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Message from the Dean

One of the world's foremost institutions for teaching and research in optics and photonics, CREOL, The College of Optics and Photonics, started in 1987 as the Center for Research and Education in Optics and Lasers (CREOL) and became a college in 2004, the first such college in the US. The College houses the Florida Photonics Center of Excellence (FPCE) and the Townes Laser Institute named after Charles Townes, the co-inventor of the laser. The faculty are world-renowned for their contributions to fundamental and applied optics and photonics and are recipients of numerous awards and honors. The College is an exciting place to have an outstanding educational experience leading to the MS and the PhD degrees, and we have several international programs. A total of more than 200 PhD and 300 MS degrees have been offered here.

The College is also an exciting place to do research. We offer a broad spectrum of research programs covering materials, devices, and systems for applications ranging from THz and infrared to EUV and X-rays, including photonic technologies such as lasers; optical fibers; semiconductor and integrated photonic devices; nonlinear and quantum optic system; and imaging, sensing and display. These technologies have applications in industry, communication and information technology, biology and medicine, energy and lighting, aerospace, and homeland security and defense. Design of optical systems, which has been the core of optical engineering, remains to be a principal component of the discipline, but advanced topics such as nanophotonics, attosecond optics, plasmonics, and biophotonics, are embraced as areas of strength and future growth. We are well positioned to take advantage of the revolution that is taking place in several fields enabled by optics and photonics.

CREOL was initially founded to promote growth in optics and related fields here in central Florida. We provide the well-trained workforce that keeps the industry growing. The Florida Photonics Cluster is working to coordinate this industry’s efforts and needs, and we also receive strong support from the Florida High Tech Corridor Council and Enterprise Florida. Since the founding of CREOL more than 150 industrial partners were affiliated with us and the faculty produced a total of 230 patents and spun off 23 photonics-based companies involving a wide variety of technologies.

Highlights of 2011

In 2011, 113 graduate students were enrolled and 19 PhD degrees and 14 MS degrees were awarded. The research performed by the faculty, students, and scientists was disseminated nationally and internationally in two books and one book chapters, 185 journal papers published in the reviewed literature, 138 conference papers and presentations (including 18 invited), and 22 invited lectures. The College hosted 33 seminars delivered by many distinguished speakers. Research and educational programs were funded by contracts and grants totaling approximately $7.7M, including $5.2M of federal funding. The faculty continue to receive awards and recognitions. This year, Professor Demetrios Christodoulides received the OSA R. W. Wood Prize, Professor S.T. Wu received the SID Slotto–Owaki Prize, and Professor Peter Delfyett received the APS Edward A. Bouchet Award. Professor Winston Schoenfeld became SPIE Fellow and Professors Peter Delfyett and Eric Van Stryland became Fellows of APS.

In 2011, we received approximately $3.4M from industry or from federal grants in collaboration with industrial partners, a connection that gives our students experience and a leg up on industry positions after they graduate. Our tradition of innovation has also continued; in 2011, the faculty were inventors or co-inventors on 19 issued patents, 34 provisional applications, and 30 patent disclosures. UCF was ranked third in the strength of U.S. patents issued to universities in 2009 (March 2010 issue of IEEE Spectrum) and the rich IP productivity in optics and photonics has contributed significantly to this ranking.

Highlights of 2011 also include the addition of two new faculty members. Dr. Rodrigo Amezgua, an expert in optical fibers formerly with the University of Southampton, was appointed Research Assistant Professor. He has helped install a new optical fiber drawing tower. Dr. Romaine Gaume, an expert in optical ceramics formerly with Stanford University, has a joint appointment with the NanoScience Technology Center at the rank of Assistant Professor. Both are active members of the Townes Laser Institute. Three faculty members left: Dr. Glenn Boreman moved on to become Chair of the Department of Physics and Optical Science at the University of North Carolina at Charlotte; Dr. James Harvey retired, and Dr. Nabeel Riza moved to Ireland to become Head of the Electrical and Electronic Engineering Department at University College, Cork.

This annual report provides a detailed description of the education, research, and partnership activities of the faculty, staff, and students during the 2011 calendar year. Key data for this year are also compared to previous years to show progress and identify trends. Information on more recent activities are regularly reported in the College’s website http://www.creol.ucf.edu/. We hope you can find the information you need in this Annual Report or in the website. Please contact us for more information and let us know what is missing and what we can improve.

Bahaa Saleh
1. Faculty and Staff

1.1 Faculty

Ayman F. Abouraddy
Assistant Professor of Optics
PhD, Electrical Engineering, Boston University, 2003
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- Fabrication of multi-material micro-structured optical fibers
- Photonic band gap fibers
- Optical thermal, electric, and magnetic sensing using fibers
- Nonlinear fiber optics, supercontinuum generation
- Mid-infrared fibers, chalcogenide glass fibers
- Fibers for solar applications
- Quantum optics and quantum information processing
- Optical generation of entangled states for sensing and imaging
- Nanowire and nanoparticle synthesis

Other Experience
- Postdoctoral Fellow, 2003-05, Research Scientist, 2005-08, Research Laboratory of Electronics (RLE), M.I.T.

Professional Activities
- Program committee member, SPIE DSS, 2009
- Subcommittee member, CLEO, 2012

Honors and Awards
- Boston University President University Graduate Fellowship, 1997
- Ralph E. Powe Junior Faculty Enhancement Award

Rodrigo Amezcue Correa
Assistant Research Professor of Optics
Ph.D. Optoelectronics, University of Southampton, 2009
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- Advanced optical fiber design and fabrication
- Photonic crystal fibers
- Fiber laser development
- Optical fiber devices and components
- Optical fiber sensors
- Nonlinear propagation in optical fibers
- Optical fiber for biomedical applications

Other Experience
- Laser Development Engineer, 2009-11, Powerlase Photonics
- Postdoctoral Researcher, 2007-09, University of Bath

Professional Activities
- Technical Committee Member, “2nd Workshop on specialty optical fibers and their applications”, Oaxaca Mexico

Honors and Awards
- Graduate Student Scholarship, CONACYT, Mexico, 2004

Glenn D. Boreman
Trustee Chair Prof. of Optics, EECS & Physics
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- Infrared sensors and systems - Nano-lithography to extend RF concepts to IR Band, antenna-coupled IR sensors
- Multi-color/polarization IR FPAs
- IR Frequency-selective surfaces
- Tunable IR signatures
- Infrared targets and tags; passive and active IR tags
- IR scene projection & target projection
- Millimeter-wave and Terahertz technology
- Subsurface mine detection/imaging

Other Experience
- Visiting Scholar, Imperial College London, Federal Institute of Technology (ETH) Zürich, Defense Research Agency (FOI) Sweden, Universidad Complutense Madrid
- Consultant, Licensed Professional Engineer

Professional Activities
- Editor-in-Chief, Applied Optics
- Co-author of Infrared Detectors & Systems
- Author of Basic Electro-Optics for EEs and Modulation Transfer Function in Optical and Electro-Optical systems

Honors and Awards
- Fellow, Optical Society of America and SPIE
- Fellow, Military Sensing Symposium

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- Attosecond science
- Terawatt femtosecond laser
- Ultrafast atomic physics
- Coherent XUV and x-ray sources
- High order harmonic generation
- X-ray streak camera and other detectors
- Near and mid-infrared femtosecond sources

Other Experience
- Ernest & Lillian Chapin Chair Prof., Kansas State University, 2009-10
- Professor, Department of Physics, Kansas State University, 2006-09
- Associate Prof. Dept. of Physics, Kansas State University, 2001-06
- Assistant Research Scientist, University of Michigan, 1999-01

Professional Activities
- Co-chair, 5th Intl. Symposium, Ultra-fast Phenomena and THz Waves,China, 2010
- Co-chair of the 2nd International Conference on Attosecond Physics,Kansas, 2009

Honors and Awards
- Fellow, American Physical Society
- Mercator Professorship, German Science Foundation (DFG), 2007
- Huber Schardin Gold Medal, 1996
Demetrios Christodoulides
Professor of Optics
Ph.D., Electrical Engineering, Johns Hopkins University, 1986
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Research
- Nonlinear wave propagation
- Nonlinear optics
- Beam synthesis and dynamics
- Optical solutions
- Periodic and random optical structures
- Nonlinear optics in soft matter
- Quantum transport in arrays and photonic lattices

Professional Activities
- QELS Program Chair, CLEO/QELS, May 6-11, 2012, San Jose, CA
- Committee Chair, CLEO/QELS—QELS5, May 1-6, 2011, Baltimore, MD
- Committee Chair, CLEO/IOEC-IDEC5, May 18-20, 2010, San Jose, CA
- Committee Chair, CLEO/IOEC-IDEC5, May 31-June 5, 2009, Baltimore, MD

Honors and Awards
- OSA’s R. W. Wood Prize, 2011
- Fellow, Optical Society of America
- Fellow, American Physical Society
- Provost Research Enhancement Position (PREP) award

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Research
- Fundamental ultrafast laser physics
- Ultrafast semiconductor lasers
- Stabilized optical frequency combs
- Optoelectronic device development
- Quantum dot based semiconductor devices for optical networks
- Ultrafast photonic networks and systems
- Optical clock distribution, synchronization & recovery
- Photonics ADC’s and DAC’s
- Coherent optical signal processing, DWDM, OTDM, and OCDMA Links

Other Experience
- Member of the Technical Staff, Bell Communications Research
- President, National Society of Black Physicists
- Founder - Raydiance, Inc.

Professional Activities
- Board of Directors, OSA; Board of Governors, IEEE - LEOS
- Editor in Chief, IEEE J. Selected Topics in Quantum Electronics
- General Chair, CLEO; General Chair IEEE LEOS Annual Meeting

Honors and Awards
- NSF Presidential Early Career Award for Scientists & Engineers
- Fellow, OSA, IEEE, APS
- APS Edward Bouchet Award
- UCF Pegasus Professor

Dennis Deppe
FPCE Endowed-Chair Professor of Optics
Ph.D., Electrical Engineering, University of Illinois, 1988
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Research
- Semiconductor devices
- Epitaxial crystal growth
- Nano-structures
- Nanophotonics

Other Experience
- ECE Department, UT Austin, 1990-05
- Member of Technical Staff, AT&T Bell Laboratories, 1988-90

Professional Activities
- Guest Editor, IEEE J. Selected Topics in Quantum Electronics, 1999
- Associate Editor, IEEE Photonics Letters, 1999-02
- Technical Program Committee, IEEE LEOS Annual Meeting, SPIE Photonics West, IEEE
- IEEE Semiconductor Laser Workshop Chair, 1998
- SPIE Conference Chair on VCSELs, 1997
- IEEE, LEOS Chair of the Semiconductor Laser Technical Committee, 99-02

Honors and Awards
- IEEE LEOS Engineering Achievement Award, 2003
- IEEE LEOS Distinguished Lecturer Award, 2001-02
- IEEE Fellow, 2000; OSA Fellow, 2000
- OSA Nicholas Holonyak Award
- NSF Presidential Young Investigator Award, 1991
- ONR Young Investigator Award, 1991

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Professor of Optics
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Research
- Optical Physics, waves propagation and scattering, electromagnetism
- Condensed matter and complex media
- Optical Sensing
- Near field optics
- Optical systems analysis, modeling, and design

Other Experience
- Chair, “Computational Optical Sensing and Imaging”, OSA, 2009
- Chair, Topical Meeting “Computational Optical Sensing and Imaging”, OSA, 2007
- Chair Biosensing Committee, “Topical meeting Coherent Optical Technologies and Applications”, OSA, 2006
- Chair, Topical Meeting “Photon Correlation and scattering”, OSA, 2004

Professional Activities
- Division Editor, Applied Optics - Optical Technology
- Member OSA Board of Editors
- Editorial Board: Journal of Holography and Speckle

Honors and Awards
- Fellow of American Physical Society
- Fellow of Optical Society of America
- Fellow of American Physical Society
- Florida Photonics Center of Excellence (FPCE) Professorship
Sasan Fathpour  
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Ph.D., Electrical Engineering, University of Michigan, 2005  
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Research  
- Silicon Photonics  
- Optical Interconnects  
- Electronic-Photonics Integrated Circuits  
- Hybrid III-V Lasers on Silicon  
- Nonlinear Integrated Optics  
- Nonlinear Photovoltaic Effect in Semiconductors  
- Integrated Plasmonics on Silicon

Other Experience  
- Senior Researcher, Ostendo Technologies, Carlsbad, CA 2008  
- Visiting Assistant Professor, Electrical Engineering Dept., UCLA 2007  
- Postdoctoral Research Fellow, Electrical Engineering Dept., UCLA, 2005-07

Professional Activities  
- Senior Member, SPIE  
- Member, IEEE Photonics Society  
- Member, OSA

Honors and Awards  
- NSF CAREER Award, 2012  
- UCLA Chancellor's Award for Postdoctoral Research, 2007  
- International Graduate Student Fellowship, University of Michigan, 2000

Romain Gaume  
Assistant Prof. of Optics & NanoScience Technology  
Ph.D, Materials Science; Paris VI University, France, 2002  
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Research  
- Fabrication of transparent ceramics: powder processing, shaping and sintering  
- Applications of transparent ceramics to lasers and scintillators  
- Gain-engineered solid state lasers  
- Nuclear and radiological scintillation detectors  
- Thermoelectric ceramic materials

Other Experience  
- Postdoctoral Research scientist, Applied Physics Dept., Stanford University 2002-06  
- Research Scientist, Applied Physics Dept., Stanford University, 2006-11  
- Consultants: Shasta Crystals, Cyanto Corporation, Silicon Light Machines

Professional Activities  
- Member: SPIE, ACerS

Honors and Awards  
- Dissertation Thesis Award, 2002

Leonid B. Glebov  
Research Professor of Optics  
Ph.D., Physics, State Optical Institute, Leningrad, 1976  
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Research  
- Optical properties of glasses  
- Photosensitive glasses for hologram recording  
- Nonlinear phenomena, including laser-induced damage  
- Holographic optical elements  
- High Power laser systems

Other Experience  
- Founder, Vice President and CTO of OptiGrate Corporation

Professional Activities  
- Member, SPIE  
- Member, Optical Society of America  
- Member, American Ceramic Society  
- Member, Directed Energy Professional Society

Honors and Awards  
- Dennis Gabor Award in Holography  
- Fellow, OSA  
- Fellow, American Ceramics Society  
- Florida Photonics Center of Excellence (FPCE) Professorship

David J. Hagan  
Associate Dean of Academic Programs, Professor of Optics & Physics  
Ph.D., Heriot Watt University, 1985  
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Research  
- Nonlinear Optics  
- Fundamental limits for nonlinear optical coefficients  
- Nonlinear Optical Switching  
- Semiconductors and Quantum dots  
- Organics and Polymers  
- Optical limiting and suppression  
- Ultrasensitive techniques for measuring optical nonlinearities  
- Ultrafast spectroscopy

Other Experience  
- Founder, Polara, LLC.  
- Photonics consultant, National Research Council “Defense After Next”

Professional Activities  
- Editor-in-Chief, Optical Materials Express (current)  
- Principal Editor, Journal of Materials Research (2001-06)  
- Program Chair, Frontiers in Optics (2013)  
- Senior Member, IEEE

Honors and Awards  
- Fellow of OSA  
- Ranked by ISI as “Highly Cited Researcher”  
- College of Optics & Photonics Excellence in Research Award (2010-11)
James E. Harvey  
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Research  
- Optical design and image analysis of advanced optical systems  
- Simulation and modeling of systems performance for unconventional optical systems  
- Image degradation due to Scattering Effects (optical fabrication errors)  
- Sparse, Optical Array Configurations  
- X-ray / EUV Imaging systems (including multilayers)  
- Experimental characterization of various optical phenomena, materials & fabrication processes  

Other Experience  
- Senior Scientist, Perkin-Elmer Corp. in NASA astronomy programs  

Professional Activities  
- Member, OSA  
- Board of Directors, SPIE  
- Designed the Solar X-Ray Imager (SXI) for the US National Oceanographic and Atmospheric Administration's current (GOES)  

Honors and Awards  
- Fellow of SPIE, for contributions in areas of surface scatter phenomena and phased telescope arrays  
- Three Separate papers chosen for reprint in SPIE’s Milestone Series (on Scalar Diffraction Theory; Adaptive Optics; and Surface Scatter Phenomena)  

Aravinda Kar  
Professor of Optics, MMAE, EECS & Physics  
Ph.D., Nuclear Engineering, University of Illinois at Urbana, 1985  
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Research  
- Laser-Advanced materials Science (LAMS)  
- Lasers in manufacturing (LIM)  
- Thermal science for LAMS and LIM  
- Laser and optical science and technology  
- Process modeling and diagnostics  
- Semiconductor and optoelectronic materials processing  
- Materials synthesis and development of new materials  
- Medical materials  
- Novel sensors, detectors and light-emitters  

Other Experience  
- Interdisciplinary science and technology  
- Cross disciplinary courses (thermal science, materials and optics)  
- Technology transfer from research to industrial implementation  

Professional Activities  
- Member, Laser Institute of America  
- Editorials Board Member  

