Low Brillouin Gain Fibers (How Low Can You Go?,** Pete Dragic; *University of Illinois, USA*

- **Transverse Anderson localization in disordered optical fibers**, Arash Mafi; *Univ. of Wisconsin, USA*

5.2 Fibers for Biomedical Applications (Joint with FiO 3)

- **Dispersive Fourier Transformation and Application to Cancer Detectionn,** Keisuke Goda; *UCLA, USA*

- **Fiber-optic Multiphoton Endomicroscopyy**, Xingde Li; *Johns Hopkins, USA*

- **Fiber-optic Probes for Deep Tissue Imaging - a Microscope in a Needle**, David Sampson; *University of Western Australia, Australia*

- **Microimaging: Seeing the Unseen in Living Patients**, Kenneth Chu; *Harvard Medical School / Massachusetts General Hospital, USA*

5.3 Optical Fiber Sensing

- **Multifuncional Fiber Optic Sensors for High Energy Physics Experiments at Cern**, Andrea Cusano; *Università del Sannio, Italy*

- **Sensing the Earth Crustal Deformation with Fiber Optics**, Zuyuan He; *Shanghai Jiao Tong University, China*

5.4 Fiber-Based Generation and Delivery of Novel Optical Sources

- **Transport of Multimode-entangled Photons through Optical Fibers**, Wolfgang Löffler; *Huygens Laboratory, Leiden University, Netherlands*

- **Combining Photonic Sources to Produce Entanglement,** Viriginia Lorenz; *University of Delaware, USA*

- **Ultra-stable Long Distance Optical Frequency/Time Distribution Using the Internet Network,** Giorgio Santarelli; *LNE-SYRTE CNRS Paris, France*

5.5 Emerging Transport, Amplification, and Signal Processing for Telecommunications

- **Phase-sensitive Fiber-optic Parametric Amplifiers and their Applications,** Peter Andrekson; *Chalmers University of Technology, Sweden*

- **Novel Fiber Designs for Nonlinear Optical Signal Processing**, John Fini; *OFS Laboratories, USA*

- **Optical Amplifiers for Cost and Energy Efficient Spatial Division Multiplexing**, Peter Krummrich; *Dortmund University of Technology, Germany*

- **Nonlinear Propagation in MMF with Random Mode Coupling,** Antonio Mecozzi; *University of L'Aquila, Italy*

5.6 General Fiber Optics and Optical Communications

2.3 Peak and Average Power Bottlenecks for Fiber Lasers (Joint with FiO 2)

FiO 6: Integrated Photonics

6.1 Silicon Photonics

- **Silicon Photonic Integrated Circuits for Coherent Transmission,** Po Dong; *Bell Labs, Alcatel-Lucent, USA*

- **Silicon Photonics,** Michal Lipson; *Cornell University, USA*

- **Tutorial: Mid-IR Nonlinear Integrated Silicon Photonics,** Richard Osgood; *Columbia University, USA*

- **Options for Silicon Based Modulators,** Graham Reed; *University of Southampton, UK*

6.2 Hybrid Integrated Photonics

- **Hybrid Integration for Beyond 100Gb/s,** Mark Earnshaw; *Bell Labs, Alcatel-Lucent, USA*

- **Hybrid Integrated Chip-scale Interconnects - Overcoming the Packaging and Density Challenges**, Michael Haney; *University of Delaware, USA*

- **Silicon Organic Hybrid (SOH) Integration and Photonic Wire Bonding: Enabling Technologies for Heterogeneous Photonic Systems,** Christian Koos; *Karlsruhe Institute of Technology*

- **Graphene Modulators,** Xiang Zhang; *University of California, Berkeley, USA*

6.3 Waveguide Integrated Optics

- **Tutorial: Low-energy Optoelectronics for Interconnects,** David Miller; *Stanford University, USA*

- **CMOS Compatible Electro-optic Modulators and Linear Modulation Techniques,** Douglas M. Gill; *IBM Thomas J. Watson Research Center, USA*

- **Advancements in Plasmonic and Graphene-based High-performance Modulators,** Volker Sorger; *George Washington University*

- **New Directions for Micro Cavity Physics,** Kerry Vahala; *California Institute of Technology, USA*

6.4 Photonic Crystals

- **Photonic Crystal Modulators and Related Slow Light Devices in Si Photonics,** Toshihiko Baba; *Yokohama National University, Japan*

- **Nanocavity optomechanics for coupling to quantum systems,** Paul Barclay; *University of Calgary*

- **Photonic Crystal Laser for Optical Interconnects,** Shinji Matsuo; *NTT Photonics Laboratories, Japan*

- **Photonic-Crystal Resonant Effects for Broad-Area Coherent-Lasers and Highly-Efficient Solar Cells**, Susumu Noda; *Kyoto University, USA*

- **Photonic Crystal Layers,** Jelena Vuckovic; *Stanford University, USA*

6.5 Plasmonics and Nanophotonics

- **Graphene Nano-optoelectronics,** Frank Koppens; *ICFO - The Institute of Photonic Sciences, Spain*

- **Active Plasmonic Metamaterials and Greatly Enhanced Light Absorption by Monolayer Graphene,** Zhaolin Lu; *Rochester Institute of Technology, USA*

- **Graphene Nonlinear and Ultrafast Optoelectronics: Stepping up to the Surface,** Chee Wei Wong; *Columbia University, USA*

- **Mid-infrared Plasmons in Graphene Nanostructures**, Fengnian Xia; *IBM Thomas J. Watson Research Center, USA*

6.6 General Integrated Photonics

- **Tutorial: Nanophotonics Technology and Applications,** Yeshaiahu Fainman; *University of California, San Diego, USA*

- **Optical Paramteric Generation in Laser Diodes**, Amr Helmy; *University of Toronto, Canada*

FiO 7: Quantum Electronics

7.1 Integrated Quantum Optics

- **Engineering the Coherent, Thermal and Quantum State of Light using Metamaterials**, Zubin Jacob; *Univ. of Alberta, Canada*

- **Singe-photon-single-molecule Quantum Optics**, Vahid Sandoghdar; *Max Planck Institute for the Science of Light, Germany*

- **Photonic Quantum Circuits and Quantum Metrologies,** Shigeki Takeuchi; *Hokkaido University, Japan*

7.2 Quantum Communications, Quantum Systems and Quantum-enabled Sensors

- **Entanglement and State Transfer in 3-mode Optomechanical Systems,** Aashish Clerk; *McGill Univ., Canada*

- **Non-standard Optical Receivers that Attain the Quantum Limit of Optical Communication Capacity,** Saikat Guha; *BBN Technologies, USA*

- **Network-Centric Quantum Communications,** Richard Hughes; *Los Alamos National Laboratory, USA*

- **Negative Refraction and Negative Radiation Pressure at Visible and UV Frequencies**, Henri Lezec; *National Inst of Standards & Technology, USA*

7.3 Nonlinear Optics in Micro/Nano-Optical Structures

- **Nonlinear Photonic Crystal Waveguides**, Gadi Eisenstein; *Technion Israel Inst. of Technology, Israel*

- **Nonlinear Nano-Photonics,** Wolfgang Freude; *Karlsruher Institut fur Technologie, Germany*

- **Synthesis of Active, Nonlinear and Quantum Photonic Circuits,** Milos Popovic; *University of Colorado, USA*

- **Producing Octave-wide Combs and Few-cycle Pulses in the Mid-infrared: Frequency Divide-and-conquer Approach**, Kostantin Vodopyanov; *CREOL, College of Optics and Photonics, Univ. of Central Florida., USA*

7.4 Optics and Photonics of Disordered Systems

- **Optics and Photonics of Disordered Systems**, Aristide Dogariu; *Univ. of Florida, CREOL, USA*

- **Anderson Localization in Low-dimensional Structures for Cavity Quantum Electrodynamics and Random Lasing**, Pedro David Garcia-Fernandez

- **Molding the Flow of Light in Disordered Active Nanostructures,** Marco Leonetti; *ICMM, Spain*

- **Laser Action in Organic Semiconductors;** Valy Vardeny; *Univ. of Utah, USA*

7.5 Quantum and Classical Phenomena in Non-plasmonic Polaritonic Systems

- **Bright Polariton Solitons and Soliton Trains,** Maksym Sich; *Univ. of Sheffield, UK*

- **Polariton-solitons**, Dmitry Skryabin*; Univ. of Bath, UK*

7.6 General Quantum Electronics

FiO 8: Vision and Color

8.1 Ultrafast Laser Applications for the Eye

- **SH Imaging of Cross-linked Corneas,** Chen-Yuan Dong; *National Taiwan University, Taiwan*

- **Noninvasive Vision Correction: A New Approach,** Wayne Knox; *University of Rochester, USA*

