

CREOL, THE COLLEGE OF OPTICS AND PHOTONICS

Annual Report 2020

University of Central Florida



UCF

Leading the Charge

The College of Optics & Photonics Executive committee serves to advise the dean on matters relating to staffing, space and facilities, budget and strategic planning.



David J. Hagan
Interim Dean & Director
Pegasus Professor of Optics & Photonics



M. G. "Jim" Moharam
Interim Associate Dean for Academic Programs
Professor of Optics & Photonics



Mark C. Wagenhauser
Budget Director



Peter J. Delfyett
University Trustee Chair
Pegasus Professor of Optics & Photonics, ECE & Physics
Director, Townes Laser Institute



Demetrios Christodoulides
Cobb Family Endowed Chair
Pegasus Professor of Optics & Photonics



Sasan Fathpour
Professor of Optics & Photonics, and ECE



A Message From the Interim Dean

2020 was a year in which the power of photonics has had major impact. Throughout the COVID-19 pandemic, businesses, education and families relied on the internet at unprecedented levels. The bandwidth required by extensive videoconferencing, Zoom happy hours, and streaming Netflix is enabled by the fiber-optics network, using the kind of technologies developed by CREOL faculty, students and our alumni.

This year also came with a change in college leadership. After 11 highly successful years of running the college, Bahaa Saleh stepped down from the dean position. His tenure resulted in considerable growth of the college, both in size and reputation. Dean Saleh also steered the college through the implementation of our highly successful Bachelor's degree in Photonic Science and Engineering.

The COVID-19 pandemic resulted in a temporary shutdown of laboratory research and a move to largely online classes in 2020. I applaud faculty and students for their flexibility in finding ways to keep teaching and learning throughout this time. I know it has not been easy. One of the greatest heartbreaks was postponing traditional annual celebrations and observations like CREOL Industrial Affiliates day and the CREOL traditional Thanksgiving celebration.

Despite the changes and the pandemic, the college continues to be successful by many measures. The number of scholarly publications, funded research grants and degrees awarded remain steady, and our faculty continue receiving accolades for their work. You'll find some of these achievements highlighted in this annual report.

I have also worked toward increasing CREOL's engagement with industry and alumni. To assist with this, we have engaged the UCF College of Sciences Marketing and Communications team, bringing about a restart of the CREOL Highlights newsletter and a new, shorter format for this annual report. In addition, I am delighted to welcome six new members of our industrial affiliates program (listed on page 18). We plan to continue this growth into the next year. To increase transparency and to help amplify the voices of the diverse makeup of the college, I also introduced a Dean's Internal Advisory board.

The amicable atmosphere in CREOL encourages our staff to remain with us for many years, so it can seem like an era has ended when staff retire. Two such eras ended in 2020, with the retirement of Gail Drabczuk and machinist Richard Zotti. Gail started in CREOL in 1996 and Richard in 2000. They will be missed.

This year brought many unanticipated challenges, but it has not slowed us down. If anything, it has showcased CREOL's resiliency as we continue to grow in our teaching, research, partnerships and innovation.

David J. Hagan, Ph.D.

Interim Dean & Director

Pegasus Professor of Optics & Photonics

For More Information Visit:
creol.ucf.edu/annual-report



Saleh Retires as Dean, Returns to Faculty

After 11 highly successful years of running the college, Bahaa Saleh stepped down from the dean position. He arrived in 2009 from Boston University, where he was Chair of the Electrical Engineering Department.

Over his time as dean, the size of the CREOL faculty grew from 23 in early 2009 to 33 at the end of 2019. During his tenure, the reputation of the college also grew considerably. One of the early decisions he made was to introduce a Bachelor's degree program as a joint program with the College of Engineering and Computer Science. This degree in Photonic Science and Engineering program has been highly successful, is accredited and still

enjoys considerable growth. In addition to his dean duties, Saleh was able to teach both graduate and undergraduate students, maintain a strong research program and was the founding editor-in-chief of a new OSA Journal, *Advances in Optics and Photonics*. Since stepping down as dean, he has continued as a Distinguished Professor of Optics and Photonics, researching in coherence and quantum optics and supervising and teaching students.