Honors and Awards  
- Fellow, Laser Institute of America  
- Numerous Patents  

Pieter G. Kik  
Associate Professor of Optics & Physics  
Ph.D., Physics, FOM Institute of Atomic Molecular Physics, Amsterdam (AMOLF), 2000  
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Research  
- Nanophotonics and near-field optics  
- Near-field scanning optical microscopy  
- Nanostructured optical waveguides  
- Nanolithography  
- Tunable plasmon optical nanosensors for biochemical detection  
- Numerical modeling of nanophotonic integrated circuits  
- Surface enhanced rama spectroscopy  
- Rare earth doped optical materials  
- Waveguide amplifiers  

Other Experience  
- Post-Doctoral Researched, California Institute of Technology, 2001-03  

Professional Activities  
- Editor, Optics Communications  
- Member, Materials Research Society  
- Member, IEEE, SPIE  

Honors and Awards  
- 2007 NSF CAREER Award  

Stephen Kuebler  
Associate Professor of Chemistry & Optics  
Ph.D, Optical Sciences, University of Arizona, 1984  
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Research  
- Laser-based patterning and material processing  
- Laser beam shaping  
- Nanophotonic structures and devices  
- 3D nano and microfabrication  
- Nonlinear optical Materials  

Other Experience  
- Assistant Staff Scientist, Chemistry, University of Arizona, 2001-03  
- Research Associate, Chemistry, University of Arizona, 1999-01  
- Post-Doctoral Researched, California Institute of Technology, 1998-99  

Professional Activities  
- Editorial Board, J. of Micro/Nanolithography, MEMS, and MOEMS  
- Editorial Board, Journal of Experimental Nanoscience  
- Member of MRS, OSA, SPIE, and ACS  
- Chair, Orlando Section of the American Chemical Society  
- Marshall Scholarship Selection Committee, Atlanta Region  

Honors and Awards  
- NSF Career Award, January 2008  
- Teaching Incentive Program Award, UCF, May 2009  
- Excellence in Undergraduate Teaching Award, College of Sciences, UCF, March 2008  
- NSF Graduate Fellowship, 1993  
- Barry Goldwater Fellowship for physical sciences, 1989  

Guifang Li
Professor of Optics, Physics & EECS
Ph.D., Electrical Engineering, University of Wisconsin-Madison, 1991
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Research
- Fiber-optic transmission systems
- All-optical signal processing
- Free-space optical communication
- Optical networking
- Fiber optics
- Microwave photonics
- Coherent detection and imaging

Other Experience
- Nonlinear surface polaritons
- Phase conjugation

Professional Activities
- Deputy Editor, Optics Express
- Associate Editor, IEEE Photonics Technology Letters

Honors and Awards
- ONR Young Investigator Award, 1995
- NSF CAREER Award, 1996
- IEEE EDS Distinguished Lecturer
- Fellow of OSA and SPIE
- Florida Photonics Center of Excellence (FPCE) Professorship

Patrick L. LiKamWa
Associate Professor of Optics & ECE
Ph.D., Electronic & Electrical Engineering, University of Sheffield, UK, 1987
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Research
- Optoelectronics
- Integrated Optics Devices with Gain using resonant
- Novel semiconductor nanostructures for advanced optoelectronics
- Implement Monolithic All-Optical Switching Circuits
- Multi-platform integration using multilayer dielectric films for integrated
- Integrated optic bio-sensors
- Monolithically integrated wavelength tunable optical emitters

Other Experience
- Co-founder, Optium Inc.

Professional Activities
- Senior Member IEEE/LEOS

Honors and Awards
- IEEE/LEOS Orlando Chapter Engineer of the Year
- UCF Teacher Incentive Program
- College of Optics Excellence in Graduate Teaching Award

M. G. "Jim" Moharam
Professor of Optics
Ph.D., EE, University of British Columbia, Canada, 1978
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Research
- Diffractive holographic optics
- Integrated photonics grating based devices
- Computational photonics
- Theory and analysis of periodic structures
- Subwavelength periodic structures and devices
- Guided-waves grating resonant devices
- Analysis and design artificial metamaterial devices
- Novel integrated antireflective surfaces
- Grating based plasmonic structures

Other Experience
- Wave propagation in periodic and anisotropic media
- Analysis and design of optical filters
- Thin film optics

Professional Activities
- Topical Editor - JOSA - A
- Conference Chair, Topical meeting on diffractive optics
- Program Committee, SPIE Europe

Honors and Awards
- Fellow, Optical Society of America
- Senior Member, IEEE
- UCF Graduate Teaching Award

Martin C. Richardson
FPCE Trustee Chair; Northrop Grumman
Prof. of X-ray Photonics; Prof. of Optics, Physics & ECE; Director, Townes Laser Institute
Ph.D., Physics, London, University, 1967
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Research
- Laser system development
- Femtosecond laser-aided materials processing
- Laser-induced-breakdown spectroscopy (LIBS)
- Biological x-ray microscopy
- Laser medicine
- Optical tweezers
- Physics of laser plasmas
- Plasma & radiation modeling - X-ray sources
- Ultra-fast X-ray production; interaction with matter diffraction studies
- X-ray and EUV optics
- Laser plasma EUV sources for lithography
- High energy lasers
- Solid state lasers
- High power fiber lasers development & High power ultrafast lasers
- Laser spectroscopy and sensing

Professional Activities
- Member, SPIE, APS, Program Committee; LEOS
- Directed Energy Consortium (UCF rep.), 2003
- Member, Expert Review Panel - Canadian Institute for Photonic Innovations, Canadian Govt.

Honors and Awards
- Fellow, OSA; Senior Member, IEEE
- Schardin Medal
Nabeel A. Riza
Professor of Optics & EECS
Ph.D., EE; California Institute of Technology, 1989
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Research
- Photonic control systems for phased arrays
- Liquid Crystal Devices
- Acousto-optic signal processing
- Optical communications
- Photonic switching
- Interferometry

Other Experience
- Lead Scientist, General Electric, 1989-95

Professional Activities
- Vice President, Memberships, IEEE LEOS 2002-05
- Chair, IEEE LEOS Orlando Chapter and Advisor
- Editor, SPIE Milestone Series Volume on Photonic Control Systems for Phased Array Antennas
- Co-Editor, SPIE Milestone series Volume on Analog Fiber-Optic Links
- Expert panel member: DARPA, OIDA, NIST, ONR, NSF, NIH, NWO

Honors and Awards
- 2001 International ICO Prize & 2001 Ernst Abbe Medal: Carl Zeiss Foundation, Germany
- Fellow, OSA and SPIE
- Laser Focus World Technical Writings Commendation Award, 2004
- GE Gold Patent Medal, 1995

Bahaa E. A. Saleh
Dean & Director, Professor of Optics
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Research
- Nonlinear and quantum optics
- Quantum information processing
- Coherence and statistical optics
- Optical imaging and sensing

Other Experience
- Chair of ECE, Boston University, 1994-07
- Chair of ECE, University of Wisconsin-Madison, 1990-94
- Assoc. Director, ERC Center for Subsurface Imaging, 2000-09

Professional Activities
- Member, Board of Directors, LIA, 2011-present
- Founding Editor, Advances in Optics and Photonics, 2008-present
- Author, Introduction to Subsurface Imaging, Cambridge 2011

Honors and Awards
- OSA Distinguished Service Award, 2009
- OSA Esther Hoffman Beller Medal, 1999
- Kuwait Prize, 2006
- SPIE BACUS Prize, 2004
- Fellow: IEEE, OSA, SPIE
- Fellow: Guggenheim Foundation

Winston V. Schoenfeld
Associate Professor of Optics
Ph.D., Materials Science, Univ. of California, Santa Barbara, 2000
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Research
- MBE growth of oxide semiconductors (wurtzite and cubic)
- Binary cubic oxide semiconductor solar-blind detectors
- Hybrid homoepitaxial zinc oxide-nitride laser diodes
- cSi photovoltaics
- Passive/active photonic crystal nanocavity systems

Other Experience
- Director, cSi Photovoltaic Manufacturing Consortium (PVMC)
- President/CEO, Medical Lighting Solutions, 2003-04
- Device Manager, Uniroyal Optoelectronics, 2000-03

Professional Activities
- Principal Editor, Journal of Materials Research
- Chair, MOEMS/MEMS Conference - Photonic West
- Executive Committee, Florida Chapter of the AVS

Honors and Awards
- Fellow of SPIE
- UCF TIP Award, 2010
- College Excellence in Graduate Teaching, 2009
- UCF Presidential Initiative Award, 2006
- Fellow, Military Sensing Symposium

Axel Schülzgen
Professor of Optics
Ph.D., Physics, Humboldt University, 1992
axel@creol.ucf.edu
(407) 823-1746
http://fol.creol.ucf.edu/

Research
- Fiber laser devices
- Fiber optic sensors
- Linear and nonlinear light propagation in fiber
- Nanostructured and functionalized fibers
- Design and fabrication of specialty optical fiber
- Advanced optical materials
- Linear and nonlinear optical spectroscopy

Other Experience
- College of Optical Sciences, The University of Arizona, 1996-09
- Department of Physics, Trinity College, Dublin, Ireland, 1995
- Department of Physics, Humboldt University, Berlin, Germany, 1991-95

Professional Activities
- Associate Editor, Applied Optics, Ultrafast Lasers and Optics
- Member, OSA, SPIE, German Physical Society

Honors and Awards
- Habilitation Fellowship, German Research Foundation, 1993
- Carl Ramsauer-Magnus Award, AEG Corporation, 1992
- Heinrich Gustav - Magnus Award, Humboldt University, Berlin, 1988


**M.J. Soileau**  
Vice Pres., Research & Commercialization and Prof. of Optics, ECE & Physics  
Ph.D., Quantum Electronics, University of Southern California, 1979  
mj@ucf.edu  
(407) 823-5538

**Research**  
- Nonlinear optical properties of materials  
- Laser-induced damage; Laser-induced damage to optical materials  
- Nonlinear refraction nonlinear absorption; Sensor protection

**Other Experience**  
- Physicist, Naval Weapons Center Physics Div., China Lake, 1973-80  
- Professor of Physics, North Texas State University, 1980-87  
- Director, School of Optics/CREOL, 1987-99  
- Chair of the Board, Orlando Science Center, 2002  
- Technology-Based Economic Development; Technology Transfer  
- Board of Directors, BEAM, Inc.; Board of Directors, Aquafiber

**Professional Activities**  
- Member, SPIE, OSA, IEEE, LEOS, LIA, ASEE; President, SPIE, 1997  
- International Advisory Committee on Coherent and Nonlinear Optics, 2001  
- Co-Chair, OSA/SPIE Joint Task Force, 1998-99

**Honors and Awards**  
- Director’s Award, SPIE, 1999  
- Fellow, OSA, IEEE, SPIE, AAAS; Senior Member, LIA  
- Outstanding Engineer Award, State of Florida, 1994  
- Gold Medal of SPIE  
- Esther Hoffman Beller Award of OSA  
- Distinguished Service Appreciation Medal, presented by the Institute of Photonic Sciences, Barcelona, Spain

**Eric W. Van Stryland**  
Professor of Optics, Past Dean  
Ph.D., Physics; Optical Sciences, University of Arizona 1976  
ewvs@creol.ucf.edu  
(407) 823-6831  
http://nlo.creol.ucf.edu

**Research**  
- Develop NLO spectroscopic techniques, e.g. Z-scan  
- Measure nonlinear absorption spectra, e.g. two-photon absorption, 2PA  
- Measure nonlinear refraction dispersion, e.g. bound electronic n2  
- Model material nonlinearities, 2PA, n2, excited-state absorption, etc.  
- Measure ultrafast NLO response and temporally resolve  
- Develop nonlinear devices - e.g. widegap IR detectors using 2PA

**Other Experience**  
- Dean, CREOL, The College of Optics and Photonics, 2004-09  
- Director, School of Optics/CREOL, 1999-04  
- Visiting Professor, Heriot-Watt University, 1985  
- Chair, Center for Applied Quantum Electronics, U. of N. Texas, 1983-86  
- Center for Laser Studies, University of South California, 1976-78

**Professional Activities**  
- President, Optical Society of America (OSA), 2006, Board of Directors,  
- Fellow, OSA, SPIE, IEEE-LEOS, APS; Senior member, LIA (Board of Directors)  
- Topical Editor, Optics Letters, 1994-98

**Honors and Awards**  
- UCF Pegasus Award, 2003  
- UCF Researcher of the Year, 1990 and 2009; R&D 100 Award, 2001  
- ISI Highly Cited Author

**Shin-Tson Wu**  
Pegasus Professor of Optics  
Ph.D, Physics, University of Southern California, 1981  
swu@creol.ucf.edu  
(407) 823-4763  
http://lcd.creol.ucf.edu

**Research**  
- Next-Generation Liquid Crystal Displays  
- Adaptive Lenses  
- Adaptive Optics  
- Biosensors  
- Laser Beam Steering  
- New Photonic Materials

**Other Experience**  
- Senior Research Scientist, Hughes Research Labs

**Professional Activities**  
- SID Honors and Awards Committee  
- SPIE G.G. Stokes Award Committee  
- Vice Chair, OSA Publication Council  
- Founding Editor-In-Chief, IEEE/OSA Journal Display Technology

**Honors and Awards**  
- 2011 SID Slottow-Owaki Prize  
- 2010 OSA Joseph Fraunhofer Award  
- 2008 SPIE G.G. Stokes Award  
- 2008 SID Jan Rajchman Prize  
- Florida Photonics Center of Excellence (FPCE) Professorship  
- Provost Research Enhancement Position (PREP) award

**Boris Y. Zeldovich**  
Professor of Optics & Physics  
Ph.D., Physics, Institute of Theoretical and Experimental Physics, Moscow, 1969  
boris@creol.ucf.edu  
(407) 823-6831

**Research**  
- Physical optics and propagation  
- Wave propagation in multimode optical waveguides and irregularly inhomogeneous media  
- Beam clean-up and combining via nonlinear-optical processes  
- Nonlinear optics, including liquid crystals

**Other Experience**  
- Vice President, Beam Engineering for Advanced Measurements Co., Winter Park, FL  
- Head of Joint Nonlinear Optics Laboratory, Electrophysics Institute of the Russian Academy of Sciences and Chelyabinsk Technical University, Russia, 1987-94  
- Principal Senior Scientific Researcher, Institute for Problems in Mechanics, Moscow, 1981-87  
- Lecturer on Nonlinear & Statistical Optics, Moscow Institute for Physics and Technology, 1969-1987

**Professional Activities**  
- Editorial Board Member, Optics Communications; Pure & Applied Optics; Optical and Quantum Electronics; International Journal of Nonlinear Optical Physics & Materials Topical Editor, J.of Optical Society of America B

**Honors and Awards**  
- Max Born Award, OSA, 1997  
- Fellow, OSA  
- Member of the Russian Academy of Sciences  
- USSR State Prize for the discovery of optical phase conjugation, 1983
<table>
<thead>
<tr>
<th>Emeritus Faculty</th>
</tr>
</thead>
</table>
| **Larry C. Andrews**  
Emeritus Professor of Mathematics & Optics  
Ph.D., Engineering, Michigan State University, 1970  
Larry.andrews@ucf.edu  
407-823-2418 |
| **Research** |
| - Propagation of laser beams through random media  
- Laser communication and laser radar |
| **Other Experience** |
| - Staff Mathematician, Antisubmarine Warfare Operation, Magnavox Co., Fort Wayne, IN  
- Assistant Professor of Mathematics and Mechanics, Tri-State University, Angola, IN |
| **Professional Activities** |
| - Author of many textbooks and monographs on wave propagation through random media, applications to laser communications and radar, atmospheric optics, and advanced applied mathematics. |
| **Honors and Awards** |
| - Fellow, SPIE |
| **Michael Bass**  
Professor Emeritus of Optics, Physics & ECE  
Ph.D., Physics, University of Michigan, 1964  
bass@creol.ucf.edu  
(407) 823-6977  
http://bass.optics.ucf.edu/ |
| **Research** |
| - Display technologies; all-optical 2- and 3-dimensional displays  
- Up-conversion processes in dielectric materials  
- Laser systems development  
- Solid state laser design  
- Models for high-average-power solid state lasers  
- Pump requirements, performance potentials and Limitations  
- Spray cooling of diode laser bars  
- Thermal management of diode laser arrays sources for solid state lasers |
| **Other Experience** |
| - Senior Research Scientist, Raytheon, 1966-73  
- Director, Center for Laser Studies, USC, 1977-84  
- Chair, EE Electrophysics, USC, 1984-87  
- Vice President for Research, UCF, 1988-93 |
| **Professional Activities** |
| - Associate Editor, Optics Express  
- Editor-in-chief “Handbook of Optics, 2nd and 3rd editions, OSA  
- Associate Editor, 100th Anniversary of OSA commemorative books |
| **Honors and Awards** |
| - Fellow, Optical Society of America (OSA)  
- Fellow, IEEE |
| **Ronald L. Phillips**  
Emeritus Professor of EECS & Optics  
PhD, Electrical Engineering, Arizona State University, 1971  
Ronald.phillips@ucf.edu |
| **Research** |
| - Laser Space Communication Systems  
- Laser Radar  
- Detection Theory and Math Modeling  
- Optical Wave Propagation Through Random Media  
- Random Field Theory |
| **Other Experience** |
| - Academic positions at Arizona State University and the University of California, San Diego. |
| **Professional Activities** |
| - Founding Director, UCF Florida Space Institute (FSI)  
- Founding Director of CREOL  
- Author of 3 books in the topic of wave propagation through random media and applications to laser communications and radar.  
- Co-author of a text on advanced applied mathematics. |
| **Honors and Awards** |
| - Senior NATO Post-doctoral Fellow  
- ASEE 1983 Medal Outstanding Contributions to Research  
- Florida Space Business Roundtable Explorer Award for education  
- Fellow, OSA, SPIE |
| **William Silfvast**  
Emeritus Professor of Optics  
Ph.D., Physics, University of Utah, 1965  
silfvast@creol.ucf.edu  
(407) 823-6855  
http://silfvast.creol.ucf.edu/ |
| **Research** |
| - X-Ray science and technology  
- EUV lithography and microscopy  
- X-Ray theory - X-Ray Lasers |
| **Other Experience** |
| - Chair, UCF Department of Physics, 1994-97  
- Distinguished Member Technical Staff, ATT-Bell Labs, 1994-97 |
| **Professional Activities** |
| - Co-Chair, CLEO, 1983  
- Board of Directors, OSA. 1986-00  
- Program Committee Member, LEOS, 1994-00  
| **Honors and Awards** |
| - Fellow, Optical Society of America, American Physical Society, IEEE  
- Guggenheim Fellow, Stanford University  
- Distinguished Member Technical Staff, ATT-Bell Labs, 1983  
- NATO Postdoctoral Fellow  
- Researcher of the Year, University of Central Florida, 2000 |
George I. Stegeman
Emeritus Professor of Optics, Physics & EECS
Ph.D, Physics, University of Michigan, 1964
george@creol.ucf.edu
(407) 629-2944