- **New Insight into Corneal Micro-structure with Polarization-resolved Second Harmonic Generation Microscopy,** Gaël Latour; *Laboratory for Optics and Biosciences, Ecole Polytechnique, CNRS, INSERM, France; Laboratoire Imagerie et Modélisation en Neurobiologie et Cancérologie, Université Paris Sud, CNRS, France*

8.2 Restoring Vision and the Future of Retinal Implants

- **Tutorial: Optical and Electronic Approaches to Restoration of Sight to the Blind,** Daniel Palanker, *Stanford University, USA*

8.3 Applications of Physiological Optics to Vision and Color

1.3 Optical Design with Unconventional Polarization and Complex Optical Fields (Joint with FiO 1)

1.5 Optical Design of Ophthalmic Instruments for Retinal Imaging (Joint with FiO 1)

LS Invited Speakers

1. Fundamentals and Applications of Photonic Crystals

- **Photonic Crystal Nanolasers for Sensing Applications,** Toshihiko Baba; *Yokohama National Univ., Japan*

- **A Diamond Quantum Photonic Interface for Nitrogen Vacancy Solid State Qubits,** Dirk Robert Englund; *Columbia Univ., USA*

- **Photonic Crystal Waveguides: From Passive to Active, from Even to Odd, and from Rough to Fine,** Wei Jiang; *Rutgers Univ., USA*

- **The Good Bits and Pieces of Microstructured Fibers,** Jonathan C. Knight; *Univ. of Bath, UK*

- **Photonic Crystals as Resonant Surfaces,** Thomas F. Krauss; *Univ. of St Andrews, UK*

- **Femtojoule-per-bit Optical Communication in a Photonic Crystal Chip,** Masaya Notomi; *NTT Basic Research Laboratories, Japan*

- **Experimental Demonstration of Light-assisted Templated Self Assembly Using a Photonic-crystal Slab,** Michelle Lynn Povinelli; *Univ. of Southern California, USA*

- **Multi-hole Defect Photonic Crystals with Enhanced Surface Area for Biosensing Applications,** Sharon M Weiss; *Vanderbilt Univ., USA*

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

- **Plasmon-enhanced Fluorescence Permits Super-resolution Imaging in vitro and in Cells**, Julie Biteen; *Univ. of Michigan, USA*
- **Silicon Photonic Crystal Open Sensors for High Sensitivity Multiplexed Chem-Bio Sensing**, Swapnajit Chakravarty; *Omega Optics, Inc, USA*
- **Smartphone Based Chemical and Molecular Diagnostics,** David Erickson; *Cornell Univ., USA*
- **Quantitative, Functional Biomarkers of Stem Cell Differentiation in 3D using Multi-modal Non-linear Imaging with Endogenous Contrast,** Irene Georgakoudi; *Tufts Univ., USA*
- **Advances in Terahertz Medical Imaging**, Warren S. Grundfest; *Univ. of California Los Angeles, USA*
- **Waveguide Biosensors for Medical Diagnostics**, Harshini Mukundan; *Los Alamos National Laboratory, USA*
- **Optofluidic Integration for Single-particle Analysis**, Holger Schmidt; *Univ. of California Santa Cruz, USA*

3. Solid-State Quantum Optics

- **Quantum Information, Laser Frequency Stabilization, and Optical Signal Processing with Rare-Earth Doped Materials**, Rufus L. Cone; *Montana State Univ., USA*
- **Enhancing Magnetometry with Single Spins in Diamond**, M. V. Gurudev Dutt; *Univ. of Pittsburgh, USA*
- **Quantum Information Processing with NV Centers at Room Temperature**, Liang Jiang; *Yale Univ., USA*
- **Quantum Memory via Phase-matching Control,** Olga Kocharovskaya; *Texas A&M Univ., USA*
- **Nanoscale Nuclear Magnetic Resonance,** John Mamin; *IBM Research Division, Almaden Research Center, USA*
- **Towards a Long-Lived Quantum Memory for Single Photons in Rare Earth Doped Crystals**, Alan L. Migdall; *National Inst of Standards & Technology, USA*

- **Technologies for Ultralow Power Integrated Nonlinear Optical Circuits,** Jason Pelc; *Hewlett Packard Company, USA*

4. Cold Atoms and Molecules

- **Experiments on Bose-Einstein Condensates in Synthetic Spin-Orbit and Gauge Fields: Transport and Dynamics,** Yong Chen; *Purdue Univ., USA*

- **Atom Interferometry: From Practical Applications to Fundamental Tests of Gravity and Quantum Mechanics**, Paul Hamilton; *Univ. of California Berkeley, USA*

- **Optical Feshbach Resonances and Coherent Photoassociation in a Strontium BEC**, Thomas C. Killian; *Rice Univ., USA*

- **Impurities in Ultracold Fermi Gases**, Han Pu; *Rice Univ., USA*

- **Spin Transport in a Unitary Fermi Gas**, Joseph H Thywissen; *Univ. of Toronto, Canada*

- **Superfluid Circuits of Ultra-cold Atoms,** Kevin Wright; *Dartmouth College, USA*

5. Optics and Alternative Energy Sources

- **Solar Cells as Light Emitters: The Key to Record Efficiencies and Approaching the Shockley-Queisser Limits,** Owen Miller; *Univ. of California Berkeley, USA*

- **Spontaneous Hyper-Emission, Optical Antenna-Accelerated Spontaneous Emission**, Ming Wu; *Wuhan National Lab for Optoelectronics, China*

6. Attosecond and Strong Field Physics

- **Sub-cycle Electron Dynamics Probed by Isolated Attosecond Pulses**, Michael Chini; *Univ. of Central Florida, USA*

- **Attoclock Reveals a Real and Not Instantaneous Electron Tunneling Time with a Probability Distribution,** Ursula Keller; *ETH Zurich, Switzerland*

- **Attosecond Spectroscopy on Surfaces and Interfaces**, Reinhard Kienberger; *Max-Planck-Institut fur Quantenoptik, Germany*

- **All Optical Measurement of Arbitrary Optical Waveforms,** Kyung Taec Kim; *Univ. of Ottawa, Canada*

- **Attosecond Transient Absorption of Field-manipulated Excited States**, Stephen R. Leone; *Univ. of California Berkeley, USA*

- **Generation and Application of Intense High Harmonics and Attosecond Pulses**, Katsumi Midorikawa; *RIKEN, Japan*

- **Development and Applications of a Femtosecond PW Laser at Center for Relativistic Laser Science,** Chang Hee Nam; *Gwangju Inst of Science & Technology, South Korea*

- **Attosecond Pulses for the Investigation of Electron Dynamics: from Diatomic Molecules to Biomolecules**, Mauro Nisoli; *Politecnico di Milano, Italy*

- **Probing Chiral Molecules by High Harmonic Generation,** Ravi Bhardwaj; *Univ. of Ottawa, Canada*

- **Toward High Energy Attosecond Laser Pulse Driven with High Contrast Ratio Ultrastrong Femtosecond Laser**, Zhiyi Wei; *CAS Institute of Physics, China*

7. Ultrafast Chemical Dynamics

- **Strong Laser Field Strategies to Control Reaction Dynamics**, Luis Bañares; *Universidad Complutense de Madrid, Spain*

- **Femtosecond Time-Resolved X-ray Photoelectron Spectroscopy Studies of Charge Transfer in Dye-Sensitized Semiconductor Nanocrystals**, Oliver Gessner; *Lawrence Berkeley National Laboratory, USA*

- **Delayed Ultrafast X-ray Induced Auger Probing**, Markus Guehr; *PULSE Institute, Stanford Univ., USA*

- **Theory of High-order Harmonic Generation from Vibrating Polyatomic Molecules**, Chii Dong Lin; *Kansas State Univ., USA*

- **Tunneling Ionization and Fragmentation of Molecules in Strong Laser Fields,** Lars Madsen; *Aarhus Universitet, Denmark*

- **Simulation of Laser Induced Quantum Dynamics of the Electronic and Nuclear Motion in the Ozone Molecule on the Attosecond Time Scale,** Ágnes Vibók; *Univ. of Debrecen, Hungary*

- **Where Are the Electrons? Charge Transfer and Dissociation from a Femtosecond Electronic-structure Perspective,** Philippe Wernet; *Helmholtz-Zentrum Berlin, Germany*

- **Imaging Ultrafast Dynamics Using Laser-Induced Electron Diffraction,** Junliang Xu; *Ohio State University, USA*