Dean's Internal Advisory Council

The Dean's internal Advisory Council was created in 2020, and is formed from faculty, staff and students. The goal is to provide advice to the dean on all aspects of the college and its programs.

STAFF

April Lamoureux
Vicky Ortiz Batson

UNDERGRAD

Austin Brigham

GRADUATE

Jessica Pena

RESEARCH STAFF

Zheyuan Zhu

FACULTY

Kyle Renshaw
Axel Schulzgen



PSE Advisory Board 2020

The Advisory Board supports and advises the Photonic Science and Engineering program as it pursues its missions and goals. The program seeks a national and international reputation for excellence in photonics.

Jeffrey Crystal

Elbit Systems of America

Richard DeSalvo '93 Ph.D.

L3Harris

Jihua Du '00 Ph.D.

Lumentum

Orges Furxhi

IMEC

Zhibing Ge '07 Ph.D.

Alexei Glebov

Optigrate Corporation

Carl Kutsche '98 Ph.D.

Idaho National Lab.

Brian Lawrence '97 Ph.D.

Hill Rom Holding

Teresa Pace

L3Harris

Chrys Panayiotou

Indian River State College

Clara Rivero-Baleine '05 Ph.D.

Lockheed Martin

Al Symmons

Vital Materials Co. Ltd.

Matt Weed '13 Ph.D.

Luminar Technologies, Inc.

2020 Awards

Ayman Abouraddy

U.S. Department of Defense's Newton Award for Transformative Ideas

Luca Argenti

UCF Reach for the Stars award

Zenghu Chang

College of Sciences Award for Excellence in Research

Demetrios Christodoulides

*Excellence in Research Award - University & College Level
Research Incentive Award*

Nicholas Cox

Fulbright Fellow

Peter Delfyett

*American Physical Society - Arthur L. Schawlow Prize in Laser Sciences
IEEE - Photonics Society William Streifer Scientific Achievement Award*

Pieter Kik

College Award for Excellence in Graduate Teaching

Brian Lawrence '97 Ph.D.

2020 Distinguished Alumnus Award

Jessica Pena

Directed Energy Professional Society Fellowship

Kyle Renshaw

College Award for Excellence in Undergraduate Teaching

Kathleen Richardson

*SPIE - Maria J. Yzuel Educator Award
ACerS - Arthur F. Greaves-Walker Lifetime Service Award*

Jim Ross

30 Years - Recognition of Service to the University

Rachel Sampson

Order of Pegasus

Alex Schulzgen

Teaching Incentive Program Award

Hannah West

Founders Award

Fan Wu

CREOL Student of the Year

Tao Zhan

*IEEE Photonics Society Graduate Student Scholarship
First place in the SPIE AR VR XR optical design challenge
SPIE Optics and Photonics Education Scholarship*



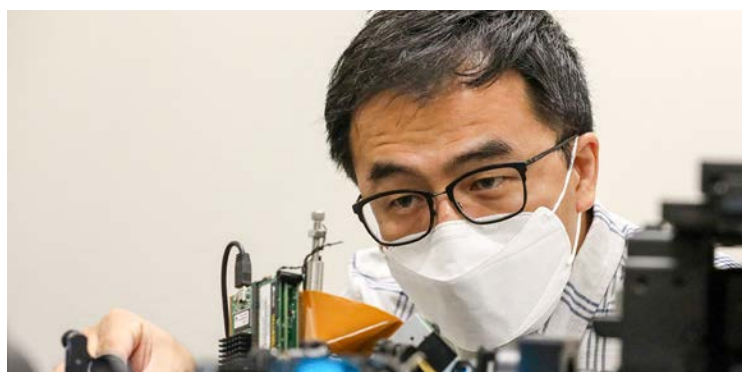
Fulbright Fellow

Graduate student Nicholas Cox has been named a Fulbright research fellow. Cox will travel to Barcelona, Spain, to work in the Institute of Photonic Sciences, led by Jens Biegert, Ph.D. There, he will use soft X-ray attosecond transient absorption spectroscopy to study ultrafast electron dynamics in solids. The Fulbright program is the largest exchange program in the U.S. for students and young professionals. Fulbright research grants foster international collaboration between research institutions and promote goodwill between nations through shared cultural experiences.