Research
• Discrete optics, linear and nonlinear, solitons

Other Experience
• Distinguished Professor, University of Toronto

Professional Activities
• Editor-in-Chief, Journal of the OSA B
• Organizing Committee, NOA 2011, Torun Poland, June 2011
• Editorial Board, Physics Reports, Responsible for Optics, 2005-present
• Chair Professor, College of Engineering, King Fahd University, Saudi Arabia

Honors and Awards
• Cobb Family Chair, UCF
• Fellow, Optical Society of America
• Fellow, American Physical Society
• Hertzberg Medal for Achievement in Physics
• R. W. Wood Prize for the Optical Society of America (2003)
• Bluto Award of the Polish Photonics Society, 2011
• Doctor Honoris Causa, Instituto Nacional de Astorfiisca, Optica y Electronica (INAEO), 2011

Visiting Faculty

ANGELA GUZMAN
Visiting Associate Research Professor
Dr.Sc., Ludwig Maximilian University
Quantum Optics
angela.guzman@creol.ucf.edu

MALVIN C. TEICH
Visiting Research Professor
PhD, Cornell University
Quantum Optics
teich@creol.ucf.edu
## Joint Appointments

**KEVIN D. BELFIELD**  
Department Chair & Prof. of Chemistry and Optics  
PhD, Syracuse University  
Multiphoton Absorbing Materials  
Belfield@ucf.edu

**LOUIS CHOW**  
Prof. and Univ. Chair of MMAE  
PhD, University of California, Berkeley  
Heat Transfer Issues in Electro-Optics  
Louis.chow@ucf.edu

**ANDRE GESQUIERE**  
Asst. Prof., Nanoscience Technology Center, Chemistry, and Optics  
PhD, University of Leuven  
Optoelectronic Materials, Nanobiology  
andre@ucf.edu

**FLORENCIO E. HERNANDEZ**  
Assoc. Prof. of Chemistry & Optics  
D.Sc., Universidad Central de Venezuela & Université Franche-comté  
Optical Materials  
Florencio.hernandez@ucf.edu

**DAVID KAUP**  
Provost Distinguished Research Prof. of Math and Optics  
david.kaup@ucf.edu

**MICHAEL LEUENBERGER**  
Assistant Prof. of Physics and Optics  
Ph.D., University of Basel  
Quantum Information  
Michael.leuenberger@ucf.edu

**ROBERT E. PEALE**  
Professor of Physics and Optics  
Ph.D., Cornell University  
Defects in Semiconductors  
Robert.peale@ucf.edu

**MICHAEL SIGMAN**  
Associate Professor of Chemistry and Optics  
PhD, Florida State University  
Explosives, Chemistry & Forensics  
Michael.sigman@ucf.edu

**MUBARAK A. SHAH**  
Agere Chair Professor of Computer Science and Optics  
PhD, Wayne State University  
Computer Vision  
Mubarak.shah@ucf.edu

**THOMAS X. WU**  
Associate Professor of EECS & Optics  
Ph.D., University of Pennsylvania  
Numerical Techniques in Electromagnetics  
Thomas.wu@ucf.edu

**ALFONS SCHULTE**  
Prof. of Physics and Optics  
Dr. rer. Nat, Technical University of Munich  
Near-IR Raman Spectroscopy  
Alfons.schulte@ucf.edu

**MICHAEL SIGMAN**  
Associate Professor of Chemistry and Optics  
PhD, Florida State University  
Explosives, Chemistry & Forensics  
Michael.sigman@ucf.edu

**CYNTHIA YOUNG**  
Professor of Math and Optics  
Ph.D., University of Washington  
Laser Propagation in Random Media  
Cynthia.young@ucf.edu
**KURT BUSCH**  
Prof. of Physics, Univ. Karlsruhe  
PhD, University of Karlsruhe  
kurt@tfp.uni-karlsruhe.de

**BRUCE H. CHAI**  
President, Crystal Photonics  
Ph.D., Yale University  
chai@crystalphotronics.com

**HANS P. JENSSEN**  
AC Materials  
Ph.D., MIT  
h.jenssen@ac-materials.com

**JANNICK ROLLAND**  
Brian J. Thompson Prof. of Optical Engineering, Prof. of Biomedical Engineering, University of Rochester  
PhD, University of Arizona  
Optical Diagnostics & Applications  
rolland@optics.rochester.edu

**ERIC G. JOHNSON**  
Professor of Physics & Optical Science  
University of North Carolina Charlotte  
Ph.D., University of Alabama  
egjohnso@uncc.edu

**KATHLEEN A. RICHARDSON**  
Professor of Materials Science and Engineering, Clemson University  
Ph.D., Alfred University  
richar3@clemson.edu

**CRAIG W. SIDERS**  
ARES Program Element Leader, Lawrence Livermore Lab  
Ph.D., University of Texas at Austin  
Photon Science and Applications  
prof.craig.siders@gmail.com

**EMIL WOLF**  
Wilson Professor of Optical Physics  
Ph.D., Bristol University, England  
Optical Coherence  
ewlupus@pas.rochester.edu
## Awards and Honors

<table>
<thead>
<tr>
<th>Year</th>
<th>Award</th>
<th>Recipient(s)</th>
</tr>
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<tbody>
<tr>
<td>1997</td>
<td>Max Born Award</td>
<td>Boris Zeldovich</td>
</tr>
<tr>
<td>1999</td>
<td>Nicholas Holonyak Award</td>
<td>Dennis Deppe</td>
</tr>
<tr>
<td>1999</td>
<td>Esther Hoffman Beller Award</td>
<td>Bahaa Saleh</td>
</tr>
<tr>
<td>2008</td>
<td>Esther Hoffman Beller Award</td>
<td>M.J. Soileau</td>
</tr>
<tr>
<td>2008</td>
<td>Distinguished Service Award</td>
<td>Bahaa Saleh</td>
</tr>
<tr>
<td>2010</td>
<td>Joseph Fraunhofer/Robert M. Burley Prize</td>
<td>Shin-Tson Wu</td>
</tr>
<tr>
<td>2003</td>
<td>R. W. Wood Prize</td>
<td>George Stegeman</td>
</tr>
<tr>
<td>2011</td>
<td>R. W. Wood Prize</td>
<td>Demetrios Christodoulides</td>
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<tr>
<td>1995</td>
<td>Kingslake Medal and Prize</td>
<td>Glenn Boreman</td>
</tr>
<tr>
<td>2004</td>
<td>Bacus Award</td>
<td>Bahaa Saleh</td>
</tr>
<tr>
<td>2008</td>
<td>Dennis Gabor Award</td>
<td>Leonid Glebov</td>
</tr>
<tr>
<td>2008</td>
<td>G. G. Stokes Award</td>
<td>Shin-Tson Wu</td>
</tr>
<tr>
<td>2008</td>
<td>Gold Medal Award</td>
<td>M.J. Soileau</td>
</tr>
<tr>
<td>2003</td>
<td>Engineering Achievement</td>
<td>Dennis Deppe</td>
</tr>
<tr>
<td>2009-10</td>
<td>Distinguished Lecturer Award</td>
<td>Nabeel Riza</td>
</tr>
<tr>
<td>2008</td>
<td>Jan Rajchman Prize</td>
<td>Shin-Tson Wu</td>
</tr>
<tr>
<td>2011</td>
<td>Slotto–Owaki Prize</td>
<td>Shin-Tson Wu</td>
</tr>
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<td></td>
<td>Edward A. Bouchet Award</td>
<td>Peter Delfyett</td>
</tr>
<tr>
<td></td>
<td>NSF Presidential Early Career Award (PECASE)</td>
<td>Peter Delfyett</td>
</tr>
<tr>
<td></td>
<td>NSF Presidential Young Investigator Award (1991)</td>
<td>Dennis Deppe</td>
</tr>
<tr>
<td></td>
<td>NSF CAREER Award (1996)</td>
<td>Sasan Fathpour</td>
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<td></td>
<td>NSF CAREER Award (2007)</td>
<td>Pieter Kik</td>
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<td>NSF CAREER Award (2008)</td>
<td>Stephen Kuebler</td>
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<td></td>
<td>NSF CAREER Award (2012)</td>
<td>Guifang Li</td>
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<td>ONR Young Investigator Award (1991)</td>
<td>Dennis Deppe</td>
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<td></td>
<td>ONR Young Investigator Award (1995)</td>
<td>Guifang Li</td>
</tr>
<tr>
<td></td>
<td>Ralph E. Powe Junior Faculty Award (2009)</td>
<td>Ayman Abouraddy</td>
</tr>
<tr>
<td></td>
<td>Guggenheim Fellow (1984)</td>
<td>Bahaa Saleh</td>
</tr>
</tbody>
</table>
**International Awards**

- Foreign Member, Russian Academy of Science (1994)
- Hubert Schardin Gold Medal Medal (1996)
- ICO International Prize In Optics (2001)
- Ernst Abbe Medal, Carl Zeiss, Germany (2001)
- Erasmus Mundus Scholar Award, European Union (2007)
- Berthold Leibinger Innovation Prize, Germany (2008)
- T. S. Walton Visitor Award, Ireland (2010)
- Hubert Schardin Gold Medal Medal (1976)
- Kuwait Prize (2006)
- Habilitation Grant, German Research Foundation (1993)
- Carl-Ramsauer-Award of the AEG AG (1992)
- USSR Academy of Sciences (1987)
- USSR State Prize (1983)

**Fellows of Professional Societies**

- Michael Bass
- Glenn Boreman
- Demetrios Christodoulides
- Peter Delfyett
- Dennis Deppe
- Aristide Dogariu
- Leonid Glebov
- David Hagan
- Guifang Li
- M.G. Moharam
- James Pearson
- Martin Richardson
- Nabeel Riza
- Bahaa Saleh
- William Silfvast
- M.J. Soileau
- George Stegeman
- Eric Van Stryland
- Shin-Tson Wu
- Boris Zeldovich

**IEEE Photonics Society**

- Michael Bass
- Peter Delfyett
- Dennis Deppe
- James Pearson
- Nabeel Riza
- Bahaa Saleh
- William Silfvast
- M.J. Soileau
- Eric Van Stryland
- Shin-Tson Wu

**SPIE**

- Glenn Boreman
- Leonid Glebov
- James Harvey
- Guifang Li
- James Pearson
- Nabeel Riza
- Bahaa Saleh
- Winston V. Schoenfeld
- M.J. Soileau
- Eric Van Stryland
- Shin-Tson Wu

**APS**

- Zenghu Chang
- Demetrios Christodoulides
- Peter Delfyett
- Eric Van Stryland

**SID**

- Shin-Tson Wu

**Laser Institute of America**

- Aravinda Kar

**The American Ceramic Society**

- Leonid Glebov
## Presidents, Directors and Officers of Professional Societies

### OSA

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eric Van Stryland</td>
<td>President (2006)</td>
</tr>
<tr>
<td>Michael Bass</td>
<td>Board of Directors Member (1989-1992)</td>
</tr>
<tr>
<td>Peter Delfyett</td>
<td>Board of Directors Member (2004-2006)</td>
</tr>
<tr>
<td>Bahaa Saleh</td>
<td>Board of Directors Member (1998-2005)</td>
</tr>
<tr>
<td>Eric Van Stryland</td>
<td>Board of Directors Member (1998-2001)</td>
</tr>
</tbody>
</table>

### SPIE

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Years</th>
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<tbody>
<tr>
<td>M.J. Soileau</td>
<td>President (1997)</td>
</tr>
<tr>
<td>Glenn Boreman</td>
<td>Board of Directors Member (1997-1999)</td>
</tr>
<tr>
<td>James Harvey</td>
<td>Board of Directors Member (2001-2003)</td>
</tr>
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</table>

### IEEE Photonics Society

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shin-Tson Wu</td>
<td>Board of Governors (2003-present)</td>
</tr>
<tr>
<td>Peter Delfyett</td>
<td>Board of Governors (2000-2002)</td>
</tr>
<tr>
<td>Jim Moharam</td>
<td>Vice-President (1997-1999)</td>
</tr>
<tr>
<td>Nabeel Riza</td>
<td>Vice-President (2003-2005)</td>
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</table>

### Laser Institute of America

<table>
<thead>
<tr>
<th>Name</th>
<th>Position and Years</th>
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<tbody>
<tr>
<td>Michael Bass</td>
<td>President (1988)</td>
</tr>
<tr>
<td>Michael Bass</td>
<td>Board of Directors Member (1985-1989)</td>
</tr>
<tr>
<td>Aravinda Kar</td>
<td>Board of Directors Member (2005)</td>
</tr>
<tr>
<td>Bahaa Saleh</td>
<td>Board of Directors Member (2010-present)</td>
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<tr>
<td>Eric Van Stryland</td>
<td>Board of Directors Member (1992-1994)</td>
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</table>

### National Society of Black Physicists

<table>
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<tr>
<th>Name</th>
<th>Position and Years</th>
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<tbody>
<tr>
<td>Peter Delfyett</td>
<td>President (2008-2011)</td>
</tr>
</tbody>
</table>
## Journal Editors & Associate Editors

<table>
<thead>
<tr>
<th>Journal Editors</th>
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<tbody>
<tr>
<td><strong>Optics Communications (2011-present)</strong></td>
<td>Pieter Kik</td>
</tr>
<tr>
<td>Optical Materials Express (2010-present)</td>
<td>David Hagan</td>
</tr>
<tr>
<td>Advances in Optics &amp; Photonics (2008-present)</td>
<td>Bahaa Saleh</td>
</tr>
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</table>

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<tr>
<th>Associate/Topical Editors</th>
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<tbody>
<tr>
<td>Optics Express (2001-2001)</td>
<td>Michael Bass</td>
</tr>
<tr>
<td>Optics Express (2009-present)</td>
<td>Glenn Boreman</td>
</tr>
<tr>
<td>Journal of the Optical Society of America B (2007-2013)</td>
<td>Guifang Li</td>
</tr>
<tr>
<td>Optics Express (2007-present)</td>
<td>Martin Richardson</td>
</tr>
<tr>
<td>Photonics Technology Letters (2007-present)</td>
<td>Nabeel Riza</td>
</tr>
<tr>
<td>Applied Optics (2008-present)</td>
<td>Shin-Tson Wu</td>
</tr>
<tr>
<td>Liquid Crystals (2009-present)</td>
<td></td>
</tr>
</tbody>
</table>
**Authors & Editors of Books**


- **Volume I**: Geometrical and Physical Optics, Polarized Light, Components and Instruments.
- **Volume II**: Design, Fabrication and Testing, Sources and Detectors, Radiometry and Photometry.
- **Volume III**: Vision and Vision Optics.
- **Volume IV**: Optical Properties of Materials, Nonlinear Optics, Quantum Optics.
- **Volume V**: Atmospheric Optics, Modulators, Fiber Optics, X-Ray and Neutron Optics.