8. Physics with Ultrafast X-rays

- **Clusters in Intense X-ray Pulses,** Christoph Bostedt*; SLAC, USA*
- **One and Two Color Pump-probe Spectroscopy in the X-ray Regime,** Ryan Neal Coffee; *SLAC National Accelerator Laboratory, USA*
- **Probing the Fastest Spin, Charge and Energy Flow Processes in Advanced Materials using Ultrafast X-rays,** Henry C. Kapteyn; *Kapteyn-Murnane Laboratories, USA*
- **Mapping Electronic States and Associated Dynamics of Non-linearly Ionised Atoms and Molecules,** Melanie Mucke; *Uppsala Universitet, Sweden*
- **Fragmentation Pathways of Molecules Multiply Ionized by Pulses from the LCLS Intense X-ray Laser,** Timur Osipov; *Western Michigan University, USA*
- **Consequences of Massive Ultrafast Electron Removal in Atomic and Molecular Clusters**, Jan Michael Rost; *Max-Planck-Inst Physik des Lichts, Germany*
- **Charge and Energy Transfer in Dissociating Molecules upon Core-Shell Photoionization,** Artem Rudenko; *Kansas State University, USA*
- **Nonlinear Excitation of Neon Using the FEL FERMI@ELETTRA,** Giuseppe Sansone; *Politecnico di Milano, Italy*
- **Transient Core level Spectroscopy at M-edges of 3D Metals**, Emily Frances Sistrunk; *SLAC National Accelerator Laboratory, USA*
- **SACLA: New Opportunities for Atomic, Molecular, and Cluster Science with XFEL**, Kiyoshi Ueda; *Tohoku Univ., Japan*

9. Precision Measurements and Metrology Using Lasers

- **Optical Lattice Clocks with Performance Approaching 1e-17**, Ben Bloom; *Univ. of Colorado at Boulder JILA, USA*
- **High Gradient Acceleration of Electrons in a Laser-driven Dielectric Accelerator**, Robert L Byer; *Stanford Univ., USA*
- **Determination of System Hamiltonian with Multi-dimensional Spectroscopy**, Steven T. Cundiff; *Univ. of Colorado at Boulder JILA, USA*
- **Comparison of Sr Optical Lattice Clocks at the 10-16 Level,** Jérôme Lodewyck; *Institut d'Optique, France*

- **Quantum Optics and Optomechanics in Gravitational Wave Detectors,** Nergis Mavalvala; *Massachusetts Institute of Technology, USA*

- **Precision Measurements using Atoms and Photons**, Holger Müller; *Univ. of California Berkeley, USA*

- **Optical Atomic Clocks and the Quest for Ultrastable Lasers,** Fritz Riehle*; Physikalisch Technische Bundesanstalt, Germany*

- **The H2 Molecule; Test of QED and Varying Constants**, Wim Ubachs; *Vrije Universiteit, Amsterdam , Netherlands*

- **Spin Squeezing, Cavity QED and Quantum Optics,** Vladan Vuletic; *Massachusetts Institute of Technology, United Stated*

10. Quantum Information with Photons

- **Weak Values and Direct Measurement of the Quantum Wavefunction**, Robert W. Boyd; *Univ. of Ottawa, Canada*

- **Raman Scattering for Quantum Technologies,** Duncan England; *National Research Council Canada, Canada*

- **Nonlinear Optics at the Few Photon Level,** Alexander L. Gaeta; *Cornell Univ., USA*

- **Ultrafast Coherent Control of an Ultracold Rydberg Gas**, Kenji Ohmori; *Institute for Molecular Science, Japan*

- **Seeing with Diamonds: from Quantum Sensing to Bionic Eyes,** Steven Prawer, *Univ. of Melbourne, Australia*

- **Micro-macro Entanglement,** Christoph Simon; *Univ. of Calgary, Canada*

- **Rydberg-Mediated Quantum Manipulation of Atom Pairs and Ensembles,** Thad G. Walker; *Univ. of Wisconsin-Madison, USA*

11. Nano-opto-mechanics

- **Brillouin MEMS and Microfluidic Optomechanics,** Tal Carmon; *Univ. of Michigan, USA*

- **Experimental Demonstration of Squeezed Light Using Optomechanics**, Simon Gröblacher; *Austrian Academy of Sciences, Austria*

- **Cavity Optomechanics: Controlling Mechanical Motion with Radiation Pressure,** Tobias J.A. Kippenberg; *Ecole Polytechnique Federale de Lausanne, Switzerland*

- **Title to be Announced,** Marko Loncar; *Harvard Univ., USA*
- **Title to be Announced,** Oskar Jon Painter; *California Institute of Technology, USA*
- **Integrated Electo-opto-mechanical Resonators on Silicon Chip**s, Hong Tang; *Yale Univ. , USA*

12. General Laser Science

Special Symposia

Symposium on Advanced Distributed Optical Fiber Sensor Systems for Security and Safety Applications

Organizers: Fabrizio Di Pasquale, *Scuola Superiore Sant'Anna, Italy*; Morten Ibsen, *University of Southampton, UK*

Distributed optical fiber sensors are becoming key technologies for security and safety in strategic industrial and civil sectors such as energy production, railway and roadway transportation, and health monitoring large civil and industrial infrastructures. This symposium will focus on recent developments in distributed sensing measurement techniques, representing the most advanced progress in the field, including recent research and industrial developments.

Invited Speakers:

- **Differential Gain in Distributed Brillouin Sensors,** Xiaoyi Bao; *University of Ottawa, Canada*
- **Rayleigh Scatter Based High Resolution Distributed Fiber Sensing for Safety and Security Applications,** Dawn Gifford; *Luna Technology, USA*
- **Brillouin Optical Correlation Domain Distributed Fiber Sensors,** Kazuo Hotate; *University of Tokyo, Japan*
- **Single End Hybrid Brillouin-Rayleigh Technology and its Industrial Applications,** Kinzo Kishida;*Neubrex, Japan*
- **High-sensitivity Distributed Fiber Sensors Based on Brillouin Dynamic Gratings,** Kwang-Yong Song; *Chung-Ang University, South Korea*
- **Hybrid Fiber Optic Sensors for Simultaneous Distributed and Dynamic Discrete Measurement,** Alessandro Signorini; *Scuola Superiore Sant'Anna, Pisa, Italy*
- **Advanced Pulse Coding Techniques for Distributed Optical Fiber Sensors,** Marcelo A. Soto; *EPFL Swiss Federal Institute of Technology, Switzerland*

- **Optical Fibre Sensing Networks for Railway Monitoring,** Hwa Yaw Tam; *Hong Kong Polytechnic University, Hong Kong*

- **Recent Advances in Polarization Sensitive OTDR for Sensing Applications,** Marc Wuilpart; *Mons Polytec, Belgium*

- **Field Application of Coherent Probe-pump Based Brillouin Optical Time Domain Analysis Sensor,** Lufan Zou; *OZ Optics, Canada*

Symposium on Functional Imaging of Visual Systems

Organizer: Jennifer Hunter, *University of Rochester, USA*

Understanding the process of vision is critical for our understanding of normal ocular function and its malfunction in disease. New techniques are making possible in vivo analysis of retinal function. In addition to discussing the cutting-edge optical techniques required, this symposium highlights their important scientific findings.

Invited Speakers:

- **Toward Spectral Classification of Single Photoreceptors by Psychophysics**, Lawrence Sincich, *University of Alabama, Birmingham, USA*

- **Functional Imaging of Hemodynamics in the Rat Retina with Optical Coherence Tomography,** WooJhon Choi; *Massachusetts Institute of Technology, USA*

- **Molecular Imaging of the Visual Cycle**, Kris Palczewski, *Case Western University, USA*

- **Measuring Single-cell Blood Velocity in the Living Eye: Adaptive Optics Reveals Micro- and Macrovascular Function**, Jesse Schallek, *University of Rochester, USA*

- **Intrinsic Signal Functional Imaging of the Retina: Outer Retinal Origins** , Daniel Ts'o, *Upstate Medical University, USA*

- **Intrinsic Optical Signal Imaging of Retinal Function,** Xin-Cheng Yao; *University of Alabama, Birmingham, USA*

- **Optical Recording of the Light Response of Ganglion Cells in the Living Eye**, Lu Yin; *University of Rochester, USA*

Symposium on the 100th Anniversary of the Bohr Atom: Niels Bohr's Nutcracker

Organizer: Charles Clark, *NIST, USA*

In July 1913, Niels Bohr transformed the understanding of light and matter. Though his simple idea seems obvious to us today, it was unprecedented at the time: take the quantization rule that Planck and Einstein had used to describe the energy of light, and apply it to the mechanical motion of particles in atoms. Since Planck's constant *h* has the dimensional units of angular momentum, Bohr suggested that it provide the basis of angular momentum quantization: $L = nh / 2\pi$, for $n = 1, 2, 3, \ldots$ without end. Bohr found that this reproduced, within experimental uncertainties, the wavelengths of all 33 emission lines of atomic hydrogen that were then known, and it also showed that a number of other lines ascribed to hydrogen were actually due to He^+. It predicted additional lines in the extreme ultraviolet, which were discovered in 1914 by Theodore Lyman, and in the infrared, found in subsequent years by Brackett, Pfund and Humphries. Bohr-like transitions have been observed in the interstellar medium for $n > 1000$, so his model give an accurate description of atomic line radiation acorss nearly nine decades of frequency in the electromagnetic spectrum. Although his specific atomic model was superseded by quantum mechanics, Bohr's basic concept endures and is often a useful guide to understanding new aspects of atomic, molecular and optical physics.