Kyu Young Han Wins Major NIH Awards

Assistant Professor Kyu Young Han, Ph.D., is the university's first faculty member to receive the National Institutes of Health's (NIH) Maximizing Investigators' Research Award (MIRA) for early-stage investigators. The five-year \$1.7 million grant will fund the development of a new optical technology that could aid in the understanding of human protein linked to diseases. Han, who has a doctorate in chemistry, will use the grant to develop a novel bioengineering tool and imaging system to enable researchers to image multiple proteins in a single cell under a super-resolution microscope. The current technique is extremely slow, taking weeks to months to image fewer than 20 target proteins. Han expects to be able to accomplish this with nanoscale resolution in 24 hours.



Han is also part of a "dream team" of researchers from the University of Illinois at Urbana-Champaign and Bar-Ilan University at Israel that recently received another grant from the NIH.

The \$4.2 million grant will fund research in what they hope may lead to a major breakthrough in understanding the three-dimensional organization of the nucleus over time and its role in certain diseases. The program aims to spur the development of technologies that will advance the understanding of how DNA is arranged within cells in space and time, and how this affects cellular functions in health and disease.



Kathleen Richardson Honored by Professional Societies

Pegasus Professor of Optics and Photonics and optical material scientist Kathleen Richardson, Ph.D., has recently been named the recipient of the ACerS (American Ceramic Society) Arthur F. Greaves-Walker Lifetime Service Award. Richardson was chosen for her exemplary

leadership and innovation, commitment to the field of ceramic glass science and engineering and her dedication to educating the next generation of scientists.

Earlier in the year, Richardson was also awarded the SPIE 2020 Maria J. Yzuel Educator Award. This award is presented in recognition of outstanding contributions to optics education by an SPIE instructor or an educator in the field.

Richardson received her B.S. degree in Ceramic Engineering from the New York State College of Ceramics at Alfred University in 1982. After working at the Lab for Laser Energetics at the University of Rochester shortly after graduation, Richardson

returned to Alfred in 1988 to pursue her Ph.D. in Glass Science and Engineering, becoming a lecturer at the university during this period. This experience led to her interest in pursuing an academic career path.

“I was so excited to hear that I would be a recipient of this award,” said Richardson. “I am humbled to be selected by my peers in the American Ceramic Society and SPIE. The award highlights not only research accomplishments but my decades of supporting and training the next generation of scientists in my discipline.”



Optics Ph.D. Student Receives Order of Pegasus

In 2019, Rachel Sampson received her master’s degree in Optics and Photonics and is currently working on her doctoral degree in Optics and Photonics. Sampson’s research focus is telecommunications, specifically in space division multiplexing. Through this research, she works on increasing the amount of information that can be transferred. “I like to joke that I help the world watch more Netflix,” she says.

Sampson is a recipient of the 2020 Order of Pegasus. Upon receiving this prestigious award, she expressed that it is a great honor to be recognized as one of the top students at UCF saying, “I plan to live up to this honor by continuing to develop creative and inclusive programming as a student leader.” She believes that UCF represents a modern university that is continuously innovating and redefining higher education and finds herself frequently in awe of the things that UCF students, faculty and staff are accomplishing.

Delfyett Wins Prestigious Awards From APS and IEEE

Peter Delfyett, a Pegasus Professor of Optics and Photonics, was awarded the 2021 Arthur L. Schawlow Prize in Laser Sciences. Each year, the American Physical Society selects one scientist who has made outstanding contributions in laser science research to receive the award, named after Schawlow, a Nobel Laureate and co-creator of the laser.

Delfyett notes it's an appropriate time for the award, because much of his previous work was instrumental to the creation of the telecommunications that kept workplaces humming during the pandemic.