Awards & Honors (2011)

**National/International**

OSA R. W. Wood Prize          Demetrios Christodoulides  
SID Slottow-Owaki Prize        S.T. Wu               
APS Edward A. Bouchet Award    Peter Delfyett            
APS Fellow                     Peter Delfyett            
APS Fellow                     Eric Van Stryland         
SPIE Fellow                    Winston Schoenfeld        
DEPS Fellow                    Martin Stickley           

**University**

Teaching Incentive Program Award Jim Moharam  
Research Incentive Award       Shin-Tson Wu            
Excellence in Graduate Teaching Award (college level) Jim Moharam  
Excellence in Research Award (college & university level) Shin-Tson Wu
### 1.2 Research Staff

<table>
<thead>
<tr>
<th>NAME</th>
<th>TITLE</th>
<th>ADVISOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Larry Shah</td>
<td>Senior Research Scientist</td>
<td>Richardson</td>
</tr>
<tr>
<td>Matthieu Baudelet</td>
<td>Senior Research Scientist</td>
<td>Richardson</td>
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<tr>
<td>Ivan Diviansky</td>
<td>Senior Research Scientist</td>
<td>Glebov</td>
</tr>
<tr>
<td>Sabine Freisem</td>
<td>Senior Research Scientist</td>
<td>Deppe</td>
</tr>
<tr>
<td>Julien Lumeau</td>
<td>Senior Research Scientist</td>
<td>Glebov</td>
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<tr>
<td>George Venus</td>
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<tr>
<td>Ilja Mingareev</td>
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<tr>
<td>Ying Chen</td>
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<td>Bass</td>
</tr>
<tr>
<td>Andrey Krywonos</td>
<td>Research Scientist</td>
<td>Harvey</td>
</tr>
<tr>
<td>Bill Franklin</td>
<td>Research Scientist</td>
<td>Boreman</td>
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<tr>
<td>Daniel Mullally</td>
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<tr>
<td>Guy Zummo</td>
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<td>Boreman</td>
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<tr>
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<td>Research Scientist</td>
<td>Wu</td>
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<tr>
<td>Igor Ciapurin</td>
<td>Research Scientist</td>
<td>Glebov</td>
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<td>Larissa Glebova</td>
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<td>Scott Webster</td>
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<td>Hagan/Van Stryland</td>
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<tr>
<td>Sergey Sukhov</td>
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<td>Dogariu</td>
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<tr>
<td>Vadim Smirnov</td>
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<td>Vasile Rotar</td>
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<td>James Ginn</td>
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<td>Yeong-Ren Lin</td>
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<td>Chow</td>
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<td>Dmitry Fishman</td>
<td>Post Doctoral Research Associate</td>
<td>Hagan/Van Stryland</td>
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<td>Jeffrey Bean</td>
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<td>Edward Kinzel</td>
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<td>Narayanan Ananthakrishna</td>
<td>Post Doctoral Research Associate</td>
<td>Kuebler</td>
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<td>Post Doctoral Research Associate</td>
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<td>Majid Masnavi</td>
<td>Post Doctoral Research Associate</td>
<td>Richardson</td>
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<tr>
<td>Arthur Freeman</td>
<td>Laboratory Technician</td>
<td>Richardson</td>
</tr>
<tr>
<td>Lorrenne Denney</td>
<td>Laboratory Technician</td>
<td>Dogariu</td>
</tr>
<tr>
<td>Somsak (Tony) Teerawattanasook</td>
<td>Senior Electrical Engineer</td>
<td>Richardson</td>
</tr>
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### Visiting Scientists

<table>
<thead>
<tr>
<th>NAME</th>
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<tbody>
<tr>
<td>Brian Lail</td>
<td>Visiting Lecturer</td>
<td>Boreman</td>
</tr>
<tr>
<td>Olga V. Przhonska</td>
<td>Visiting Research Scientist</td>
<td>Hagan/Van Stryland</td>
</tr>
<tr>
<td>Sven Schröder</td>
<td>Visiting Research Scientist</td>
<td>Harvey</td>
</tr>
<tr>
<td>Bruno Bousquet</td>
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<td>Richardson</td>
</tr>
<tr>
<td>Nikolai Vorobiev</td>
<td>Visiting Research Scientist</td>
<td>Glebov</td>
</tr>
<tr>
<td>Harby Ahmed</td>
<td>Visiting Research Scientist</td>
<td>Richardson</td>
</tr>
<tr>
<td>Giovanni Di Giuseppe</td>
<td>Visiting Research Scientist</td>
<td>Saleh</td>
</tr>
<tr>
<td>Ruiyi Chen</td>
<td>Visiting Research Scientist</td>
<td>Fathpour</td>
</tr>
<tr>
<td>Gihwan Lim</td>
<td>Visiting Research Scientist</td>
<td>Wu</td>
</tr>
<tr>
<td>Haiqing Xianyu</td>
<td>Visiting Research Scientist</td>
<td>Wu</td>
</tr>
</tbody>
</table>
Irina Popkova  
Shuxin Dai  
Dagong Jia  
Xiangru Wang  
Jing Zhang  
Julio Cesar Hernandez Herrejon  
Juangying Zhao  
Harby Ahmed  
Binfeng Yun  
Seishi Shibayama  
Armando Perez Leija  
Jose Antonio Lopez  
Sergiy Mokhov  
Fabian Weirauch  
David Romero-Antequera  
Dayana Penalver-Vidal  
Haggeo Desirena Enriquez  
Chao-Te Lee  
Jin-Jei Wu  
Dijun Chen  
Margarida Vieira Facao  
Qing Li  
Jun Hyup Lee  
Takakiro Ishinabe  
Visiting Research Scientist  
Visiting Research Scientist  
Visiting Research Scientist  
Visiting Research Scientist  
Visiting Research Scientist  
Visiting Research Scientist  
Visiting Research Scientist  
Visiting Research Scientist  
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Visiting Research Scientist  
Visiting Research Scientist  
Visiting Research Scientist  
Glebov  
Abouraddy  
Li  
Bass  
Li  
Christodoulides  
Christodoulides  
Richardson  
Kik  
Wu  
Christodoulides  
Li KamWa  
Glebov  
Richardson  
Christodoulides  
Harvey  
Schülzgen  
Wu  
Wu  
Bass  
Christodoulides  
Wu  
Wu  
Wu  
Wu

Special Assistants

**DR. JAMES PEARSON**
Special Consultant
jpearson@creol.ucf.edu  
(407) 823-6858

**DR. C. MARTIN STICKLEY**
Special Assistant to the Vice President, Research and Commercialization
stickley@creol.ucf.edu  
(407) 628-2514

The CREOL Building
1.3 Organization and Administrative Staff

Organization Chart

Office of Academic Programs

Assoc. Dean
Academic Programs
David Hagan

Admissions
Rachel Franzetta

Payroll & Personnel
Amy Perry
Gail Drabczuk

Administrative support
Chantel Negrete
Kelly Ross

Accounting
Tavis McLelland

Purchasing
Matt Petrone
Sono Shah

Proposals & Deliverables
Vicky Ortiz
Travel
Maria Lopes
Marisa Dickler

Computer Support
Deon Frank
Adrian Kostic

Engineering Support
James Ross
Machine Shop
Richard Zotti

Dean
Baha Salch

Assistant to the Dean
Denise Whiteside

Assoc. Director
Business Manager
Mark Wagenhauser

Administrative Staff

MARISA DICKLER
Office Assistant
Marisa.Dickler@creol.ucf.edu

GAIL DRABCZUK
Coordinator, Administrative Services
gaild@creol.ucf.edu

DEON FRANK
Computer Support
dfrank@creol.ucf.edu

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Senior Admissions Specialist
rfranzet@creol.ucf.edu

ADRIAN KOSTIC
Computer Support
akostic@creol.ucf.edu

MARIA LOPES
Travel Coordinator
mlopes@creol.ucf.edu
2. Academic Programs

The College has a strong focus on education at the MS and PhD levels through both coursework and research. Our graduates are highly educated and well prepared for the modern-day work force and consequently our graduates are highly sought after in both the private sector and in top research universities. We also contribute to the undergraduate teaching mission of the university by teaching optics and photonics courses for undergraduates in other programs.

2.1 Graduate Recruitment and Enrollment

Enrollment in both MS and PhD programs has remained approximately constant at about 125 (Approx. 105 in the PhD and 10 – 20 in the MS.) A total of 35 new students (26 Ph.D. and 9 MS) enrolled in the 2010-11 academic year. The GRE scores of our admitted students were similar to 2009-10 and higher than in previous years. Overall, we received 394 pre-applications and 249 full applications to the graduate programs, which is an increase over previous years.

We received a total of 364 pre-applications to our graduate programs in Fall 2010, which resulted in 201 official applications submitted through the graduate school. The pre-application is a preselecting tool run through our own web site that allows us to make contact with applicants early and to help advice international students as to whether to apply officially, which is an expensive undertaking for many international students. These numbers are similar to previous years.
New Matriculants for Fall 2010 - Summer 2011

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>FT</th>
<th>PT</th>
<th>CREOL Fellow</th>
<th>UCF Award*</th>
<th>UCF Trustee</th>
<th>UCF Dean</th>
<th>UCF Provost</th>
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<tbody>
<tr>
<td>PHD</td>
<td>11</td>
<td>0</td>
<td>11</td>
<td>1</td>
<td>7</td>
<td>1</td>
<td>1</td>
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<td>12</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>MS</td>
<td>4</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<td>1</td>
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<td>Total New Students</td>
<td>35</td>
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* Northrop Grumman, Schwartz, Suchoski, Frances Townes

Fall 2010 Mean GRE Scores

<table>
<thead>
<tr>
<th></th>
<th>Quantitative</th>
<th>%</th>
<th>Verbal</th>
<th>%</th>
<th>Analytic Writing</th>
<th>%</th>
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<tbody>
<tr>
<td>PHD</td>
<td>755</td>
<td>84%</td>
<td>536</td>
<td>70%</td>
<td>4</td>
<td>51%</td>
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<tr>
<td></td>
<td>792</td>
<td>92%</td>
<td>407</td>
<td>68%</td>
<td>3</td>
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<tr>
<td>MS</td>
<td>665</td>
<td>64%</td>
<td>380</td>
<td>28%</td>
<td>3.25</td>
<td>14%</td>
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<td></td>
<td>768</td>
<td>87%</td>
<td>360</td>
<td>24%</td>
<td>2.87</td>
<td>11%</td>
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Mean 745 421 3

Spring 2011 Mean GRE Scores

<table>
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<tr>
<th></th>
<th>Quantitative</th>
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<th>Verbal</th>
<th>%</th>
<th>Analytic Writing</th>
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</thead>
<tbody>
<tr>
<td>PHD</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<tr>
<td></td>
<td>670</td>
<td>63%</td>
<td>370</td>
<td>27%</td>
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<tr>
<td>MS</td>
<td>745</td>
<td>82%</td>
<td>635</td>
<td>82%</td>
<td>4.8</td>
<td>69%</td>
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<tr>
<td></td>
<td>760</td>
<td>86%</td>
<td>310</td>
<td>11%</td>
<td>2.5</td>
<td>8.0%</td>
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</table>

Mean 725 438 3

2.2 Degrees Awarded

As shown in the chart below, there was a slight decrease in the number of PhD degrees awarded in the past year. This does not appear to be related to any particular trend, as the recruitment rate has remained constant over the past few years. A higher than normal graduation rate last year may be partly responsible. Overall, we have a continuing trend of students achieving PhD candidacy status sooner in the program that has been historically the case. This may be related to a new advising database that the college has implemented to monitor student progress. This is also resulting in students passing their proposal examinations sooner.
PhD degrees awarded to students in the College of Optics and Photonics and students in other UCF colleges with College of Optics and Photonics advisors.

The number of MS degrees awarded in academic year 2010-2011 (23) is roughly similar to previous years. This number tends to fluctuate on a year to year basis.

MS degrees awarded. Recipients of these degrees are classified into two groups: those who leave with an MS degree (“Terminal MS”) and those who are continuing on to the PhD degree (“En-route to PhD”).

† Data on enrollment and awarded degrees are taken from UCF’s official reports, which consider Summer 10, Fall 10 and Spring 10 as the Academic year 2010-11.
# 2.3 Ph.D. Dissertations

**Academic Year  Fall 2010 – Summer 2011**

<table>
<thead>
<tr>
<th>Student</th>
<th>Advisor</th>
<th>Dissertation Title</th>
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<tbody>
<tr>
<td>Hubert Seigneur</td>
<td>Winston Schoenfeld</td>
<td>Modeling and Design of a Photonic Crystal Chip Hosting A Quantum Network Made of Single Spins in Quantum Dots That Interact Via Single Photons</td>
</tr>
<tr>
<td>Meizi Jiao</td>
<td>Shin-Tson Wu</td>
<td>Fast-Response Liquid Crystal Displays</td>
</tr>
<tr>
<td>Panomsak Meemon</td>
<td>Jannick Rolland</td>
<td>Development of Optical Coherence Tomography for Tissue Diagnostics</td>
</tr>
<tr>
<td>Wilson Caba</td>
<td>Glenn Boreman</td>
<td>Application of Antenna Synthesis and Digital Signal Processing Techniques For Active Millimeter-Wave Imaging Systems</td>
</tr>
<tr>
<td>Claudiu Cirloganu</td>
<td>Dave Hagan/ Eric Van Stryland</td>
<td>Experimental and theoretical approaches to characterization of electronic nonlinearity in direct-gap semiconductors</td>
</tr>
<tr>
<td>Peter Olszak</td>
<td>Dave Hagan/ Eric Van Stryland</td>
<td>Nonlinear Absorption and Free Carrier Recombination in Direct Gap Semiconductors</td>
</tr>
<tr>
<td>Gero Nootz</td>
<td>Dave Hagan/ Eric Van Stryland</td>
<td>Experimental and Theoretical Study of the Optical Properties of Semiconductor Quantum Dots</td>
</tr>
<tr>
<td>Michael Hemmer</td>
<td>Martin Richardson</td>
<td>Few-cycle pulses amplification for attosecond science applications: modeling and experiments</td>
</tr>
<tr>
<td>Clarisse Mazuir</td>
<td>Winston Schoenfeld</td>
<td>Design, Fabrication, and Testing of High-Transparency Deep Ultra-Violet Contacts Using Surface Plasmon Coupling In Subwavelength Alumninum Meshes</td>
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<tr>
<td>Ibrahim Ozdur</td>
<td>Peter Delfyett</td>
<td>Low Noise, Narrow Optical Linewidth Semiconductor-Based Optical Comb Source And Low Noise RF Signal Generation</td>
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<tr>
<td>Brian Slovick</td>
<td>Glenn Boreman</td>
<td>Infrared Phased-Array Antenna-Coupled Tunnel Diodes</td>
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<tr>
<td>Ty Olmstead</td>
<td>Martin Richardson</td>
<td>Photodisruption In Ocular Tissue Near And At The Boundary Between The Anterior Chamber and Crystalline Lens</td>
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<tr>
<td>Christopher Brown</td>
<td>Martin Richardson</td>
<td>Laser induced breakdown spectroscopy for detection of organic residues: impact of ambient atmosphere and laser parameters</td>
</tr>
<tr>
<td>Joshua Lentz</td>
<td>James Harvey</td>
<td>Perceptual Image Quality of Launch Vehicle Imaging Telescopes</td>
</tr>
<tr>
<td>Dimitrios Mandridis</td>
<td>Peter Delfyett</td>
<td>Low Noise and Low Repetition Rate Semiconductor-Based Mode-Locked Lasers</td>
</tr>
<tr>
<td>Name</td>
<td>Co-Authors</td>
<td>Title</td>
</tr>
<tr>
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<tr>
<td>Sergiy Mokhov</td>
<td>Boris Zeldovich</td>
<td>Theoretical Study of Beam Transformations by Volume Diffraction</td>
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<tr>
<td>Alessandro Salandrino</td>
<td>Demetrios Christodoulides</td>
<td>Electromagnetic Propagation Anomalies in Waveguiding Structures and Scattering Systems</td>
</tr>
<tr>
<td>Samuel Wadsworth</td>
<td>Glenn Boreman</td>
<td>Multilayered Planar Periodic Subwavelength Microstructures for Generating and Detecting Circularly Polarized Thermal Infrared Radiation</td>
</tr>
</tbody>
</table>