Invited Speakers:

- **Niels Bohr's Nutcracker,** Charles W. Clark; *Joint Quantum Institute*, *National Institute of Standards and Technology and University of Maryland*, *USA*

- **Quantum Interference of Clusters and Large Molecules**, Nadine Dörre; *Vienna Center for Quantum Science and Technology, University of Vienna, Austria*

- **The Quantum World of a Rydberg Electron in Atoms and Exotic Molecules**, Chris H. Greene; *Purdue University, USA*

- **Determination of the Antiproton-to-electron Mass Ratio by Two-photon Laser Spectroscopy of Antiprotonic Helium Atoms,** Masaki Hori; *Max-Planck Institute for Quantum Optics, USA*

Symposium on Photonics for Quantum Information Processing

Organizer: Michael Raymer, *University of Oregon, USA* and Ian Walmsley*, Oxford University, UK*

The theme of the Symposium focuses on photonic components and architectures for a quantum information processing network. Topics include quantum optics techniques for storing, manipulating, and detecting photonic qubits, such as quantum frequency conversion; single-photon pulse shaping; atomic and solid-state quantum memories; hybrid quantum-information systems; fiber and on-chip waveguide quantum information systems; optomechanics for quantum information.

Invited Speakers:

- **Programmable Optical Quantum Memory with Hot and Cold Gas,** Ben Buchler, *Australian National University, Australia*
- **Tutorial: Quantum Optical Information Networks,** Pieter Kok, *University of Sheffield, UK*
- **Tutorial: Quantum Memories,** Brian Kennedy, *Georgia Tech. University, USA*
- **Tutorial: Quantum Frequency Conversion,** Colin McKinstrie**,** *Alcatel-Lucent Technologies, USA*
- **Arbitrary Interferometric Structures in 3D Integrated Photonics,** Paolo Mataloni, *Sapienza University of Rome, Italy*
- **Nanophotonics and quantum Frequency Conversion,** Kartik Srinivasan; N*ational Inst. of Standards & Technology, USA*

Laser Science Symposium on Undergraduate Research

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

This special DLS annual symposium started in 2001 and has rapidly become one of the most successful DLS traditions. During the past several years the number of undergraduates presenting papers has grown from only 10 to more than 40, and the talks have been of outstanding quality, some absolutely stellar. Last year's posters were outstanding as well, and generated a great deal of lively interest and on-the-spot discussion. This year's symposium will consist of afternoon poster and oral sessions. The event provides an opportunity for some of the student members of our community, who are already among the finest young scientists to be found anywhere, to present their work before an audience of their peers as well as the larger optics community. All are invited and encouraged to attend the sessions.

Submissions

Author Timeline

14 February 2014	**1 Call for Papers**
19 May 2014 12:00 EDT (16.00 GMT)	**2 Papers Submissions Deadline**
May/June 2014	**3 Peer Review**
July 2014	**4 Postdeadline Submissions Open**
11 July 2014	**5 Program Committee Meeting**
The week of 14 July 2014	**6 Author Notification Sent**
21 July 2014	**7 Program Available**

6 October 12:00 EDT (16.00 GMT) 2014	**8 Postdeadine Submissions Deadline**
10 October 2013	**9 Postdeadline Author Notification Sent**
19-23 October 2013	**10 Present at Meeting**

Submission Categories

FiO Topics

FiO 1: Optical Design and Instrumentation

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

Topics of this theme 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 Optical Design with Unconventional Polarization and Complex Optical Fields (Joint with FiO 8)

The polarization of light plays an important role in optical science and engineering. Recently there is an increasing interest in complex optical fields with spatially inhomogeneous state of polarizations and optical singularities. New effects and phenomena have been predicted and observed for light beams with these unconventional polarization states. The topics of this theme include but are not limited to: description and characterization of unconventional polarization states (including radial polarizations, azimuthal polarizations, and other types of polarization vortices); novel devices for the creation and

manipulation of unconventional polarization states and complex optical fields including active unconventional polarization sources; the interaction of unconventional polarized light and complex optical fields with nanostructures (such as atomic and quantum systems, quantum dots and nanoparticples, photonics crystals, optical antennas, plasmonic structures, metasurfaces and metamaterials, etc.); propagation of unconventional polarized light and complex optical fields in free space, waveguides and optical fibers; information processing and transmission with unconventional polarized light and complex optical fields; ray tracing and optical design with spatially variant polarizations; polarization aberrations in optical design and instrumentation, polarizing in tissue scattering, biomedical imaging, and bio-optics; retrieval techniques in imaging polarimetry.

1.4 Wavefronts and Aberrations: Engineering, Sensing and Applications

This theme is intended to promote technical exchange in the sciences and engineering of optical wavefronts and aberrations with broad coverage ranging from theory, algorithm developments, numerical simulations, to hardware implementation and applications. The topics to be covered include but not limited to: aberration theory; orthogonal polynomials in wavefront and aberration analysis, optical design, optical testing and wavefront sensing; orthogonal polynomials descriptions for optical systems with circular, annular, hexagonal, and other pupil shapes; design and fabrication of freeform optics; effective modeling and measurement methods for freeform optics; conventional wavefront sensing techniques; image-based computational wavefront sensing techniques (e.g., phase-retrieval and phase-diversity); compressive sensing techniques; various estimation approaches; applications in adaptive optical systems and optical instrumentation.

1.5 Optical Design of Ophthalmic Instruments for Retinal Imaging (Joint with FiO 8)

The ability to image the living retina with high-resolution has advanced significantly over the past two decades. This theme is intended to provide a forum for researchers to compare and contrast optical design parameters that must be considered when designing and constructing ophthalmic instrumentation for imaging the living retina in clinical and research environments, present innovative optical imaging techniques and discuss parameters requiring optimization for future instruments to facilitate high-fidelity retinal imaging.

1.6 General Optical Design and Instrumentation

Scope includes but not limited to: design of new optical elements and systems, classical optical design methods and software development, fabrication, testing, systems analysis and instrumentation, optical displays, including backlit LCD/LED, 3D, OLED, projection, novel methods, etc. and their applications

FiO 3.2: Microscopy and OCT (Joint with FiO 3)

FiO 2: Optical Sciences

2.1 Frequency Comb Science and Technology

Frequency combs are transitioning from the subject of scientific study to a powerful tool capable of enabling a broad range of new science and technology including precision spectroscopy, stable microwave generation, time and frequency transfer, the search for exoplanets and many others. A critical step in this transition is the development of robust, compact, high-performance comb systems across the visible, UV and IR spectrum. This session will focus on novel new frequency comb designs and applications.

2.2 Extreme Light Sources and Laser-Driven Particle Accelerators

Laser acceleration of electrons and ions can produce high energies and ultrashort pulses in compact devices, potentially enabling new applications from light sources to energy frontier physics. Simultaneously, free electron laser-based light sources are revolutionizing our understanding of materials. Submissions on topics related to these areas, including improved electron injection, increased energies, stability, accelerator staging, and production of secondary radiation, are encouraged.

2.3 Peak and Average Power Bottlenecks for Fiber Lasers (Joint with FiO 5)

Optical fibers provide significant advantages, such as compactness, stability and immunity to environmental effects. Advances in both specially tailored fiber fabrication and pump laser diode technologies paved the way to both high average and high peak power fiber laser development. Recent progress in high-power fiber lasers has revealed limitations due to fundamental physical phenomena. This theme will be devoted to addressing power- and energy-scaling bottlenecks for practically realizable systems.

2.4 High-Field Physics

High-field physics theme covers a broad range of topics related to laser-matter interactions with matter in the intensity range from 10^14 W/cm^2 to ultra-relativistic values of 10^22 W/cm^2, including the characterization and application of attosecond pulses from plasma and atomic media.

2.5: General Optical Sciences

This is a theme encompassing a broad range of optical science topics which do not fit in the other specific themes. Submissions of both experimental and theoretical work are invited, ranging from fundamental to applied research in optical sciences.

FiO 3: Optics in Biology and Medicine

3.1 Translational Biophotonics – Focus on Pathology and Diagnostics

Optical tools have great potential for innovation in pathology and diagnostics. In pathology, new imaging modalities, contrast mechanisms and design improvements could enable novel ways of looking at tissue and diagnosing disease. In addition, optical technologies are entering the operating room and clinic as in situ diagnostics. Previously, technologies such as flow cytometry have revolutionized medical fields such

as hematology. To facilitate translation, discussion will include pathologists who can familiarize scientist and engineers with current practices and technologies and highlight opportunities for advances.