Delfyett was also chosen as the recipient of the IEEE Photonics Society William Streifer Scientific Achievement Award for 2020. The award recognizes a single scientific contribution to field of lasers and electro-optics in the past 10 years. Delfyett's citation notes his

“Pioneering contributions to semiconductor diode based ultrafast laser science and technology.”

Delfyett's personal contributions to the base of scientific knowledge include 44 patents that apply directly to the advancement of everyday life. Many of these discoveries use lasers for precision timing, fiber optics communication, and signal processing, which helps information move faster on the internet and in devices such as cell phones, laptops, tablets and autonomous vehicles. Another major group of patents is related to the generation and amplification of very short pulses of light using semiconductor lasers that help build smartphones, medical stents for surgical procedures and micro-precision holes to make car engines more fuel efficient.





CREOL Student of the Year

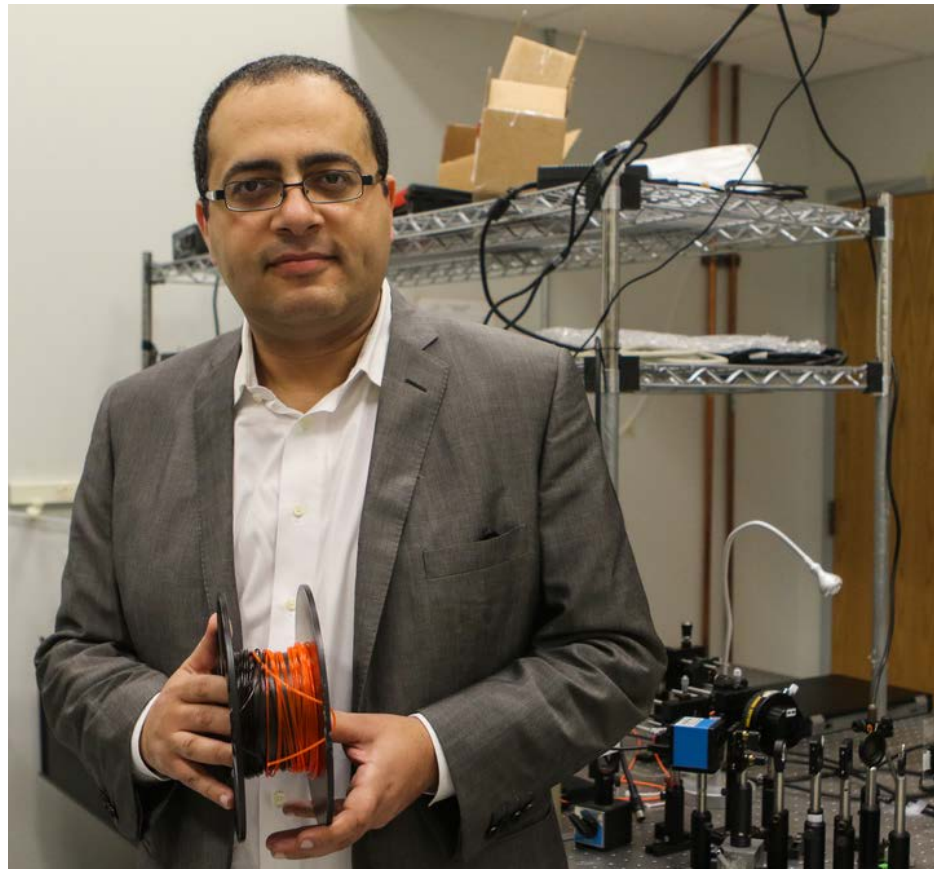
Fan Wu is currently a Ph.D. candidate in Dr. Demetrios Christodoulides' Nonlinear Waves group. He received his B.S. and M.S. degrees, both in Physics, from Harbin Institute of Technology in 2012 and 2014, respectively. He has worked in the general areas of nonlinear waves in both bulk and waveguide arrangements. In particular, he has made contributions to the development of a comprehensive optical thermodynamics theory that can be used to effortlessly describe the collective nonlinear behaviors of multimode photonic systems. Additional research interests also include orbital angular momentum light sources and rogue waves.