2011 Student-of-The-Year Dimitrios Mandridis (left) receiving the award from Dr. Bahaa Saleh.
## 2.4 Courses Taught

<table>
<thead>
<tr>
<th>Core Graduate Courses</th>
<th>Fall 2010</th>
<th>Spring 2011</th>
<th>Summer 2011</th>
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<tbody>
<tr>
<td>OSE 5203</td>
<td>GEOMETRICAL OPTICS AND IMAGING SYSTEMS</td>
<td>Harvey</td>
<td>Boreman</td>
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<tr>
<td>OSE 5312</td>
<td>LIGHT MATTER INTERACTION</td>
<td>Kik</td>
<td>Van Stryland</td>
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<tr>
<td>OSE 6111</td>
<td>OPTICAL WAVE PROPAGATION</td>
<td>Moharam</td>
<td>Christodoulides</td>
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<tr>
<td>OSE 6115</td>
<td>INTERFERENCE, DIFFRACTION AND COHERENCE</td>
<td>Dogariu</td>
<td>Kar</td>
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<tr>
<td>OSE 6432</td>
<td>GUIDED WAVES AND OPTOELECTRONICS</td>
<td>LiKamWa</td>
<td>Moharam</td>
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<tr>
<td>OSE 6525</td>
<td>LASER ENGINEERING</td>
<td>Hagan</td>
<td>Schulzgen</td>
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<table>
<thead>
<tr>
<th>Other OSE Graduate Courses</th>
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<th>Spring 2011</th>
<th>Summer 2011</th>
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<tbody>
<tr>
<td>OSE 5041</td>
<td>INTRODUCTION TO WAVE OPTICS</td>
<td>Christodoulides</td>
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<tr>
<td>OSE 5414</td>
<td>FUNDAMENTALS OF OPTELECTRONICS</td>
<td>LiKamWa</td>
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<td>OSE 5630</td>
<td>THIN FILM OPTICS</td>
<td>Boreman</td>
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<tr>
<td>OSE 6143</td>
<td>FIBER OPTICS COMMUNICATION</td>
<td>Li</td>
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<td>OSE 6211</td>
<td>FOURIER OPTICS</td>
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<tr>
<td>OSE 6234L</td>
<td>APPLIED OPTICS LABORATORY</td>
<td>Harvey</td>
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<td>OSE 6265</td>
<td>OPTICAL SYSTEMS DESIGN</td>
<td>Harvey</td>
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<tr>
<td>OSE 6314</td>
<td>OPTICS OF LOW DIMENSIONAL SEMICONDUCTORS</td>
<td>Schoenfeld</td>
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<tr>
<td>OSE 6319</td>
<td>OPTICAL WAVES AND MATERIALS</td>
<td>Zeldovich</td>
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<td>OSE 6120</td>
<td>THEORETICAL FOUNDATIONS OF OPTICS</td>
<td>Zeldovich</td>
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<td>OSE 6125</td>
<td>COMPUTATIONAL PHOTONICS</td>
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<td>APPLIED QUANTUM MECHANICS FOR OPTICS</td>
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<td>HIGH SPEED PHOTONICS</td>
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<tr>
<td>OSE 6615L</td>
<td>OPTOELECTRONIC DEVICE FABRICATION LABORATORY</td>
<td>Schoenfeld</td>
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</table>
### Undergraduate Courses

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<tr>
<th>Course Code</th>
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<th>Fall 2010</th>
<th>Spring 2011</th>
<th>Summer 2011</th>
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<tr>
<td>OSE 4052</td>
<td>INTRODUCTION TO PHOTONICS</td>
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<td>OSE 4470</td>
<td>OPTICAL FIBER COMMUNICATION SYSTEMS</td>
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<td>Fathpour</td>
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<tr>
<td>OSE 4830</td>
<td>INTRODUCTION TO IMAGING SYSTEMS</td>
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### Other Courses

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<th>Spring 2011</th>
<th>Summer 2011</th>
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<tbody>
<tr>
<td>IDS 6938</td>
<td>ST: HISTORY OF PHYSICAL SCIENCE, CULTURAL CONNECTIONS AND OTHER ISSUES</td>
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<td>Bass</td>
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<tr>
<td>PHY 5937</td>
<td>ST: ATTOSECOND LASER PHYSICS</td>
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<td>PHY 4424</td>
<td>OPTICS</td>
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## 2.5 Course and Program Development

### Graduate Education

In 2010-2011, there were few changes to the curriculum, which had already been significantly overhauled the year before. These changes to the PhD core in 2009-2010 necessitated changes to be made to the PhD qualifying exam in 2010-2011. In addition to changes in content, the qualifying exam was also modified so that problems are more integrated across disciplines, instead of being tied to individual course. Thanks to the hard work of the examination committee, these changes were successfully implemented for the August 2010 and January 2011 examinations. One new graduate course, *Fiber Lasers*, was taught by Dr. Axel Schülzgen. This was taught as a Special Topics course and it is planned to be developed into a regularly scheduled course in 2012.

### Undergraduate Education

The faculty of the college reached the decision to implement a full undergraduate degree in *Photonic Science and Engineering*. Currently, there are discussions within the university administration as to how this will be administered.
2.6 Instructional Laboratories

OSE 6234C Applied Optics Laboratory
Prerequisite Course: Graduate standing and OSE 5203 or consent of the instructor. Laboratory Techniques for observing optical phenomena and quantitative experimental study of geometrical optics, optical interferometry, diffraction, and image processing.

OSE 6455C Photonics Laboratory
Prerequisite Course: Graduate standing and OSE 6432 or consent of the instructor. Experimental study of photonic devices and systems including liquid crystal displays, fiber-optic sensors, laser diodes, electro optic modulation, acousto-optic modulation, lightwave detection, optical communications, and photonic signal processing.

OSE 6526C Laser Engineering Laboratory
Prerequisite Course: Graduate standing and OSE 6525 or consent of the instructor. Designing and device implementation of diode pumped solidstate lasers, nonlinear frequency conversion, Q-switching, mode locking, and pulse second harmonic generation.

OSE 6615L Optoelectronic Device Fabrication Laboratory
Prerequisite Course: Graduate standing or C.I. Design and micro-fabrication of semiconductor optoelectronics devices including passive waveguides, light emitting diodes (LEDs), laser diodes (LDs), photodetectors.
## 2.7 Colloquia and Seminars

<table>
<thead>
<tr>
<th>DATE</th>
<th>SPEAKER</th>
<th>TITLE</th>
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<tbody>
<tr>
<td>2/21/2011</td>
<td>Moti Segev, Physics Department, Technion - Israel Institute of Technology, Haifa, Israel</td>
<td>Sparsity-Based Sub-Wavelength Imaging and Super-Resolution in Time and Frequency.</td>
</tr>
<tr>
<td>3/1/2011</td>
<td>Hui Cao, Department of Applied Physics, Yale University</td>
<td>Complex Photonic Nanostructures and Phenomena.</td>
</tr>
<tr>
<td>3/31/2011</td>
<td>Laura Marcu, Biomedical Engineering University of California, Davis</td>
<td>Fluorescence Lifetime Techniques for Biomedical Diagnostics.</td>
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<td>Technology</td>
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<td>University, Boston, MA.</td>
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<tr>
<td>4/7/2011</td>
<td>Andreas Mandelis</td>
<td>Center for Advanced Diffusion-Wave Technologies, University of Toronto,</td>
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<td>Toronto, Canada</td>
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<tr>
<td>6/1/2011</td>
<td>Markus B. Raschke</td>
<td>Department of Physics, Department of Chemistry, and JILA University of</td>
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<td>Colorado at Boulder</td>
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<tr>
<td>7/7/2011</td>
<td>Nathaniel Fried</td>
<td>Department of Physics and Optical Science UNC-Charlotte</td>
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<tr>
<td></td>
<td></td>
<td>Jena, Germany</td>
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<tr>
<td>Date</td>
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<td>Department of Electrical &amp;</td>
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<td>Computer Engineering, Johns</td>
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<td></td>
<td>Hopkins Univ.</td>
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<tr>
<td>8/29/2011</td>
<td>Prof. Yan-qing Lu</td>
<td>Optical Sensing with Microstructured Fibers.</td>
</tr>
<tr>
<td></td>
<td>College of Engineering and</td>
<td>SID Student Chapter Seminar Series</td>
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<td>Applied Sciences, Nanjing</td>
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<td>University, China</td>
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<td>Photonics Group University</td>
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<td>of Toronto</td>
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<td>10/14/2011</td>
<td>Yi-Hsin Lin</td>
<td>Electrically switchable surface of a liquid crystal and polymer composite film and its</td>
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<td>National Chiao Tung</td>
<td>applications.</td>
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<td></td>
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<td>10/28/2011</td>
<td>Dietmar Kracht</td>
<td>Single-frequency and ultrafast fiber lasers</td>
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<td>Laser Zentrum Hannover e.V.</td>
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<td>11/29/2011</td>
<td>P. Mauchien, J.-B. Sirven,</td>
<td>Laser-induced breakdown spectroscopy for online elemental analysis</td>
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<td>J.-L. Lacour, G. Moutiers</td>
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<td>CEA, Nuclear Energy Division,</td>
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<td>12/07/2011</td>
<td>Mohamed Abdel Harith</td>
<td>Making Use Of Molecular Bands In LIBS Spectra In Recent Applications At NILES, Cairo</td>
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<td>NILES, Cairo University</td>
<td>University</td>
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<tr>
<td>12/09/2011</td>
<td>Timothy Day</td>
<td>Recent Results from both High Power and Broadly Tunable External Cavity Quantum Cascade</td>
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<td>Daylight Solutions</td>
<td>Lasers</td>
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<tr>
<td>12/13/2011</td>
<td>Tony Valenzuela</td>
<td>Overview of ARL-WMRD USPL Activities</td>
</tr>
</tbody>
</table>

### 2.8 International Collaboration

#### International REU Program

**Research Experiences for Undergraduates in Optics, Lasers, Photonics and Optical Materials**

The NSF International REU Program in Optics, Lasers, Photonics & Optical Materials, directed by UCF, is a special program that seeks to provide promising undergraduates in physics, engineering, materials science and other related disciplines, an opportunity to fast track into the research world in these areas. The NSF-sponsored International REU program in Optics, Lasers Photonics and Optical Materials will again run in 2011. This program offers students a comprehensive introduction into the research area of lasers, optics, and photonics, new engineering modalities with lasers, including ultra-fast lasers, and the development of new optical materials. Students are associated with an international research collaboration that usually results in research publications and presentations at international conferences.

The program is a two-summer internship. The first summer is usually spent in a research group at UCF or Clemson University’s School of Material Science & Engineering. Throughout the following semester, the student stays engaged with the research project. The second summer the student spends 12 weeks working in the laboratories of
our international collaborators in Europe (France, Germany or Italy) in institutes and universities in cities that include, Bordeaux, Berlin, Paris, Turin, Lyon, Jena.

**2010 REU students:** Kristina Bagnell, Jeffrey Chia, Chelsea Guy, Samantha Hutcheson, Julian Leland, Shoshana Levi, Izabella Lipnarski, Annam Nguyen, Edward Romero, Danielle Simmons, Lionel Gigant, Christophe Gombaud.

**The Atlantis- MILMI Program**

The Atlantis-MILMI Program is a Masters Degree program, offering dual Masters degrees in the interdisciplinary field of Lasers, Photonics and Material Science by a consortium of four institutions, the Physics and Chemistry departments of the University of Bordeaux, France; the Friedrich Schiller University in Jena, Germany; CREOL, the College of Optics & Photonics of the University of Central Florida; and the School of Material Science & Engineering, Clemson University in South Carolina. Twelve scholarships are offered each year to allow students in this dual Masters degree program to take courses and perform research for up to 12 months at institutions across the Atlantic. Six different choices of Dual Masters are offered under the Atlantis-MILMI Program and unique opportunities to work with different professors are available.

Resulting from a long history of scientific collaboration between these institutions, this advanced degree program creates individualized education and training in optics, lasers, photonics, optical materials and the interaction of light with matter, drawing on their unique expertise, research programs, and educational curricula. CREOL, The College of Optics & Photonics at UCF, provides comprehensive education and research training in optics, photonics and lasers. Friedrich Schiller University is renowned for its expertise in advanced lasers and laser material processing. The University of Bordeaux will introduce non-linear science and the optical properties of materials. A foundation in chemistry and physics is complemented by dedicated programs in organic and inorganic materials science and engineering at Clemson University.

Each semester, the students attend existing selected technical courses taught in English at all four institutions. The latest technology in teleconferencing and "podcasting" solutions is used to accompany the mobility of students. First class training facilities will be offered to participants along with strong tutorship. Special (existing) intensive language classes in the national languages of the consortium (German, French and English) are made available to participants along with particular courses that will foster mutual integration of the scientific community. The students are also involved in research activities and exposed to research seminars and courses. Faculty exchanges also support a summer school each year in Europe or the US. To encourage entrepreneurship experience, every effort is made to match each student’s program to a technical project having scientifically and technologically maturity in his home university.

**Fraunhofer-Townes Collaboration**

Research and academic collaboration between the Townes Laser Institute, UCF and the Fraunhofer Institute for Laser Technology, RWTH Aachen University (Germany) has been established in August 2009. Under this collaboration agreement a joint research program in the fields of laser development, material processing, novel system technology, and life sciences is being created, including the exchange of scientist and students.

The Fraunhofer Institute for Laser Technology (ILT) located in Aachen, Germany is the leading industrial laser and laser applications facility in Europe. For more than 20 years, ILT has stood for concentrated expertise in the field of laser technology. The innovative solution to manufacturing and production problems, the development of new technical components, competent consultancy and training, highly specialized personnel, the latest technology as well as an international reputation: all these factors make for long-term partnerships.

Fraunhofer ILT’s interdisciplinary research activities cover a wide range of areas such as the development of new laser beam sources and components, the use of modern laser measurement and testing technology and laser-supported manufacturing. This includes for example laser cutting, caving, drilling, welding and soldering as well as surface treatment, micro-processing and rapid-prototyping. Furthermore, ILT’s research involves laser plant technology and versatile system technology including process control. Besides solving questions of laser technology, the institute develops high-energy sources for soft X-rays for use in semiconductor production and in X-ray microscopy.

The close contact to the Department of Laser Technology at the RWTH Aachen University ensures that a continuous access to a wide knowledge base in the field of laser technology is ensured. RWTH Aachen University has achieved international recognition in several fields of engineering and science, currently ranked the first place in Germany in
the fields of mechanical engineering, electrical engineering, and computer science. Several scientists affiliated with RWTH Aachen have won world-wide acclamations, including Nobel Prizes in physics and chemistry.

Research Topics:

- Laser-assisted fabrication of graphene
- Selective laser etching of dielectrics and semiconductors
- Mid-IR optical phase microscopy
- Manufacturing of biocompatible substrates
- Ultrafast laser materials processing

Martin Richardson, Director of the Townes Laser Institute (left), UCF President John Hitt (Center) and Reinhart Poprawe, Director of the Fraunhofer Institute for Laser Technology (right), at the signing of the collaboration agreement between the Townes Laser Institute, UCF and the Fraunhofer Institute for Laser Technology, RWTH Aachen University (Germany)
3. Research

The faculty, scientists, and students of CREOL, The College of Optics and Photonics, engage in research in areas utilizing radiation at wavelengths extending from millimeter waves to X-rays and cover the basic science and physics of optics and photonics, as well as prototyping development and demonstration of feasibility of applications. They vigorously pursue joint research projects with industry, academia, and government laboratories. In addition to CREOL (Center for Research and Education in Optics and Lasers), which is the primary research arm of the College, two centers are also active:

Florida Photonics Center of Excellence (FPCE)
The FPCE was established with a $10 million grant from the State of Florida to create a new center of excellence within The College of Optics and Photonics at the University of Central Florida. The program began in 2003 with three primary goals: Advance excellence in research and graduate education to serve existing and emerging industry clusters in the state (photonics, optics, lasers), leverage state resources via partnerships with industry and government, and work in partnership with local, state and regional economic development organizations to attract, retain and grow knowledge-based, wealth producing industries to Florida. The focus of the FPCE research and education work has been on the technologies of nanophotonics, biophotonics, advanced imaging and 3D displays, and ultra-high bandwidth communications, all of which are forecast to experience rapid market growth. The grant has been used for developing the research infrastructure (new faculty, new facilities, new equipment), funding competitive R&D Partnership Projects at Florida universities in partnership with Florida industry, and pursuing commercialization and outreach with the help of the FPCE Industrial Advisory Board, the UCF Technology Incubator, and the Florida Photonics Cluster.

Townes Laser Institute
The Townes Laser Institute was established in 2007 in the presence of and in honor of Charles Townes, inventor of the concept of the laser, and a 1964 Nobel Laureate for Physics. Established for the development of next-generation lasers and their uses in medicine, advanced manufacturing and defense applications, the Institute was funded by a $4.5M grant from the State of Florida, together with matching funds from UCF for 5 faculty positions and $3M for start-ups and infrastructure. Since its founding, the Townes Laser Institute has grown to a faculty of 14 and has developed major capabilities in optical fibers, attoscience and new laser materials. It has made significant investments in optical fiber pulling facilities, pre-form fabrication, glass science and processing. It is currently building up a comprehensive capability in transparent ceramic laser materials. Future areas of investment include mid-infrared sources and materials, medical laser technology, laser-bioengineering, advance laser-based manufacturing and new defense-related laser technologies including long-distance laser light propagation through the atmosphere. The Townes Laser Institute is directed by Prof. Martin Richardson.