3.2 Microscopy and OCT (Joint with FiO 1)

The fields of optical microscopy and optical coherence tomography remain at the forefront of biophotonics and medical optical imaging. The spatial resolution and exquisite sensitivity of these technologies to sources of both endogenous and exogenous contrast, enable scientists to push the boundaries of what is currently known about the structure and function of in-vitro and in-vivo systems. With use of novel superresolution techniques and a wide array of molecular probes and nanostructures, study of single molecules is possible. Advances in light sources and data-acquisition schemes enable real-time microscopy and OCT. Submissions on innovative technology research and the biological and medical applications of microscopy and OCT, are strongly encouraged.

3.3 Optical Trapping and Manipulation

Optics in biological experiments extends far beyond imaging and can be used to exert forces, change chemistry and alter biological function in cells and molecules. Combined with microscopy and other measurement techniques, these advances in optical trapping and manipulation enable new biological experiments. Optical trapping is an established method for study of single-cell behavior in solution, but recent developments extend the applications and capabilities of this technique. Other optical innovations enable novel manipulations and measurements in cultured cells and in vitro experiments. Submissions on novel techniques and combinations of methods that yield new biological experimental capabilities are highly encouraged.

3.4 Lab-on-a-chip and Optofluidics

The combination of inexpensive optical technologies, optofluidics, microfluidics and cellular technologies has led to novel technologies for biotechnology and medical applications. The potential to use these platforms for on-site diagnostic tests at the bedside or in resource-poor areas across the globe is considerable. In addition, the growth in microfluidic/lab-on-a-chip technologies enables development of novel combined optical/microfluidic approaches to achieve point-of-care diagnostics. Additional applications of these advances are high-throughput research and clinical screening tools. Submissions on innovative optical technologies and methodologies that are deployable, robust, scalable or applicable to the biotech industry are strongly encouraged.

3.5 Experimental Methods for Tissue Imaging and Therapy

Due to the interdisciplinary nature of biophotonics research projects, technologies and methodologies from both biology and optics are being combined to yield groundbreaking findings. This is a broad theme related to tissue and in vivo imaging, spectroscopy, therapy and a range of light-tissue interactions. As evidenced by the increasing number of high-profile journals that describe experimental methods and protocols, there is a clear growing demand for dissemination of innovative, unique methods to the

scientific community. Submissions that are designed to disseminate details on innovative methods, analyze system capabilities and illustrate potential applications are strongly encouraged.

3.6 General Optics in Biology and Medicine

The pace of innovation in the application of optics to biology and medicine rapidly generates new technologies and opportunities. Broadly applicable submissions or topics that extend beyond the existing themes should submit to this theme.

5.2 Fibers for Biomedical Applications (Joint with FiO 5)

FiO 4: Optics in Information Processing

4.1 Optical System Design for Information Optics

As the field of information optics grows, it becomes worthwhile to consider whether traditional design metrics (such as the MTF and PSF) retain their general utility, or if new metrics and design strategies must be developed. Contributions are sought on topics related to optical system design in the context of information optics. Examples include, but are not limited to, non-traditional optical system architectures and information-based design metrics.

4.2 Coherence and Quantum Imaging (Joint FiO 7)

Methods to extract information from the classical or quantum statistics of light have become a central part of the applied optical sciences. Contributions are solicited on topics in coherence and quantum optics that pertain to imaging or other sensing modalities. Examples include but are not limited to spatial coherence imaging, ghost imaging, and propagation in random media.

4.3 Image and Information Processing in Biooptics (Joint FiO 3)

Interrogation of biological systems with light simultaneously presents both unique opportunities and unique challenges. Contributions are sought that address the particular issues of imaging, diagnosing, and otherwise interrogating biological samples and the subsequent analysis and processing of the resultant data. Examples include phase retrieval in bioimaging, and image analysis.

4.4 Imaging/Sensing Over Non-spatial Dimensions

'Imaging' most typically refers to methods for mapping the spatial variation of a parameter (irradiance, electric field strength, refractive index, etc.). Submissions are solicited on topics relating to 'imaging' (or more generally, 'sensing'), where one or more of the relevant dimensions is non-spatial in nature. Examples include advances in not only the more-familiar multi-dimensional imaging modalities such as spatio-temporal or spectral imaging, but also quantum-state or phase-space tomography.

4.5 Analysis Techniques, Signal Recovery, and Synthesis

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.

4.6 General Optics in Information Science

Topics that do not fit into the above categories should be submitted to this theme. Representative examples of topics covered in this category include the display of imaging information including human factors, image quality assessment metrics, design of specialized optical components that enable new functions, advances in digital photography, multi-aperture imaging systems and image processing for these systems, and combined optical and focal plane design together with related digital processing for optimized system performance. Contributions are sought in analysis of optical systems in the context of information capacity and quality, image analysis, computed imaging and inverse problems.

FiO 5: Fiber Optics and Optical Communications

5.1 Optical Fibers from Novel Materials

This theme will be devoted to optical fiber exhibiting enhanced and unusual properties that arise from novel materials or combinations of materials. Particular topics of interest include: crystalline and polycrystalline optical fibers (oxide and semiconductor), novel glass compositions that cannot be made via conventional vapor deposition (e.g., MCVD, OVD, VAD) processes, and multi-material fibers.

5.2 Fibers for Biomedical Applications (Joint with FiO 3)

Fibers are ubiquitous in the field of biomedical engineering and in the study of biological systems – they are used for sensing, imaging, endoscopy, multi-photon microscopy, tissue engineering, tissue ablation, and a host of other technological applications, either as a simple delivery medium, or for complex photonic functionalities enabled by the fiber. This theme will explore new directions in which fibers can enhance the biomedical field. Papers will be considered on both novel fiber structures, as well as fiber devices and lasers motivated by biomedical applications, and on proof-of-concept demonstrations of the use of fibers in specific biomedical applications.

5.3 Optical Fiber Sensing

This theme covers advanced fiber optics sensing techniques including discrete, distributed, and hybrid sensor systems based on conventional and specialty fibers including photonic crystal fibers. Contributions will be considered ranging from new basic physical effects to be exploited for sensing physical and biological parameters as well as on practical applications of fiber optic sensing in strategic industrial sectors such as energy production, oil & gas monitoring, transportation, security, and structural health monitoring.

5.4 Fiber-Based Generation and Delivery of Novel Optical Sources

Novel optical sources are becoming increasingly important for many applications. This theme covers the use of fibers not only to generate such optical signals, but also to transport them without loss of fidelity. Particular topics of interest include: fiber-based generation and delivery of optical frequency combs, fiber-based generation and delivery of entangled photon generation, fiber-based generation and delivery of THz waves, and synchronization of laser sources over fibers.

5.5 Emerging Transport, Amplification, Signal Processing for Telecommunications

This topic will cover emerging technologies for telecommunications in three topical areas: Novel Transmission Fibers, including multi-core, multi-mode, and micro-structured fibers for transmission in unconventional bands; Optical Fiber Amplifiers for Optical Networks, including multi-mode and multi-core optical fiber amplifiers, ultra-wide band Raman amplifiers, parametric amplifiers, and optical amplifiers out of C-band; and Signal Processing, including novel techniques for signal generation, impairment mitigation, and switching/routing in the new transport media.

5.6 General Fiber Optics and Optical Communications

Topics which do not fit in well with the other specific themes should be submitted to this theme.

2.3 Peak and Average Power Bottlenecks for Fiber Lasers (Joint with FiO 2)

FiO 6: Integrated Photonics

6.1 Silicon Photonics

Silicon has emerged as an important 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. This theme involves micro and nanophotonics in the silicon material system. Topics of interest include passive and active devices, components and circuits, modeling and simulation, fabrication processes and techniques, and applications such as optical interconnects and biological sensing.

6.2 Hybrid Integrated Photonics

Integrated photonics involving hybrid material systems aim to achieve unique or optimized functionalities that are challenging to obtain from any single material system. This theme focuses on novel integrated photonic devices and circuits consisting of dissimilar components or material platforms. Topics of interest include optical gain/absorption integrated devices, III-V's on silicon, ferroelectrics on silicon, integrated photonics incorporating graphene, organic/inorganic devices, and hybrid integration for on-chip non-reciprocal devices.

6.3 Waveguide Integrated Optics

Waveguide integrated optics involves that control of light in planar optical waveguides in a manner that is analogous to integrated circuits in electronics. Processing or routing of data in the optical domain can offer advantages compared to electronic solutions, especially at increasing data rates. This theme welcomes submissions based on planar optical waveguides including modulators, switches, couplers, resonators, filters, and nonlinear optics in a waveguide platform. The application space includes, but is not limited to, the areas of highly integrated photonics for communications, optical interconnects, and optical signal processing.