Abouraddy Receives DoD Newton Award

Professor Ayman Abouraddy was awarded the U.S. Department of Defense's Newton Award for Transformative Ideas during the COVID-19 Pandemic.

"The idea of this new award invokes a comparison to a not too dissimilar situation from ours today that arose in England in 1665," Abouraddy says. "A plague spread in England that led all universities to shut down and send their students home. One of these students was the young Isaac Newton, who made use of the down time to further his research."

The DOD award, named in honor of Sir Isaac Newton's achievements in mathematics, optics and gravitation during the Great Plague of London in 1665, sought "transformative ideas" to resolve challenges, advance frontiers and set new paradigms in research of immense potential benefit to



the DOD and the nation at large during the COVID-19 pandemic.

Abouraddy's research focuses on a new class of matter in motion. The proposed project is an extension of his work on a class of laser beams with unique properties.



CREOL Alumnus Jason Eichenholz is Driving the Future

By Nicole Dudenhoefer '17

Self-driving cars were once science fiction fantasy. Today, Jason Eichenholz '95MS '98PhD and his company, Luminar, are making them a reality.


Over the past several years, self-driving cars have become the next major frontier in transportation. At the forefront of this movement is Luminar, a seven-year old company co-founded by Jason Eichenholz '95MS '98PhD. The company, which is based in Silicon Valley and Orlando, has developed more efficient and affordable methods for creating the technology behind these vehicles. So

much so, they've earned partnerships with Audi, Toyota, Volvo and more than a dozen other autonomous vehicle programs.

"Our partnerships allow us to take the technology we're developing and deploy it in the real world with real customers and get the kind of feedback needed to continue to innovate and make the product better," Eichenholz says.

Leading the race to create the first fully autonomous car is lidar, a sensor that uses infrared light to measure distance and enable autonomous vehicles to detect or "see" their surroundings.

The lidar developed by Luminar can see almost 10 times farther than other sensors, even for objects with less than 10 percent reflectivity. This allows the company's software to perceive pedestrians in detail —



even detecting their limbs in the dark — and anticipate what their next move will be.

“Luminar’s sensor architecture is incredibly efficient to build in terms of cost and time. It uses only one laser and one receiver, as opposed to most autonomous vehicle lidar sensors that use 64 lasers and 64 receivers. Pursuing this architecture from the beginning means it was designed from the chip level up to be scalable into consumer vehicles, both from a manufacturability and a cost standpoint,” Eichenholz says.

In 2020, Luminar announced it would merge with special purpose acquisition company Gores Metropoulos Inc., for a deal evaluated at \$3.4 billion, according to Tech Crunch. This same year, Fortune included the tech company in its inaugural Impact 20 list, which recognizes young, developing companies that are already making people’s lives better. Eichenholz also received *i4 Business magazine’s* 2020 Business Leader of the Year Industry award for his work to help position Central Florida and

UCF on the cutting edge of industry and technology.

“This milestone is pivotal for the future of the autonomous car industry and the automotive industry at large because there is a clear opportunity for us to set a new baseline standard for vehicle safety industry-wide,” Eichenholz says. “Autonomy presents an opportunity to save lives through enhanced safety and active safety systems, which are systems activated in response to a safety problem or abnormal event. Through this milestone, we have the opportunity to deliver what we believe is the world’s first autonomous solution for series production, powering highway autonomy and proactive safety.”

Eichenholz has a Master’s and a Doctoral degree in Optical Science and Engineering from the University of Central Florida and a Bachelor’s in Physics from Rensselaer Polytechnic Institute.

Jason Eichenholz was a graduate student in the Laser Plasma Laboratory in CREOL, under the direction of Martin Richardson. His dissertation was titled “Generation of High Powers From Diode Pumped Cr³⁺ Doped Colquiriites”. Jason has been a strong supporter of CREOL as an alumnus and in 2013 became the College of Optics and Photonics’ first recipient of the Distinguished Alumnus/Professional Achievement Award.