3.1 Areas of Research
Five major photonic technologies are pursued in the College: 1) lasers, 2) optical fibers, 3) semiconductor and integrated photonic devices, 4) nonlinear and quantum optics, and 5) imaging, sensing and display. Each of these technologies have applications in industry, communication and information technology, biology and medicine, energy and lighting, aerospace, and homeland security and defense. Design of optical systems, which has been the core of optical engineering, remains a principal component of the optics discipline, but advanced topics such as nano-photonics, atto-second optics, meta-materials, plasmonics, and biophotonics, are being embraced as areas of strength and future growth. The College is well positioned to take advantage of the revolution taking place in several areas enabled by optics and photonics. The following list describes some of the details of each research area and the applications pursued. A list of the faculty active in each of these areas and their specializations is available at http://www.creol.ucf.edu/Research/ResearchArea.aspx
**Lasers**

**Science & Technology**
- Solid State Lasers
- Ceramic Lasers
- Semiconductor Lasers
- EUV & X-ray Lasers
- High Power Lasers
- Ultrafast Lasers
- Optical Frequency Combs

**Applications**
- Laser Fabrication & Lithography
- Laser Material Processing
- Lasers in Medicine

**Fiber Optics**

**Science & Technology**
- Fiber Fabrication Technology
- Multimaterial Fibers
- Nano-structured Fibers
- Mid Infrared Fibers
- Fiber Lasers

**Applications**
- Fiber Optic Communication
- Fiber Optic Networks
- Fiber Optic Sensing
Semiconductor & Integrated Photonics

**Science & Technology**
- Eptaxial Growth
- LEDs & Laser Diodes
- Quantum Dots & Nanostructures
- Optoelectronics
- Oxide Semiconductors
- Photovoltaics
- Integrated Optics
- Periodic Structures & Photonic Crystals
- Nanophotonics & Plasmonics
- Silicon Photonics
- Gratings & Holographic Optical Elements

**Applications**
- Optical Communication
- Optical Processing & Switching
- Solar Energy Applications
- Integrated-Optic Sensing
- Integrated-Optic Signal Processing

Nonlinear & Quantum Optics

**Science & Technology**
- Nonlinear Guided Waves & Fibers
- Nonlinear Optical Materials
- Nonlinear Optics & Spectroscopy
- Nonlinear Optics in Periodic Structures
- Photosensitive Glasses
- Quantum Optics
- Solitons

**Applications**
- Laser Protectors
- Quantum Communication & Information

MBE Facility

Nanophotonics Fabrication Facility

Femto-second Nonlinear Optics Laboratory
3.2 Laboratories & Facilities
The main facilities of the College are housed in a state-of-the-art 104,000 sq. ft. building dedicated to optics and photonics research and education.

Shared Facilities

**Nanophotonics Systems Fabrication Facilities.** A 3,000 ft² multi-user facility containing Class 100 and Class 1000 cleanrooms and a Leica 5000+ e-beam lithography instrument capable of 10-nm resolution. These facilities are used for fabrication and study of nanostructured materials and nanophotonic integrated circuits. The Laboratory is designed and operated as a multi-user facility, with availability to companies and other outside users. Rm 180.

**Optoelectronic Fabrication Cleanroom.** 800 sq. ft. multiuser facility consisting of class 100 and class 10,000 cleanrooms. Used in the development of optoelectronic semiconductor devices. The facility equipment includes a Suss MJB-3 aligner, a Plasma-Therm 790 RIE/PECVD, an Edwards thermal evaporator, along with a bonder, a scriber and microscope. Rm 211.

**Scanning Electron Microscope (SEM) Facility.** Vega SBH system built by Tescan is a tungsten-filament scanning electron microscope. The system is designed with a fully electronic column and is capable of imaging from 1-30 keV with nanometer scale resolution. Additionally, the system is equipped with the state of the art sample positioning stage with 5 nm resolution and a full scale travel of 42 mm. The shared SEM is ideal for checking the fidelity of travel of 42 mm. The shared SEM is ideal for checking the fidelity of the microfabrication routinely performed in the CREOL cleanroom. Rm 176.

**Cary Spectra-Photometer and Microscope.** Cary 500 is Spectrophotometer that is capable of measuring light absorption in both transmitted and reflected light in the UV, visible and near IR spectrum. Rm 159.

**Zygo Facility.** Rm 211B. Shared facility administered by Martin Richardson.
**Machine Shop.** Has two modern Sharp LMV milling machines and a 16-50G lathe capable of achieving the tolerances required for the instruments used in CREOl. Classes are offered to qualify research scientists and students to safely modify and construct instruments critical to their research. Rm A106. Richard Zotti.

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**Faculty Labs**

**Northrup Grumman EUV Photonics Laboratory.** Also referred to as the Laser Plasma Laboratory. Conducting research on X-ray and EUV optics and sources, X-ray microscopy, laser-aided material processing, and laser generated plasmas. Martin Richardson.

**Laser Aided Materials Processing Laboratories.** Investigating the interaction of lasers with absorbing and non-absorbing materials, growth, solidification, and plasma effects; laser CVD; laser ablation, laser drilling, cutting, welding; developing process-monitoring and diagnostic techniques. Stephen Kuebler (NPM) and Martin Richardson (LPL).

**Laser System Development Laboratories.** Developing new solid-state lasers, external cavity semiconductor lasers and amplifiers, seeding lasers, laser-induced damage, far infrared semiconductor lasers, high-average-power solid state lasers, semiconductor and solid state volume Bragg lasers, high power laser beam combining, ultra-high-intensity femtosecond lasers, new solid state lasers and materials development (crystals & glasses). Michael Bass, Martin Richardson, Peter Delfyett, Leonid Glebov.

**Laser Advanced Material Processing (LAMP).** Engaged in novel manufacturing technology; new materials synthesis including optical, electronic and magnetic materials for a variety of applications such as sensors, detectors and medical devices; and process physics modeling. Aravinda Kar.

**Diffractive and Holographic Optics Laboratory.** Conducting rigorous analysis, design, and demonstration of diffractive and holographic optical elements, subwavelength grating structures and their applications, E-M theory of grating diffraction, holographic optical information processing and storage, volume holography. Leonid Glebov.

**Optical Glass Sciences & Photo-Induced Processing Laboratory.** Conducting studies of new materials for high-efficiency, robust holographic optical elements; high power laser beam combining, glass spectroscopy, refractometry and interferometry; photo-induced processes in glasses; technology of optical quality and high-purity glasses. Leonid Glebov.

**Optical Ceramics Laboratory.** Conducting research on the synthesis of transparent ceramics, powder processing, ceramic casting, vacuum and pressure sintering, diffusion bonding, dopant diffusion, and crystal growth for laser and nuclear detector applications. Romain Gaume.

**Ultrafast Photonics Laboratory.** Conducting research on ultrafast high power optical pulses from semiconductor diode lasers, for applications in applied photonic networks and laserinduced materials modification. Peter Delfyett.

**Florida Attosecond Science and Technology Lab.** Generation of attosecond (10⁻¹⁸ s) and zeptosecond (10⁻²¹ s) X-ray pulses. Zenghu Chang.

**Fiber Optics Lab.** Research in fiber fabrication technology, nano-structured fibers, nonlinear fiber materials, fiber lasers, and fiber sensing applications. Axel Schülzgen, Rodrigo Amezcua.

**Multi-Material Optical Fiber Devices Lab.** Research on novel optical fiber structures, nanophotonics, fiber-based
optoelectronic devices, optical imaging using large-scale three-dimensional arrays constructed from photosensitive fibers, and mid-infrared fiber nonlinear optics. Ayman Abouraddy.

**Optical Communication Laboratory.** High-capacity optical communication through linear and nonlinear channels including free space and optical fiber using synergy of advanced optical and electronic techniques. Guifang Li.

**Semiconductor Lasers Lab.** A III-V epitaxial growth facility used to research new types of semiconductor heterostructures and devices that include quantum dots, quantum dot laser diodes, vertical-cavity surface-emitting laser diodes, spontaneous light sources, and single quantum dots. A characterization laboratory is used to study the optical properties of the samples, including their light emission, microcavity effects, and laser diode characteristics. Dennis Deppe.

**Nanophotonic Devices Laboratory.** Research in epitaxial growth and properties of oxide semiconductors, oxide and nitride-semiconductor light emitting diodes, self-assembled quantum dots, and e-beam nano-lithography. Winston Schoenfeld.

**Nanophotonics Characterization Laboratory.** Optical analysis tools for investigation of nanostructured devices including Near-field Scanning Optical Microscope, fiber-coupled microscope for single particle spectroscopy, leakage radiation setup for surface plasmon imaging, near-infrared waveguide analysis setup, and variable temperature photoluminescence setup. Projects include manipulation of surface plasmon dispersion in nanoscale thin films, enhancement of erbium excitation in semiconductor nanocrystal doped oxides, and enhancement of optical nonlinearities using plasmon resonances. Pieter Kik.

**Multiple Quantum Wells Laboratory.** Research on the design, fabrication and testing of novel all-optical switching devices using III-V multi-quantum well semiconductors, and the integration of high-speed optical and optoelectronic devices to form monolithic integrated optical circuits for high data throughput optical networks. Patrick Likamwa

**Integrated Photonics & Energy Solutions Lab.** Specializing in fundamental and technological aspects of silicon-based optoelectronic devices and chips, including their energy efficiency issues. The lab encompasses near- and mid-infrared setups for characterizing the devices fabricated in CREOL's Nano Fabrication Facility. Sasan Fathpour.

**Nonlinear Optics Laboratories.** Conducting research on a variety of nonlinear optical effects, materials, and devices including nonlinear interactions in waveguides, nonlinear signal processing, optical power limiting, and characterizing materials response at picosecond and nanosecond scales. Eric Van Stryland and David Hagan

**Nonlinear Waves Laboratory.** Research in nonlinear optics, spatial and spatio-temporal solitons, discrete solitons in photonic lattices, and curved beams. Demetrios Christodoulides.

**Quantum Optics Laboratory.** Conducting research on the generation and detection of nonclassical light, such as entangled photons, and its quantum information applications, including quantum imaging and quantum communication. Bahaa Saleh, Ayman Abouraddy.

**Infrared Systems Laboratory.** Conducting research on infrared detector and focal-plane analysis, optics of random media, infrared scene projection, and transfer-function techniques. Glenn Boreman.

**Photons Diagnostic of Random Media.** Exploring different principles for optical sensing, manipulation of electromagnetic fields, and phenomena specific to optical wave interactions with complex media. Aristide Dogariu.

**Optical Design & Image Analysis Laboratory.** Conducting research on Optical Design and Image Analysis, Simulation and Modeling of Optical Systems, and characterization of optical phenomena. James Harvey.

**Photonic Information Processing Systems Laboratory.** Exploring the principles of optics and information processing for solving important problems in system science relevant to academia, government, and industry. Nabeel Riza.

**Liquid Crystal Display Lab.** Investigating 1) advanced liquid crystal display materials, display devices, and device modeling, 2) electronic laser beam steering and adaptive optics using fast-response spatial light modulators, 3) adaptive liquid crystal and liquid lenses for forveated imaging and zoom lens, and 4) bio-inspired tunable optical filters using cholesteric liquid crystals. Shin-Tson Wu.
3.3 Publications

Books


Book Chapters


Journal Publications


Photon crystals for biomedical imaging


Q. Bkan, S. Chen, B-T Kim, N. Leventis, H. Lu, Z. Chang, and S. Lei, "Micromachining of polyurea aerogel using femtosecond laser pulses," Journal of...


R. M. Gaume and L-M. Joubert, "Airtight container for the transfer of atmosphere-sensitive materials into vacuum-operated characterization instruments,"


L.A. Padilha; G. Nootz; P.D. Olszak; S. Webster; D.J. Hagan; E.W. Van Stryland; L. Levina; V. Sukhovatkin, L. Brzozowski, and E.H. Sargent, "Optimization of Band Structure and Quantum-Size-Effect Tuning for Two-Photon Absorption...


L. Zhu, and G. Li, "Folded digital backward propagation for dispersion-managed fiber-optic


J. Yan, L. Rao, M Jiao, Y. Li, H. C. Cheng, and S. T.


Note: The preceding list includes journal papers co-authored by full-time CREOL faculty, with the faculty names highlighted in black. Also included are papers co-authored by faculty with joint and courtesy appointments who listed CREOL as one of their affiliations, with the names highlighted in blue. Papers published by CREOL scientists and students, with no faculty co-authors, are also listed with the names highlighted in green.


D. N. Christodoulides, "Airy Beams and Bullets," Asymptotics, phases and chaos, Optical and Quantum Conference in Honor of Michael Berry’s 70th Birthday, Universidad Nacional Autónoma de México, Cuernavaca, México, September 7th to 9th (2011). (Invited)


N. Choi and J. E. Harvey, "Linear Systems Formulation of Image Analysis in the Presence of both Aberrations and Surface Scatter," Presented at SPIE's International Symposium on Optics and Photonics, San Diego, CA, August (2011).

J. E. Harvey, "Linear Systems Formulation of Nonparaxial Scalar Diffraction Theory," Presented at the
Tribute to Joseph W. Goodman Conference at SPIE’s International Symposium on Optics and Photonics, San Diego, CA, August 21-25 (2011).


G. Li, "Coherent optical technologies for free-space communication and sensing," OSA Summer Congress, Toronto, Canada (2011). (Invited)


M. C. Richardson, "The Impact of transparent ceramic materials on future lasers," Glass and Optical Materials Division of The American Ceramic Society, Annual


Y. Liu, L. Gigant, M. Koehler, M. Baudelet, and M. C. Richardson, "Combination of LIBS and Raman for food quality monitoring," North-American Symposium on Laser-Induced Breakdown Spectroscopy 2011; Clearwater, FL, USA (2011).


Invited Lectures and Tutorials


A. Schülzgen, "Advanced Optical Fiber and Fiber Lasers," Department of Physics, University of Cincinnati March 10, Cincinnati, USA (2011).


S. T. Wu, "Tutorial seminar on Blue-phase LCDs," 90-minute seminar at SID annual meeting, Los Angeles, CA, May 16 (2011). (Tutorial)

Patents and Disclosures

Patents


Provisionals


G. Boreman, I. Chapman, S. McHugh, K. Morse, D. Shelton, "Ultrafast Metamaterials Based Beam Steering," Provisional Patent 61/427,147, Filed...
December 24 (2010)


S.T. Wu, L. Rao, Y.P. Chang, C.C. Tsai, “Low Voltage

Patent Disclosures

A.F. Abouraddy, "Micro-Particle and Nano-Particle Fabrication through Fluid Instabilities in Multi-Material Fibers."

M. Bass, “Detection of Covert Writing using Inks Containing Up Converters with Devices containing 975 nm Diode or Diode Laser Light Sources.”

M. Bass, JH Cho, “Covert Writing and Detection using Inks Containing up Converters.”

G. Boreman, J. D'Archangel “Metamaterial Flakes for Dispersal in a Liquid Binder.”


Z. Chang, “Phase-Matching of X-RAY Generation with Plasma Gradient”

P.J. Delfyett, J. Davila-Rodriguez, I. Ozdur, “Method of mode-locking and stabilizing a frequency comb source using an intra-cavity phase modulator and Fabry-Pérot.”

P.J. Delfyett, I. Ozdur, “Optically Tunable Optoelectronic Oscillator.”

P.J. Delfyett, J. DaVila-Rodriguez, I. Ozdur, “An improved optical frequency locking technique with intracavity phase and amplitude modulation for fiberized and free space intracavity etalon mode-locked lasers.”

D.G. Deppe, “Thermoelectrophotonic Device for Waste Heat Recovery.”

D.G. Deppe, S. Freisem, “Heterostructures for Optical and Electrical Confinement in Semiconductor Light Sources”

S. Fathpour, S. Khan, “Electronically Tunable Silicon Photonic Delay Lines.”

L. Glebov, G. Venus, A. Jain, "Method of two-dimensional spatial mode selection in multimode optical resonators by reflecting volume Bragg gratings”

A. Kar, R. Vaidyanathan, “Nanostructural and Microstructural Modification of Materials for Tailoring Response to Electromagnetic Fields”

G. Li, B. Saleh, “Electronic Phase Conjugation and its Applications.”

G. Li, E. Mateo, “Electronic Phase Conjugation for Optical Communication.”

G. Li, N. Bai, C. Xia, “Supermode Fibers”

G. Li, I. Ozdur, “Imaging Amplifier for Optical Fiber Communication Links”


I. Mingareev, A. Kar, M. Richardson, M. Ramme, “Fabrication of Large-Area Graphene by Controlled Sublimation of Carbon Planes with Ultrafast Laser Radiation”

N.A. Riza, “Broadband Variable Photonic Delay Line For Photonic and RF Signal Processing.”

N.A. Riza, “Compressive Optical Display.”

N.A. Riza, “Power Smart In-door Optical Wireless Link Design and Applications.”

A. Santhanam, S. Meeks, H. Neelakkantan, “Real-Time Radiation Delivery Dose Calculation Using Physics-Based Lung Models and Multiple GPU.”

A. Santhanam, S. Meeks, J. Rolland "Simulating 3D Lung Dynamics Using an iPad.”


S.T Wu, M. Jiao, Y. Li, “Liquid crystal display devices with patterned electrodes”
3.4 Research Funding

Research has been funded by a combination of federal, industrial, and state grants. The amounts shown below are actual funds received for each year, with each grant covering a different period. Some of the industrial grants include federal funding that has come via industry. Not included in the chart of funding history are the state grants. These include a $10M fund received in FY 2004 for the Florida Photonics Center of Excellence (FPCE) and a $4.5M grant received in FY 2007 to establish the Townes Laser Institute (TLI). These funds continue to support the research and educational activities of these centers.