6.4 Photonic Crystals

Integrated photonics based on photonic crystals harness the dispersion engineered properties of guided wave periodic dielectric structures. Advances in the design and fabrication of photonic crystals have enabled the demonstration of novel capabilities involving the control of light. This theme includes the science and engineering of photonic crystal structures for photon emission, propagation, amplification, storage, and material interaction.

6.5 Plasmonics and Nanophotonics

Plasmonic and nanophotonic interactions with guided waves 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. This theme focuses specifically on optical guided wave interactions with free-metal electrons, nanowires, nanotubes, and nanostructures for integrated photonics. Submissions involving graphene plasmonics for integrated photonics are also of interest.

6.6 General Integrated Photonics

The subcommittee on integrated photonics encompasses the science and engineering of optical guided waves in highly integrated devices, components, circuits, and systems. Topical coverage includes theory, design, numerical modeling and simulation, materials, fabrication, test and measurement, and applications.

FiO 7: Quantum Electronics

7.1 Integrated Quantum Optics

Topics covered include: waveguides, couplers, interferometers, phase control, gates, etc.; sources: heralded (SPDC, SFWM, etc.) & triggered (single quantum emitter); single photon detectors, number resolving detectors, state tomography; circuit QED, various other integration schemes; implementation of algorithms using circuits; feedback and error control, quantum plasmonics.

7.2 Quantum Communications, Quantum Systems and Quantum-enabled Sensors

Topics covered include: quantum optomechanics, NV centers in diamond and other areas of diamond nanoscience, quantum-enabled sensors (e.g., magnetometry), transduction of quantum states for hybrid integration, and quantum simulations, quantum radiation pressure. This theme will also 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.

7.3 Nonlinear Optics in Micro/Nano-Optical Structures

Papers are invited on optics in frequency (up/down) conversion, including infrared and ultraviolet generation, nonlinear devices (for applications such as switching, modulation, memories and logic), nonlinear optics in waveguides and resonators, including frequency combs, nonlinear optics in metamaterials, and optomechanics

7.4 Optics and Photonics of Disordered Systems

Papers are invited on random lasers and control, localization, electrically-pumped random lasers, optical forces, aperiodic structures, transmission, focusing and imaging through random media, bio-photonic applications of random media, quasi-crystals, topologically protected transmission and disorder tolerant structures, and symmetry and optical nonreciprocity in photonic structures.

7.5 Quantum and Classical Phenomena in Non-plasmonic Polaritonic Systems

This theme is devoted to linear and nonlinear effects due to formation of strongly coupled exciton-photon excitations (polaritons) in structures with modified photon vacuum (photonic resonators, periodic and aperiodic photonic structures). Papers dealing with such phenomena as manipulation of polariton dispersion, stimulated polariton scattering and polariton lasing, Bose-Einstein condensation of polaritons are invited.

7.6 General Quantum Electronics

This is a broad theme related to laser physics, quantum mechanics, and light-matter interactions. This includes, but is not limited to, the following specific fields: quantum optics, nonlinear optics, meta-materials, random media, micro cavity design, and laser science and engineering. Submissions of both experimental and theoretical work are welcome, with an emphasis which can range from fundamental to applied research, and which do not fit in the above-mentioned specific themes.

FiO 8: Vision and Color

8.1 Ultrafast Laser Applications for the Eye

The purpose of this session is to showcase leading research on ultrafast laser applications for the eye. Contributions are solicited across many applications such as non-linear imaging, cornea thin-flap and refractive surgery, as well as laser safety issues.

8.2 Restoring vision and the future of retinal implants

The purpose of this session is to gain insight into the latest developments in restoring vision to the blind and visually impaired. Contributions are solicited on restoring vision, retinal implants, and clinical results in animal models and in human patients.

8.3 Applications of Physiological Optics to Vision and Color

The role of optics in vision and color science is very broad. Research ranges from optical models of the eye and methods for retinal imaging to the study of color vision and visual perception. Contributions are solicited across all areas of optics applications in vision and color science.

1.3 Optical Design with Unconventional Polarization and Complex Optical Fields (Joint with FiO 1)

1.5 Optical Design of Ophthalmic Instruments for Retinal Imaging (Joint with FiO 1)

Laser Science Topics

1. Fundamentals and Applications of Photonic Crystals

The ability to fabricate structures on a nanometer distance scale is leading to exciting new possibilities in the field of photonics. One example is the fabrication of photonics crystals with controllable optical properties, such as the extreme values of the group velocity of light. Photonic crystals of this sort can be used to enhance the strength of nonlinear optical interactions and control the emission properties of quantum emitters located within the crystal. These and related ideas are to be explored.

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

This session addresses emerging research relevant to optical methods of biological and chemical detection or quantification. Specific focus is upon those techniques which improve detection limits, enable or enhance sensor specificity, improve device response time, and facilitate multi-target detection. Examples of such technologies include, but are not limited to, resonant cavity photonic structures, surface enhanced Raman spectroscopy (SERS), cavity ring-down spectroscopy (CRDS/CRLAS), laser-induced fluorescence or spectroscopy (LIF/LIBS), and on-chip or fiber-based microfluidic systems.

3. Solid-State Quantum Optics

Topic description to be announced.

4. Cold Atoms and Molecules

The study of cold and ultracold molecules has produced many remarkable results in the last few years. It appears that many of the long-sought goals of the work, e.g. dipolar many-body physics, ultracold chemical reactions, high-resolution spectroscopy, etc., are now within reach of experiment. Sessions will highlight these topics as well as explore the next generation of cold molecule experiments, which aim to produce cold molecular systems by entirely new techniques, such as direct molecular laser cooling, sympathetic cooling of molecular ions, and direct association to the ground state.

5. Optics and Alternative Energy Sources

Topic description to be announced.

6. Attosecond and Strong Field Physics

This session will focus on attosecond science and the physics underlying it. Topics include high harmonic sources, xuv and soft x-ray emission, and attosecond metrology. The study of atoms and molecules and solids using these sources, both on the attosecond and femtosecond time scales, will be highlighted.

7. Ultrafast Chemical Dynamics

This session focuses on the use of ultrafast laser sources to study the structure and dynamics of molecules. The sources include femtosecond visible and infrared lasers, high harmonic generation, recolliding electrons, x-ray free electron lasers, etc.

8. Physics with Ultrafast X-rays

The session focuses on the atomic and molecular physics problems that can be studied using novel ultrafast x-ray sources that include x-ray free electron lasers (XFEL) and high-harmonic sources.

9. Precision Measurements and Metrology Using Lasers

The last decade has seen a revolution in the way we can probe the physical world using lasers at the highest resolution and accuracy. Laser sources have now been refined in their frequency stability such that they can furnish phase stable radiation, probe optical transitions at the Hz level, and search for subtle physical phenomena such as the detection of gravitational waves. In addition, the methods of ultra-fast laser science have permitted the construction of absolute, referenced frequency combs of radiation that

span large portions of the electromagnetic spectrum and allow a direct connection between currently defined microwave atomic time/frequency references and new reference transitions at optical frequencies. Together with the now established methods of laser cooling and trapping of atoms, precise measurements of physical constants, ultra accurate atom interferometry, and the development of a new generation of optical atomic clocks have now arrived. This session provides a survey of some of the exciting and frontline research being conducted in the area of precision measurements using laser sources applied in a number of areas. These presentations illustrate the realm of new measurements that can be attainable and our ability to advance our understanding of the physics together with opening new technology areas. The session is dedicated to the memory of the late Prof. Norman Ramsey (Harvard) who played a critical role in the development of atomic time standards and precision measurements. He also trained a new generation of scientists who are playing a key role in current laser based precision measurements.

10. Quantum Information with Photons

This session will focus on the quantum properties of light and the use of quantum systems for information processing and novel technological applications. It includes quantum optics and quantum processing, including applications of single photons, entanglement, and other non-classical effects.

11. Nano-opto-mechanics

The scope of this session is to provide updated progress of experimental realization, theoretical proposal/investigation, and numerical design of optomechanical phenomena in nanophotonic structures and their applications.

12. General Laser Science

Any other topics in laser science that do not fit into the other categories.

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. Should you have any suggestions for any of the technical group activities, contact the respective technical group chair with your input. Please check back regularly for more information. If you are interested in organizing an activity at FiO for your respective technical group, please contact your group chair or contact OSA at tgactivities@osa.org.