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Grants received in FY 2011

History of disclosures, applications, and issued patents by FY

History of funding from various sources since 2002
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<td>Spectral Combining of five 150-W fiber lasers by volume Bragg gratings in PTR glass</td>
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<td>Implementation of Light Scattering Models</td>
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<td>Millimeter-wave and THz Aperture-Plane Imaging using Digital Holography Techniques</td>
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<td>Deep-UV Emitters and Detectors Based on Lattice-Matched Cubic Oxide Semiconductors</td>
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<td>Van Stryland, E</td>
<td>Kent State University</td>
<td>Self-Assembled Soft Optical NIMs</td>
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<td>Abouraddy, A</td>
<td>Oak Ridge Associated Universities</td>
<td>Electromagnetic-assisted optical chromatography in hollow-core multi-material photonic band gap filters</td>
<td>5/14/09</td>
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<td>Mid-infrared, wide-bandwidth, stable coherent optical sources generated by multi-material, nonlinear chalcogenide-glass</td>
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<td>Laser Calorimetry</td>
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<td>10.6 Micron Calorimetric Measurement of Diamond Absorption</td>
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<td>Support of PECASE Program</td>
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<td>6/28/10</td>
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<td>Glebov, L, Zeldovich, B</td>
<td>OptiGrate</td>
<td>Coherent Beam Combining of Fiber Lasers by Volume Bragg Gratings</td>
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<td>Richardson, M</td>
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3.5 Affiliated Research Centers

The University of Central Florida has several nationally and internationally recognized research institutes in addition to the three at CREOL, The College of Optics and Photonics that are devoted to research and development.

Advanced Materials Processing and Analysis Center

The Advanced Materials Processing and Analysis Center (AMPAC) is an interdisciplinary research and education center for materials science and engineering, one of two major UCF research centers that comprise the Center of Advanced Materials and Nanotechnology. Our two university-wide multi-user facilities — the Materials Characterization Facility (MCF) and the Advanced Microfabrication Facility (AMF) - are available to all researchers at UCF and from outside companies, government labs, and universities, enabling them to perform cutting-edge research, and to train and educate students and other personnel in the use of state-of-the-art equipment. AMPAC's vision is to make UCF an international leader in materials science and engineering research and education by excelling in the development, processing and characterization of advanced materials to achieve prominence in targeted research areas; providing leadership to the UCF Materials Science and Engineering research and education program; and enhancing economic growth and promoting industrial development through effective partnerships with industry.

NanoScience Technology Center

In 2003 the Nanoscience Technology Center (NSTC) was formed with a $4M grant from the state of Florida when leaders recognized the potential of nanotechnology as its applications in medicine, materials, computing and electronics began entering the mainstream. Since that time, NSTC has consolidated UCF researchers across multiple disciplines and hired many more to better respond to nanoscience funding opportunities and to develop the technologies demanded by the industries of the future. In 2007 the NSTC officially opened a 20,000-square-foot renovated research facility in the Central Florida Research Park. A total of 15 faculty and 42 graduate students at the center are creating tools to treat neurological diseases; materials that can advance solar and fuel cell technology; and longer batteries that can make ever-smaller electrical devices a reality. Current research areas include Green Energy, In Vitro Test Systems, Functional Nanomaterials, Computer/Mathematical Simulations, Quantum Dynamics, Bio-Imaging, NanoElectronics & NanoPhysics, and Integrated Device Development.

Biomolecular Science Center

The Burnett School of Biomedical Sciences became an integral part of the UCF College of Medicine in 2007, making the college a research-intensive medical school where cutting edge medical research spans the entire spectrum from laboratory bench to bedside of the patients, providing a great environment of training physicians and biomedical researchers. We vigorously pursue our mission, to build nationally recognized research programs and undergraduate and graduate programs in biomedical sciences. The School is well on its way of accomplishing its goal towards hiring faculty members to build vigorous research programs focused on cancer, cardiovascular diseases, neurological diseases and infectious diseases. The School has formed active partnerships with other units such as the College of Optics and Photonics, the School of Electrical Engineering and Computer Science and the NanoScience Technology Center to build interdisciplinary research and education programs in the innovative applications of photonics and nanoscience to biomedical problems. The School recently updated its undergraduate curriculum to better prepare students for health professions and graduate studies in biomedical sciences. The School also provides pre-health advisement for UCF students to prepare them for entry into health professional schools. Our BS degree program in Biotechnology started Fall 2007 and graduated the first students in Spring 2009.

Florida Solar Energy Center

The Florida Solar Energy Center (FSEC) was created in 1975 to serve as the State's energy research institute. The main responsibilities of the center are to conduct research, test and certify solar systems and develop education programs. Our mission is to research and develop energy technologies that enhance Florida’s and the nation’s economy and environment and to educate the public, students and practitioners on the results of the research. As Florida’s energy research institute — with a 35-year history of unique expertise, experience and infrastructure — we are leading research and development efforts to bring our vision of Energy Independence to fruition.
Florida Space Institute

FSI is located at the space center, in Brevard County in East Central Florida, so as to provide a focus on space for the research and education programs of its institutional members. Classrooms, faculty offices and laboratories are located at the Kennedy Space Center Visitors Center, in the Astronaut Memorial Foundation’s Center for Space Education facility. While the academic program is at the core of FSI, providing Masters and Ph.D. level programs of study, the Institute also has a strong engineering support staff, and performs research on contracts and grants, providing real-life opportunities for student research and thesis projects. The organizational structure also encourages research on the individual campuses of the member schools, allowing the development of space hardware, and then "flowing" that hardware through the FSI facilities at the space center for processing and then on to space flight. Since its founding in 1990 as a consortium of state universities, community colleges, and private schools, the consortium has expanded, and now counts as its members UCF, Florida Institute of Technology, Brevard Community College, Embry-Riddle Aeronautical University, Florida Agricultural & Mechanical University, University of Miami, Florida Atlantic University, University of South Florida, University of Florida, and Broward Community College. Additionally, through NASA’s Florida Space Grant Consortium program resident with FSI, some 16 additional universities and colleges throughout Florida enjoy an indirect relationship with the Institute.

Institute for Simulation and Training

IST is an internationally recognized research institute that focuses on advancing modeling and simulation technology and increasing our understanding of simulation’s role in training and education. Founded in 1982 as a research unit of the University of Central Florida, the institute provides a wide range of research and information services for the modeling, simulation and training community. Faculty and staff are distributed among IST’s three Central Florida Research Park buildings, the Progress building, Partnership II, and the Simulation and Training Technology Center.

Innovative Science & Technology Facility (ISTEF)

The ISTEF site is located at the Kennedy Space Center, Florida. It is a Navy SSC PAC facility operated by CSC. ISTEF was originally built in 1989 to support the Strategic Defense Initiative Organization’s Innovative Sciences and Technology Office (SDIO/ISTEF). Today ISTEF has a much broader mission; it supports research and development of electro-optics sensing technologies for DOD, commercial and academic applications. DOD customers include: the Army, Navy Air Force, DARPA, and DIA. The facilities include a laser and optics laboratory, 1 km laser test range, a precision tracker (gimbal) with a coude mirror feed (for laser transmission), and several transportable trackers capable of supporting active (laser) or passive testing. Additionally, ISTEF maintains an assortment of telescopes, optics, and sensors to support data collection requirements. ISTEF is a tenant of the 45th Space Wing at Cape Canaveral Florida and has operating agreements that allow tasking Eastern Range assets as needed. It also has standardized range operations for laser testing against boosting rockets, satellites, and other targets. ISTEF has a close partnership with the CREL, The UCF College of Optics and Photonics, which provides access to cutting edge R&D and expertise in atmospheric propagation of lasers, laser communications, laser radar (LADAR), fiber-optic lasers, passive imaging, and optical design.

Other Facilities & Centers

Other organized programs at UCF offer researchers and students additional support in pursuit of their research goals. These include:

- National Center for Simulation (NCS)
- Center for Advanced Transportation Systems Simulation (CATSS)
- National Center for Forensic Science (NCFS)
- Small Business Development Center (SBDC)
- University of Central Florida Business Incubation Program (UCFBIP)
4. Partnership

Since its early years, the College has benefitted from a strong partnership with industry. It endeavors to transfer the technology developed by the faculty, scientists, and students to industry, particularly Florida industry, and to assist in forming, recruiting, and retaining optics and optics-related industries in Florida. The College has established a large industrial affiliates program (with current membership of 63 companies, sustained over many years). Our Industrial Affiliates Day brings in optics companies from around the country to learn about the ongoing research, recruit students, and identify new partnering opportunities.

4.1 Industrial Affiliates Program

Membership in the Industrial Affiliates (IA) program provides to industrial corporations, organizations, and individuals many benefits, most of which are also of mutual benefit to The College of Optics and Photonics. One of these mutual benefits is the regular communication and contact the program provides between the research faculty and students at the College and the IA member company’s engineers and scientists who are developing new technologies and products for their business. Other benefits include:

- Establishing a close association with this leading institute in optics, lasers, and photonics
- Exposure to the latest research and developments in cutting edge technologies
- Membership certificate or plaque for display in your facility
- Availability of sophisticated measurement, test, and calibration facilities
- Early notice of students approaching graduation (the next generation of experts in the field). See our Student Resumes.
- Ability to post your job openings on our website (exclusive benefit for IA members)
- Close interactions with our faculty, each of whom are leaders in their fields
- Opportunity to make presentations about your company and products to the faculty and students of the College
- Opportunity to participate in our Industrial Advisory Board, a committee of our senior stakeholders that provides advice on the long-term direction of CREOL, The College of Optics & Photonics
- Copies of the College’s periodic newsletter, Highlights, and monthly e-Highlights
- Notification of seminars at the College
- Opportunity for free presentation space at our annual Industrial Affiliates Day meeting
- Several Web-based benefits, including linkage to your company’s web site from the College website
- For companies who donate equipment, getting their hardware/software in the hands of some of the leading researchers – faculty and students – in the field provides visibility to future customer prospects and information on its impact in leading-edge research
- Demonstration by the company of their support of CREOL, The College of Optics & Photonics, its research programs, and its effective corporate cooperation and partnership activities

In addition, we use many mechanisms to give visibility to our Industrial Affiliates that can be valuable to them in marketing their products. Wherever possible, the level of the membership is indicated. Examples of current practices include:

- Listing in CREOL, The College of Optics & Photonics Highlights quarterly newsletter
- Special recognition at the annual Industrial Affiliates Day
- Listing in other CREOL, The College of Optics & Photonics publications, where appropriate, including on CREOL, The College of Optics & Photonics website (with a link to the company’s website)
- Company name plaque prominently displayed in the entrance lobby of the CREOL building of CREOL, The College of Optics & Photonics

There are also many intangible benefits that accrue from association with this dynamic research and education institution. Among these are facilitated access to and collaboration with other specialized facilities within the University of Central Florida and the central Florida area. In addition to resources in the Center for Research & Education in Optics & Lasers (CREOL) and the Florida Photonics Center of Excellence (FPCE), UCF facilities include the following major research centers:

- Nano-Sciences & Technology Center (NSTC)
- Advanced Materials Characterization Facility (AMPAC)
- Materials Characterization Facility (MCF)
The College’s faculty and students play leading roles in both local and international professional associations and can provide effective introductions to the extensive network of industry and expertise to which CREOL, The College of Optics & Photonics connects. Through the IA program, your company can also readily connect with other optics, photonics, and industrial organizations through local Florida organizations in which the College maintains an active participation, including the Florida Photonics Cluster (FPC), the Laser Institute of America (LIA), Florida High Technology Corridor Council (FHTCC), the UCF Technology Incubator — ranked #1 in the US in 2004 — and a large family of laser and optics companies in the Central Florida region.

### 4.2 Industrial Affiliates Members

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<td>Northrop Grumman Corporation</td>
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**Memoriam Members:** Dr. Arthur H. Guenther and Dr. William C. Schwartz

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<td>CST of America</td>
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<td>Cubic Defense Applications</td>
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<td>Edmund Optics</td>
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<td>Newport Corporation</td>
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<td>Optical Research Associates</td>
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<td>Paul G. Suchoski, Jr</td>
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<td>Yokogawa Corporation of America</td>
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4.3 Industrial Affiliates Day

The Industrial Affiliates Day was held on April 29, 2011 and included a symposium on “Far IR and Terahertz Photonics.” Invited talks were presented by distinguished speakers.

The event drew over 200 registrants, 26 exhibitors, and 23 student poster participants.

Affiliates Day at the Alumni Center

Student Poster presentations at the CREOL building

Industrial Affiliates Day Program
<table>
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<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
<th>Affiliation</th>
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<tr>
<td>8:00</td>
<td>Continental Breakfast and Walk-in Registrations</td>
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<td>8:30</td>
<td>Welcoming Remarks</td>
<td>Tony Waldrop MJ Soileau</td>
<td>UCF Provost &amp; Vice President UCF Vice-President for Research</td>
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<td>8:50</td>
<td>CREOL, The College of Optics and Photonics – Overview</td>
<td>Bahaa Saleh</td>
<td>Dean &amp; Director, CREOL, The College of Optics and Photonics</td>
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<tr>
<td>9:20</td>
<td>&quot;Quantum Cascade Lasers:widely Tailorable light source from the Mid-infrared to TeraHertz&quot;*</td>
<td>Federico Capasso*</td>
<td>Harvard School of Engineering and Applied Optics*</td>
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<td>9:55</td>
<td>Break &amp; Exhibit</td>
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<td>10:10</td>
<td>“Novel nano architectural concepts for THz/IR based bio-sensing”</td>
<td>Dwight Woolard</td>
<td>Army Research Laboratory</td>
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<td>10:35</td>
<td>“Far IR and Terahertz Technology-at the Turning Point of Change!”</td>
<td>Micheal Dudzik</td>
<td>Lockheed Martin Corp.</td>
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<td>11:00</td>
<td>Break &amp; Exhibit</td>
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<td>11:15</td>
<td>“Infrared Imaging in the Military: Status and Challenges”</td>
<td>Ronald Driggers</td>
<td>Optical Sciences Division Naval Research Laboratory</td>
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<td>11:40</td>
<td>Open Questions</td>
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<td>12:00</td>
<td>Lunch</td>
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<td>1:00</td>
<td>“Next generation optical fibers for IR Applications”</td>
<td>Axel Schülzgen</td>
<td>CREOL, The College of Optics &amp; Photonics</td>
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<tr>
<td>1:25</td>
<td>“Infrared Antennas and Frequency Selective Surfaces”</td>
<td>Glenn Boreman</td>
<td>CREOL, The College of Optics &amp; Photonics</td>
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<td>1:50</td>
<td>Student of the Year talk-“A low noise Chirped pulse laser with an intra-cavity Fabry-Pérot etalon and high precision etalon characterization”</td>
<td>Dimitrios Mandridis</td>
<td>Graduate Student CREOL, The College of Optics &amp; Photonics</td>
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<td></td>
<td>*Cancelled</td>
<td></td>
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</tr>
</tbody>
</table>

**Afternoon Session**
Posters, Award presentations &Reception - CREOL Bldg.

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Participants</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:05</td>
<td>Walk to CREOL Building</td>
<td>CREOL Graduate Students</td>
<td>CREOL rooms 102 &amp; 103; tours start from lobby CREOL lobby</td>
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<tr>
<td>2:20</td>
<td>Poster Sessions</td>
<td>CREOL Graduate Students</td>
<td>CREOL rooms 102 &amp; 103; tours start from lobby CREOL lobby</td>
</tr>
<tr>
<td></td>
<td>Lab Tours</td>
<td>CREOL Graduate Students</td>
<td>CREOL rooms 102 &amp; 103; tours start from lobby CREOL lobby</td>
</tr>
<tr>
<td></td>
<td>Exhibits Open (contiguous)</td>
<td>CREOL Graduate Students</td>
<td>CREOL rooms 102 &amp; 103; tours start from lobby CREOL lobby</td>
</tr>
<tr>
<td>4:00-</td>
<td>Poster award presentation reception</td>
<td>Bahaa Saleh</td>
<td>Dean &amp; Director, CREOL, The College of Optics &amp; Photonics</td>
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<tr>
<td>5:30</td>
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**Tabletop Exhibits – CREOL Lobby & Alumni Center**
### 4.4 Industrial Projects