- **Optical Fabrication and Testing Networking Event**

Sunday, 6 October, 19:00-20:30
Bonnet Creek Ballroom, Salon VI

Come mix & mingle with members of this Technical Group and enjoy discussions on topics relevant to Optical Fabrication and Testing. To RSVP for this event, please email jpridgen@osa.org. Host: Rajesh Menon

- **Holography and Diffractive Optics Meetings**
  Monday, 7 October- 19:00-20:30
  Bonnet Creek Ballroom, Salon VII

  Come mix & mingle with members of this Technical Group and enjoy discussions on topics relevant to Holography and Diffractive Optics. To RSVP for this event, please email jpridgen@osa.org. Host: Andrew Forbes

- **Bio-Medical Optics**
  Monday, 7 October, 19:00 -20:30
  BB King's Club at Pointe Orlando

  Bus transportation will be provided for attendees. **Bus will depart at 6:30 p.m**. from Hilton Bonnet Creek (Porte Cochere, Main Valet and Convention Entrance). Come enjoy a welcome drink and appetizers on OSA as you mix and mingle with members and leaders from the Bio-Medical Optics Division. We encourage you to keep the conversations going and stay longer for dinner at your own expense. For more information and to RSVP to this event, please email jpridgen@osa.org **by Monday, September 30, 2013.** Host: Adam Wax & Adela Ben-Yaker

- **Information Acquisition, Processing and Display**
  Monday, 7 October, 19:00 -20:30
  Copper Canyon at Pointe Orlando

  Bus transportation will be provided for attendees. **Bus will depart at 6:30 p.m**. from Hilton Bonnet Creek (Porte Cochere, Main Valet and Convention Entrance). Come enjoy a welcome drink and appetizers on OSA as you mix and mingle with members and leaders from the Information Acquisition, Processing and Display Division. We encourage you to keep the conversations going and stay longer for dinner at your own expense. For more information and to RSVP to this event, please email jpridgen@osa.org **by Monday, September 30, 2013.** Host: Abhijit Mahalanobis

- **Fundamental Laser Sciences**
  Tuesday, 8 October, 18:00 -19:00
  Pool-Side Beech Restaurant on Hotel Property

  Come mix & mingle with members of this Technical Group and enjoy discussions on topics relevant

to Fundamental Laser Sciences. To RSVP for this event, please email jpridgen@osa.org. Host: Reinhard Kienberger

- **Applications of Visual Science Technical Group Meeting and Social Gathering**
  Wednesday, 9 October, 17:45-18:45
  Bonnet Creek Ballroom, Salon IX

  Members of the Applications of Visual Science Technical Group and those interested in becoming members are invited to come enjoy light refreshments & mingle with other members and leaders of this group. Not only will there be a discussion on this year's Technical Group activities and ideas for the future, but also topics of high current relevant to all of you working in visual optics will be discussed. Host: Brian Vohnsen

Symposium on the 100th Anniversary of the Bohr Atom: Niels Bohr's Nutcracker

Sunday, 6 October, 16:00 - 18:00
Bonnet Creek Ballroom, Salons I - III

This symposium reviews the discovery of Niels Bohr which transformed the understanding of light and matter. Though his simple idea seems obvious to us today, it was unprecedented at the time: take the quantization rule that Planck and Einstein had used to describe the energy of light, and apply it to the mechanical motion of particles in atoms.
View for more information on symposium speakers and other symposiums.

FIO/LS Welcome Reception

Sunday, 6 October, 18:00 - 19:30
Bonnet Creek Ballroom Foyer West

Complimentary to all Technical Conference Attendees: Get the FiO 2013/LS XXIX 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, 7 October, 08:00 - 12:00
Bonnet Creek Ballroom, Salons I - III

The 2013 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.

Laser Science Symposium on Undergraduate Research

Monday, 7 October, 12:00 - 18:00

Technical Session: Bonnet Creek Ballroom, Salon XII

Poster Session: Bonnet Creek Ballroom Foyer Center

This special DLS annual symposium is rapidly becoming one of the most successful DLS traditions (this year's is the 13th 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*

Optics and the BRAIN Initiative: Challenges and Opportunities

Monday, 7 October, 13:30-15:30

Hilton Bonnet Creek Ballroom, Salon II

All Attendees including Exhibit Only Passes are welcomed to attend.

Co-Chairs: Chris Xu, Cornell University and Rafael Yuste, Columbia University

Keynote Speaker

The BRAIN Initiative, Rafael Yuste, Columbia University

Probe development for brain imaging, **Doug Kim, Janelia Farm, HHMI**

The BRAIN Initiative: a DARPA Perspective, **Prem Kumar, DARPA**

Optical Needs for Neuroscience, **Mike Szulczewski, Prairie Technologies**

Optical imaging technology for the BRAIN initiative, **Chris Xu, Cornell University**

Deep Focusing of Light in Tissues by Optoelectronic Time-reversal, **Changhuei Yang; California Institute of Technology**

Optical technologies will play a major role in the BRAIN initiative, providing non-invasive and microscopic imaging capability to investigate brain function. This special session will bring in eminent scientists from multiple disciplines to present the current status of optical imaging for neuroscience. Challenges and opportunities for optics in the BRAIN initiative will be highlighted. Government funding agency and industry perspectives will also be presented.

For more information on the BRAIN initiative, visit the official White House site.

Museum Tour & Scenic Boat Cruise for OSA Members & Families

Tuesday, 8 October, 9:00 - 13:00

OSA members attending FiO: 2013 and their families are invited to enjoy an art museum tour and canal cruise in beautiful Winter Park, Florida, on Tuesday, 8 October from 9:00-12:30. OSA guests will travel by bus to the Charles Hosmer Morse Museum of American Art, which houses the world's most comprehensive collection of works by Louis Comfort Tiffany, as well as late 19th- and early 20th-century American painting, graphics and decorative art. Join the OSA guided tour or explore the museum's collections at your own pace. After leaving the museum, the group will embark on a one-hour narrated cruise through twelve miles of Winter Park's tranquil lakes and canals. Float by swaying palms, lush ferns, and sub-tropical flowers as you view the Kraft Azalea Gardens, Isle of Sicily, and opulent private homes and estates.

Winter Park, approximately 15 minutes north of Orlando, was once considered a winter resort. Today, the arts- and culture-filled city is home to upscale shopping, dining, history, museums and galleries. It is also a nature lover's paradise, with more than 70 parks.

The event is free to OSA members and their families. Children are welcome. To reserve a spot, contact edreaz@osa.org by **30 September 2013**.

National Photonics Initiative Event

Tuesday, 8 October, 14:30 -15:30

Floridian Ballroom, Salons D - L, Corporate Theater

All Attendees including Exhibit Only Passes are welcomed to attend. - See more at: http://www.frontiersinoptics.com/home/special-events/#NPI

All Attendees including Exhibit Only Passes are welcomed to attend.

The future of technology hinges on how great ideas find their way to market. Elizabeth Rogan, CEO of OSA, Tom Hausken, Senior Adviser to OSA and OIDA, and Jason Eichenholz, Founder of Open Photonics Inc talk about the National Photonics Initiative and how the open innovation model illustrates

what the success of the NPI could look like – a viable bridge over the valley of death for emerging technologies**.**

Meet OSA's Journal Editors

Monday, October 7, 15:30 – 17:00,

Hilton Bonnet Creek Ballroom, Salon III

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

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

Refreshments will be provided. All are welcome.

Poster Sessions

Tuesday, 8 October, 12:00 - 13:30

Joint FIO/LS Posters Session, Wednesday, 9 October, 12:00 - 13:30

Floridian Ballroom, Salons D - L

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

OSA Fellow Members & OSA Foundation Major Donor Appreciation Luncheon

Tuesday, 8 October, 12:00 - 14:00

Citrus, Collier, Columbia Rooms, Ground Level

All OSA Fellow, Fellow Emeritus, Honorary Members & OSA Foundation Major Donors will receive a special invitation to this annual event. During the program distinguished members and Foundation supporters are recognized for their outstanding leadership within the community.

A reply will be needed by Friday, 20 September 2013 to reserve a place at the luncheon. We hope that you will be able to join us!

Questions? Email foundation@osa.org



Meet the Editors of the APS Journals

Tuesday, 8 October, 15:30 - 17:00

Bonnet Creek Foyer Center

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.

OSA's Enabled by Optics Inaugural Event

Celebrate Optical Technologies that Transform Our World

Tuesday, 8 October, 16:00 – 18:00

Floridian Ballroom, Salons D - L, Corporate Theater

After the exhibit hall closes on Tuesday, join your colleagues for a complimentary networking reception and business program.

16:00 – 16:30	Networking Reception
16:30 – 16:50	Enabled by Optics Award Presentation

16:50 – 17:00	 Market Update Presented by Tom Hausken, Sr. Engineering & Applications Advisor, OSA
17:00 – 17:55	 Executive Interview with Marv DeVries, President, Trojan Technologies
17:55 – 18:00	Closing Comments

To learn more about Enabled by Optics, please visit our homepage.