<table>
<thead>
<tr>
<th>Recipient</th>
<th>Source</th>
<th>Title of Award</th>
<th>Begin</th>
<th>End</th>
<th>Awarded 2010</th>
<th>Cumulative Funding</th>
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<tbody>
<tr>
<td>Abouraddy, A</td>
<td>LightPath</td>
<td>Chalcogenide Glass Recycling and Extrusion</td>
<td>7/30/2010</td>
<td>2/28/2011</td>
<td>$30,000</td>
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<tr>
<td>Boreman, G</td>
<td>ERC, Incorporated</td>
<td>Antenna-Coupled Laser Detection Sensors</td>
<td>5/1/2011</td>
<td>7/10/2011</td>
<td>$110,000</td>
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<tr>
<td>Boreman, G</td>
<td>Plasmonics, Inc</td>
<td>CREOL Support for STTR AF103-BT35: Tunable Fresnel-Zone Lens for Agile Wavefront Control</td>
<td>4/22/2011</td>
<td>1/21/2012</td>
<td>$50,000</td>
<td>$50,000</td>
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<tr>
<td>Boreman, G</td>
<td>Plasmonics, Inc</td>
<td>Profile Feature Extractor (PFx) Sensor Component for Persistent ISR Applications</td>
<td>1/26/2011</td>
<td>7/25/2011</td>
<td>$5,000</td>
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<tr>
<td>Boreman, G</td>
<td>Polaris Sensor</td>
<td>Polarizing IR Beamsplitter</td>
<td>10/12/2010</td>
<td>6/3/2011</td>
<td>$15,000</td>
<td>$15,000</td>
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<tr>
<td>Delfyett, P</td>
<td>Harris Corporation</td>
<td>Laser Metrology and Coherent Signal Development</td>
<td>9/1/2010</td>
<td>4/30/2011</td>
<td>$175,000</td>
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<tr>
<td>Delfyett, P</td>
<td>MIT Lincoln Laboratory</td>
<td>Compact, High Power, Low Noise Mode-locked Semiconductor Lasers for Photonic Analog to Digital Converter Applications</td>
<td>10/13/2010</td>
<td>10/13/2011</td>
<td>$200,000</td>
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<tr>
<td>Delfyett, P</td>
<td>Raydiance, Inc.</td>
<td>Amplitude and Phase Tailoring Phase 2</td>
<td>2/1/2011</td>
<td>6/29/2012</td>
<td>$150,000</td>
<td>$150,000</td>
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<tr>
<td>Deppe, D</td>
<td>Lockheed Martin</td>
<td>Nanophotonics for the Halifax Collaboration</td>
<td>8/2/2010</td>
<td>12/15/2010</td>
<td>$50,000</td>
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<tr>
<td>Dogariu, A</td>
<td>KaMin LLC</td>
<td>Light Scattering Properties of Load Pigment Layers</td>
<td>7/15/2010</td>
<td>7/14/2011</td>
<td>$61,736</td>
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<tr>
<td>Dogariu, A</td>
<td>Schafer Corporation</td>
<td>Study of high-order cross correlations</td>
<td>10/1/2010</td>
<td>12/31/2010</td>
<td>$25,000</td>
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<tr>
<td>Freisem, S</td>
<td>BD Displays</td>
<td>New Technology for High Efficiency Low Voltage Microdisplays</td>
<td>9/1/2008</td>
<td>8/31/2011</td>
<td>$70,000</td>
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<td>Glebov, L</td>
<td>OptiGrate</td>
<td>Mode Selection in Fiber Lasers</td>
<td>4/5/2011</td>
<td>4/4/2012</td>
<td>$40,000</td>
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<tr>
<td>Glebov, L</td>
<td>Raydiance, Inc.</td>
<td>Fabrication of chirped Bragg gratings for high power nanosecond-to-femtosecond range pulse compression at 1553 nm</td>
<td>10/21/2010</td>
<td>12/16/2011</td>
<td>$150,000</td>
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<tr>
<td>Glebov, L</td>
<td>Raydiance, Inc.</td>
<td>Technology and metrology development for fabrication of chirped Bragg gratings with improved characteristics at 1553nm</td>
<td>8/31/2010</td>
<td>4/21/2011</td>
<td>$83,500</td>
<td>$83,500</td>
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<tr>
<td>Harvey, J</td>
<td>Lockheed Martin</td>
<td>Solar Ultra-Violet Imager (SUV)</td>
<td>3/24/2008</td>
<td>1/31/2012</td>
<td>$63,695</td>
<td>$286,370</td>
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<td>Kuebler, S</td>
<td>Academy of Applied Science</td>
<td>AAS-REAP Program 2011</td>
<td>2/10/2011</td>
<td>5/31/2012</td>
<td>$780</td>
<td>$2,600</td>
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<tr>
<td>Li, G</td>
<td>AT&amp;T</td>
<td>RF: Advanced Modulation Technologies for High-Speed and High-Spectral Efficiency Optical Transmission</td>
<td>4/9/2010</td>
<td>4/30/2012</td>
<td>$40,000</td>
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<td>Name</td>
<td>Organization</td>
<td>Description</td>
<td>Start Date</td>
<td>End Date</td>
<td>Initials</td>
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<tr>
<td>Li, G</td>
<td>AT&amp;T</td>
<td>RF: Support of Propagation of Super-modes in Multicore</td>
<td>4/11/2011</td>
<td>4/10/2012</td>
<td>$15,000</td>
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<td>Li, G</td>
<td>NEC Laboratories America, Inc.</td>
<td>RF - Li Group Research</td>
<td>3/1/2010</td>
<td>4/15/2013</td>
<td>$40,000</td>
<td>$80,000</td>
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<tr>
<td>Li, G</td>
<td>Northrop Grumman Corporation</td>
<td>Millimeter-wave and THz Aperture-Plane Imaging using Digital Holography Techniques</td>
<td>5/1/2010</td>
<td>6/30/2012</td>
<td>$5,000</td>
<td>$20,000</td>
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<td>Lumeau, J</td>
<td>OptiGrate</td>
<td>A narrow-band laser source for pumping the Rb D2 transition in the vicinity of 780nm - Service for absorption measurements</td>
<td>8/1/2010</td>
<td>12/22/2010</td>
<td>$15,000</td>
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<td>Lumeau, J</td>
<td>OptiGrate</td>
<td>High Power Measurement Services</td>
<td>8/1/2010</td>
<td>12/31/2010</td>
<td>$5,000</td>
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<tr>
<td>Lumeau, J</td>
<td>OptiGrate</td>
<td>Monolithic rare earth doped PTR glass laser</td>
<td>6/1/2011</td>
<td>3/31/2012</td>
<td>$15,000</td>
<td>$90,000</td>
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<tr>
<td>Moharam, M,</td>
<td>Ocean Optics</td>
<td>Wideband High Efficiency Gratings for Spectrometer Applications</td>
<td>7/1/2010</td>
<td>2/12/2011</td>
<td>$1,000</td>
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<td>LiKamWa, P.</td>
<td>KLA-Tencor Corporation</td>
<td>Theoretical Analysis of the Radiation Dynamics from Mass-Limited Laser-Plasma Sources</td>
<td>5/25/2011</td>
<td>5/24/2012</td>
<td>$100,000</td>
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<td>Richardson, M</td>
<td>Mannkind Biopharmaceuticals</td>
<td>Microscopic and spectral examination of FDKP self assembly processes</td>
<td>1/1/2008</td>
<td>8/31/2009</td>
<td>($0)</td>
<td>$155,500</td>
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<td>Rolland, J</td>
<td>HEDZOPT</td>
<td>HEDZOPT Eye glass Display</td>
<td>7/15/2008</td>
<td>9/30/2010</td>
<td>($90)</td>
<td>$173,123</td>
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<td>Schoenfeld, W</td>
<td>Orlando Health</td>
<td>Feasibility Study: Method for Biopatient Compatibility in MRI Imaging</td>
<td>8/1/2010</td>
<td>2/28/2011</td>
<td>$25,000</td>
<td>$25,000</td>
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<tr>
<td>Schoenfeld, W</td>
<td>PICO Technologies</td>
<td>Smart AMLCD Backlighting for Military Craft</td>
<td>9/18/2008</td>
<td>9/18/2010</td>
<td>$13,976</td>
<td>$27,951</td>
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<td>Van Stryland, E, Hagan, D</td>
<td>Georgia Tech Research Corporation</td>
<td>Zeno Project for Georgia Tech</td>
<td>9/30/2009</td>
<td>11/30/2012</td>
<td>$64,385</td>
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<td>Wu, ST</td>
<td>ITRI Display Technology Center</td>
<td>Blue-Phase Liquid Crystals</td>
<td>4/1/2010</td>
<td>3/31/2012</td>
<td>$101,250</td>
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<td>Wu, ST</td>
<td>Raytheon</td>
<td>Fast-Response Liquid Crystals</td>
<td>8/25/2010</td>
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<td>$130,000</td>
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<td>Wu, ST</td>
<td>Raytheon</td>
<td>LWIR LC Light Shutter</td>
<td>6/30/2010</td>
<td>8/31/2010</td>
<td>$10,000</td>
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<td>Zeldovich, B</td>
<td>OptiGrate</td>
<td>Calculation of the Intensity Distribution transformed by a phase mask</td>
<td>11/1/2010</td>
<td>11/30/2010</td>
<td>$6,000</td>
<td>$6,000</td>
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</tbody>
</table>
Industrial Affiliates members providing financial support for research projects
5. CREOL Association of Optics Students

CAOS, the CREOL Association of Optics Students, is a student organization founded in 1999 to bring together the diverse population of graduate students of CREOL, The College of Optics and Photonics. CAOS facilitate communication and integration of the student chapters of four optics and photonics professional societies: OSA, IEEE-Photonics Society, SPIE and SID.

5.1 Officers

Elected officers of CAOS and the professional societies’ student sections in 2009-2010 are listed below:

President – Joshua Bradford
Vice President – Zhang Yu
Treasurer – Kumel Kagalwala

President – Likai Zhu
Vice President – Yifan Liu
Treasurer – Cen Xia
Secretary – Matt Falanga

President – Matt Weed
Vice President – Casey Boutwell
Treasurer – Matt Weidman
Secretary – Tony Klee

Chairman – Linghui Rao
Vice-Chairman – Su Xu
Treasurer – Jie Sun
Secretary – Hui-Chuan Cheng

President – Apurva Jain
Vice President – Pankaj Kadwani
Treasurer – Christina Willis
Secretary – Erdem Erden
5.2 Educational Outreach

Expanding Your Horizons: February 26, 2011
Organized by SPIE

Middle School Science Night: March 16, 2011
Each year, local middle schools host science nights during which they invite community members to exhibit their science to students and parents. CREOL has participated in 5 of these in the past two years and our OSA chapter has taken the lead on the two in the past year at Avalon and Corner Lake Middle Schools. OSA student members took demonstrations, photographed here, to the schools to show the wonders of how things emit light.

CREOL Educators’ Day: March 19, 2011
With a strong, 2 year track record of interfacing with the local K-12 school system through classroom visits and open houses at our facility, our chapter shifted toward working more exclusively with the teachers themselves this year. We focused our time and effort on generating a workshop model to teach teachers how to be more comfortable working with topics in optics. The culmination of this effort was the first CREOL Educators’ Day where representatives from 10 elementary and middle schools came to CREOL for a half-day workshop. Educators’ Day event was very well received and we were invited to conduct a set of mini-workshops at a day-long STEM workshop organized by Disney. While we felt that these short sessions missed the mark, simply too short a time to get any worthwhile experience, there is a second invitation for August to work with elementary school teachers for a day that we are working toward.

Optics Day: April 1, 2011
Organized by CAOS

CREOL Summer Camp: June 13 - 17, 2011
This year’s campers were focused on Science Olympiad training and worked at problem solving as well as gaining some fun exposure to optics technology. Also, as is customary, a liquid nitrogen exploration was provided in which marshmallows and flowers are frozen and ‘analyzed.’

Florida-AAPT Workshop: October 22 - 23, 2011
The Florida Section of the American Association of Physics Teachers held their annual meeting at UCF this year and CREOL played host. The teachers from all over Florida brought work for discussion and CREOL students lead tours of our facilities on Friday evening. As part of Saturday’s program, our OSA student chapter developed a
demonstration of how to build a laser communications experiment that can be used in a high-school and introductory college physics settings.

Super Scientist Day Partin Elementary School: December 15, 2011
This local elementary school is home to the children of CREOL faculty and so during their Super Scientist Day, CREOL students are sure to make an appearance. OSA student members volunteered their time teaching introductory physics topics like heat transfer, the water cycle, and even basic circuits in a fun way that also provides a face to a profession that is veiled in mystery to most kids.

CREOL Student demonstrates the effect liquid nitrogen has on different materials at the CREOL summer camp.

CREOL student gives a demonstration for a visiting home-schooled 10th grader.

Student Open Houses:
When schedules permit, members of our OSA chapter have put aside time to host small groups (<10) of students and their parents or teachers at CREOL. For example, twice we’ve had home-schooled students in a study group come visit the building to learn about the impact of the material they were learning.

5.3 Professional Development

The Human Side of Research Series: February 24, 2011
How Washington works and why scientists should care with Greg Schuckman
With more than 20 years of experience in leadership, advocacy and policy development for postsecondary institutions, associations, and various nonprofit boards and commissions, Greg Schuckman works on behalf of UCF in Washington with a focus on how to improve educational achievement, increase economic opportunity, and enhance access to higher education in our the United States. A brief presentation on the current political landscape was followed by an open discussion on how to make an impact as a scientist.

SPIE Donut Series: April 15, 2011
Presentation Skills with Courtney Lewis
Organized by SPIE

Human Side of Research Series: September 9, 2011
The Building of Organizations with Dr. MJ Soileau
M.J. Soileau has built a research group as a professor, a world class graduate research facility as a director and a high ranking university wide research portfolio as a Vice President. Who better to discuss the planning, building, and leadership of scientific establishment? A brief presentation about the origins and influencing events of this living legend was followed by an open discussion on usefull experiences with managing people in academia.
5.4 Political Advocacy

Congressional Visits Day: April 7, 2011 & May 5, 2011
Five CREOL students represented the College as well as the Central Florida optics industry this year in DC during two OSA sponsored Congressional Visits. CREOL’s contingency took to the Hill with stories of federal research investments that are making real impact in the Central Florida communities. In a region soon to be greatly hurt by the minimization of NASA, the Florida Photonics Cluster has made enormous strides in turning the research powerhouse of UCF into economically stimulating industry. This was a message that was heard loud and clear by those members of Congress the CREOL contingency met with, and the college has since hosted a reaction visit by Jared Stout from Congresswoman Adams’s office.

District Office Visit with Congresswoman Sandy Adams: August 16, 2011
While at home in her district office in Oviedo during the Congressional Recess, Congresswoman Adams accepted a request by CREOL students to meet and discuss the importance that Federal research support has in Central Florida, and at UCF in particular. The students’ message was received and the Congresswoman accepted an invitation to visit and tour CREOL.
**Congresswoman Sandy Adams visits CREOL: September 26, 2011**

While on campus, Congresswoman Adams paid CREOL a visit to see the progress first hand since she had visited during the dedication of the Florida Photonics Center of Excellence (FPCE) in 2003 as a Representative in the Florida legislature. She was able to see two of CREOL’s most impressive fabrication tools, Molecular Beam Epitaxy (MBE) and Fiber Draw Towers, as a message of CREOL as an engine for commercial possibilities was relayed.

Dr. Winston Schoenfeld discusses film growth and solar initiatives with Congresswoman Adams.

CREOL students and Dr. David Hagan pose with the Congresswoman at the end of her visit to CREOL.

Dr. Axel Schülzgen explains optical fiber fabrication to Congresswoman Adams.

Dr. Ayman Abouraddy discusses novel optical fiber devices with Congresswoman Adams.
## 5.5 Seminars

<table>
<thead>
<tr>
<th>Date</th>
<th>Organization</th>
<th>Event Description</th>
<th>Series</th>
</tr>
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<tbody>
<tr>
<td>2/18/2011</td>
<td>Glenn Boreman</td>
<td>Donuts Series</td>
<td>SPIE Student Chapter Seminar Series</td>
</tr>
<tr>
<td></td>
<td>CREOL</td>
<td></td>
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</tr>
<tr>
<td>2/24/2011</td>
<td>Greg Shuckman</td>
<td>How Washington works and why scientists should care?</td>
<td>OSA Student Chapter Seminar Series</td>
</tr>
<tr>
<td></td>
<td>Assistant VP for University Relations</td>
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<tr>
<td>4/01/2011</td>
<td>CAOS</td>
<td>Optics Day</td>
<td>OSA Student Chapter Seminar Series</td>
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<td>CREOL</td>
<td></td>
<td>CREOL Association of Optics Students (CAOS)</td>
</tr>
<tr>
<td></td>
<td>NASA - Jet Propulsion Laboratory, California Institute of Technology</td>
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<tr>
<td>5/20/2011</td>
<td>SPIE</td>
<td>Life After Grad School</td>
<td>SPIE Student Chapter Symposium</td>
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<tr>
<td>6/13/2011</td>
<td>CREOL</td>
<td>Summer Science Camps</td>
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<td>8/03/2011</td>
<td>REU</td>
<td>REU Student Poster Presentation</td>
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<tr>
<td>8/29/2011</td>
<td>Prof. Yan-qing Lu</td>
<td>Optical Sensing with Microstructured Fibers.</td>
<td>SID Student Chapter Seminar Series</td>
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<tr>
<td></td>
<td>College of Engineering and Applied Sciences, Nanjing University, China</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9/9/2011</td>
<td>MJ Soileau, VP of Research &amp; Commercialization, UCF</td>
<td>Building of Research Organization.</td>
<td>OSA Student Chapter Seminar Series</td>
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<tr>
<td>10/14/2011</td>
<td>Yi-Hsin Lin</td>
<td>Electrically switchable surface of a liquid crystal and polymer composite film and its applications.</td>
<td>SID Student Chapter Seminar Series</td>
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<td>National Chiao Tung University, Taiwan</td>
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<td>12/05/2011</td>
<td>L. Pavesi, University of Trento, Povo (Trento) Italy</td>
<td>NanoSilicon NanoPhotonics</td>
<td>IEEE Student Chapter Seminar Series</td>
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<tr>
<td>2/18/2011</td>
<td>Glenn Boreman</td>
<td>Donuts Series</td>
<td>SPIE Student Chapter Seminar Series</td>
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<td>2/24/2011</td>
<td>Greg Shuckman</td>
<td>How Washington works and why scientists should care?</td>
<td>OSA Student Chapter Seminar Series</td>
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<td>Assistant VP for University Relations</td>
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<tr>
<td>11/10/2010</td>
<td>Janglin (John) Chen</td>
<td>E-paper technology and future development.</td>
<td>SID Student Chapter Seminar Series</td>
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