APS Division of Laser Science Annual Business Meeting

Tuesday, 8 October, 18:00 - 19:00

Lake Room, Ground Level

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, 8 October, 18:00 - 19:00

Columbia Room, Ground Level

Learn more about OSA and join the OSA Board of Directors for the Society's annual business meeting. The 2012 activity reports will be presented and the results of the Board of Directors election will be announced.

Laser Science Banquet

Tuesday, 8 October, 19:00 - 22:00

La Luce, Hilton Bonnet Creek

Join your colleagues for the annual LS Banquet. Tickets are required for this event and can be purchased when you register for the meeting. Dinner is being held at the top-rated italian restaurant, La Luce.

Speaker: Dr. M. J. Soileau, VP for Research and Commercialization, *University of Central Florida*
Title: History of CREOL - a personal prospective of opportunities and challenges of the early days.

OSA "Great Gatsby" Member Reception

Guys and Dolls, It's Time to Roar in the 20s!

Tuesday, 8 October, 19:00 - 21:00

Speakeasy Parlor - Bonnet Creek Ballroom, Salons I-III

Complimentary for all OSA Members

"Come as a flapper or come as you are,
Dress as a gangster or silent screen star.
It's going to be fun – no matter the dress,
Join us at the OSA Member Reception and be ready to impress!"

The roaring twenties gang at OSA cordially invites all **OSA Members** to the **SPEAKEASY PARLOR** to attend the OSA “Great Gatsby” Member Reception.
Enjoy a special evening of beverages, music, appetizers and dancing the night away among your friends, colleagues, guys and dolls!

Members only, *Password required*. For entry into the Parlor, make sure you are not being followed by anyone as to tip off the whereabouts of the soiree. Not a member yet? Join today to attend this complimentary OSA member event.

Costumes and/or accessories are encouraged.

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

Tour of CREOL - Complimentary

The College of Optics and Photonics, University of Central Florida
Wednesday, 9 October, 15:30 - 19:00

Limited capacity. Register now!

On Wednesday, 9 October, OSA Members, Families and Friends are invited to join other FiO/LS conference attendees in a special guided tour of the internationally renowned CREOL, The College of Optics and Photonics at the University of Central Florida. The provided bus transportation will depart from the front of Hilton Bonnet Creek at 15:30. Please for register here and as an FIO/LS attendee (technical or exhibit only) and on the "Additional Items" that you can select CREOL Lab Tour. Bus transportation is limited, so register early.

Schedule of events:
15:30 *Bus departs from Hilton Bonnet Creek
16:15 Arrive at CREOL, The College of Optics & Photonics
16:30 Overview of CREOL by Dean Bahaa Saleh
16:45 Lab Tours
18:00 Reception with light hors d’oeuvres, wine, beer & soft drinks

19:00 Tour Bus departs for Hilton Bonnet Creek

*Limited capacity on Buses. If you wish driving on your own, contact Denise Whiteside at denise@creol.ucf.edu.

FIO Postdeadline Papers

Wednesday, 9 October, 18:30 - 20:00

The FiO 2013 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.

Recent Graduate and Student Activities

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

Tuesday 8 October, 8:00 - 9:30

Floridian Ballroom, Salons B-C

Free of Charge and includes Breakfast – RSVP Required

Sponsored by GoFoton

Participating executives include:

- Jason Eichenholz, CEO & Co-Founder, Open Photonics Inc
- Alexei Glebov, CEO and President, OptiGrate Corp.
- Marc Himel, Business Development Manager – Micro-optics, Jenoptik Optical Systems GmbH
- Gordon Knight, Research Operation Manager and Photonics Leaders, Trojan Technologies
- Alan Symmons, Vice President of Corporate Engineering, LightPath Technologies, Inc.
- Steve Testa, Program Manager, Vision Engineering Solutions

This session brings together Industry Executives to share their business experience – from how they started their careers and lessons learned along the way, to using their degree in an executive position – with Recent Graduates and Students. The program starts with informal networking during lunch and then

transitions into “speed meetings” – small, brief visits with 5-6 executives to discuss careers, industry trends or other career topics.

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

Registration for this event will open in September. Questions? Email vipevents@osa.org.

Annual OSA Student Chapter Leadership Conference

Sunday, 6 October, 7:00 – 16:30
Floridian Ballroom, Salons A - C

The invitation-only Student Leadership Conference brings together OSA Student Chapter leaders from around the globe to network, present posters and learn about successful chapter management and the popular International OSA Network of Students (IONS).

Questions? Email chaptersandsections@osa.org.

Student Chapter Competition

Tuesday, 8 October, 12:00 - 16:00, Winner announced at 14:30
Floridian Ballroom, Salons D - L

Every year, OSA challenges Student Chapters to showcase their best ideas for youth education outreach during Frontiers in Optics. This year, chapters can earn a prize of $500 for participating in Mission:Optibox.

Chapters will use simple household items (laser pointers, paper towel rolls, cellophane, aluminum foil, string, tape, etc.) create and present a new optics education demonstration for the judges and crowd. The demonstration will be made entirely with items purchased in stores such as food markets or office supply stores, and chapters must explain it to the judges in five minutes or less. Maximum price for the entire demonstration: $25 USD. **All FiO attendees are welcome to stop by and join in the fun!**

Follow Events on Twitter

Do you have a Twitter account? Participate in the Annual Tweet-A-Rama contest.

Join us in tweeting onsite about the best of FiO/LS 2013 and you could win up to $100 USD. ***New this year!*** Double your chances of winning with a post to Instagram too using **#FiO13**.

OSA/SPS Student Member Reception

Monday, 7 October, 18:30–22:00

Howl at the Moon, 8815 International Drive Orlando, FL

This reception is a fun event that encourages Student Members of OSA and SPS to meet, enjoy refreshments and have a good time! Note that membership status will be checked. ID is required. Must be 21 or over.

Buses will depart from the Porte Cochere, Main Valet and Convention Entrance at the Hilton Bonnet Creek

Bus transportation will be available to Howl at the Moon and back to the Hilton Bonnet Creek from 18:00 to 21:30 running every half an hour.

Minorities and Women in OSA (MWOSA) Networking Reception

Monday, 7 October, 17:30 - 18:30

Columbia Room, Ground Level, Hilton Orlando Bonnet Creek Resort in Orlando, FL (collocated with the Frontiers in Optics)

No charge

Featuring

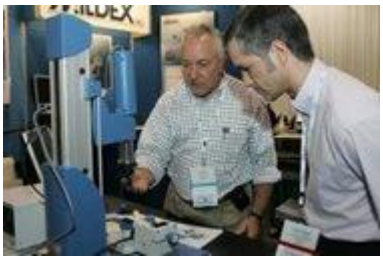
Guest Speaker: Dr. Jie Qiao
WiSTEE Founder and Chairperson
"WiSTEE: Women in Science, Technology, Engineering, and Entrepreneurship"

WiSTEE Founder and Chairperson Dr. Jie Qiao, associate professor at the Chester F. Carlson Center for Imaging Science, Rochester Institute of Technology will discuss promoting women leadership in Science, Technology, Engineering, and Entrepreneurship; bridging the gap between Science and Business; and providing a forum to learn, connect and lead.

Questions? Email mwosa@osa.org.

Exhibit Floor Activities

21-22 October 2014



Visit with approximately 60 participating companies from around the globe to see the latest products and innovations in optics and laser science. **Exhibit-Only Admission is Free!**

The exhibit hours are:

Tuesday, 21 October	10:00 – 16:00
Wednesday, 22 October	10.00 – 14:00

Unopposed Exhibit-Only Times:

Tuesday, 21 October	12:00 – 13:30
Wednesday, 22 October	12:00 – 13:30

There's so much to explore at the FiO Exhibit. **FREE** Exhibit Only Registration grants you the opportunity to attend events like these from 2013 - check back for an updated list of 2014 events.

- Discover the latest products and innovations from approximately 60 participating companies
- Visit with Florida Photonics Cluster participants
- ***Join in on the fun!*** OSA Student Chapters have been challenged to showcase their best ideas on youth education outreach in optics. This year, chapters can earn a prize of $500 for participating in Mission: Optibox. Chapters will use simple household items to create and present a new optics education demonstration.
- Hear new, exciting research by talking one on one with presenters during the FiO Poster Sessions.
- Learn from prestigious scientists at the Plenary and Awards Presentation
- Meet the Editors of the APS Journals
- Attend special events such as Optics and the BRAIN initiative: Challenges & Opportunities, Symposium on the 100th Anniversary of the Bohr Atom, OSA's Enabled by Optics Inaugural Event & more

Visit Special Events for dates and times and a list of all activities. Check back for updates to exhibit floor actvities' information.