Alumnus Innovation Improves Cataract Surgery



Thousands of people are seeing more clearly thanks in part to the vision of Vadim Smirnov, '02 MS, whose research group played an integral role in the development of lasers that revolutionized cataract surgery.

Local optical component manufacturer OptiGrate Corp was approached by a medical

laser company more than 10 years ago with a request to develop the holographic optical elements for new ultrafast lasers (also called volume Bragg gratings). Smirnov drew on his experience in CREOL's laboratory and the Institute for Fine Mechanics and Optics in St. Petersburg, Russia, to realize that vision.

"Stability of lasers based on a conventional technology is quite poor and requires regular and complex alignment

that is unacceptable for medical applications," explained Smirnov, who was mentored by CREOL's Leonid B. Glebov, Ph.D. "Lasers built based on a volume Bragg grating however dramatically improved eye surgeries because of their unprecedented stability, versatility and precision."

Creating the Bragg gratings is a difficult and ongoing process under constant development. Smirnov points out that technology development can go on for years, if not indefinitely.

Today, OptiGrate enjoys success as a leading developer and manufacturer of volume Bragg gratings, and supplies holographic elements to more than 600 customers around the globe. Smirnov anticipates that volume Bragg gratings will continue to evolve and, eventually, expand its deployment to an even wider range of applications.

Alumni Professional Society Fellows

Each year, SPIE, the International Society for Optics and Photonics and OSA, The Optical Society, select a few members of distinction to recognize their contributions to the field. In 2020, five CREOL Alumni were elected to the rank of Fellow of either SPIE or OSA.



SPIE-Raymond C. Rumpf '06 Ph.D.
Associate Professor at University of Texas at El Paso
Student of Eric Johnson



OSA-Arthur Dogariu '97 Ph.D.
Research Scholar and Lecturer, Princeton University
Student of Eric W. Van Stryland & David J. Hagan - "For discovering and developing novel nonlinear spectroscopic techniques for remote sensing with applications from medicine to national security"



SPIE-Kenneth J. Jerkatis '92 M.S.
Staff Consultant at Ball Aerospace
Student of James Harvey



OSA- Sergey Polyakov '03 Ph.D.
National Institute of Standards & Technology
Student of George I. Stegeman - "For contributions using quantum properties of light for optical metrology, communication, and biosensing beyond classical limits"



OSA- Yi-Hsin Lin '06 Ph.D.
National Chiao Tung University
Student of Shin-Tson Wu - "For pioneering contributions to electrically tunable liquid crystal lenses that led to wide-ranging applications"

Childhood Laser Fascination Leads Distinguished Alumnus to CREOL

Brian Lawrence, Ph.D., '96, sees problems as opportunities.

A self-described “experimentalist at heart,” Lawrence ran into plenty of problems in seventh grade when he built a power supply to power a donated HeNe laser tube to explore his curiosity about lasers. Those problems became learning opportunities that led him to eventually assemble more powerful ruby crystal lasers.

His science fair projects skipped the generic baking soda volcano and dove into sophisticated topics like the impacts of monochromatic light on photosynthesis. That opened opportunities like undergraduate study at the Massachusetts Institute of Technology (MIT).

“At that point I was hooked on lasers,” says Lawrence, the 2020 Distinguished Alumnus for CREOL, the College of Optics and Photonics. “I loved being in the lab and solving problems.”

While earning a master’s at MIT, Lawrence traded the classroom for a co-op position at General Electric. The lab work continued, with a focus on nonlinear optics in organic materials. Working with a particular class of organic salts, Lawrence and the team at GE demonstrated some of the largest second-order nonlinear



optical coefficients at the time. In a corporate research environment like GE Global Research, Lawrence soon came to realize that everyone either had a doctorate degree or worked for someone who did. There was only one solution.

Other schools promised opportunities to study lasers in depth, but it was the laboratory of the late George Stegman, Ph.D., at CREOL, the College of Optics and Photonics that snagged Lawrence.

Under Stegman’s mentorship, Lawrence rebuilt and improved a laser system that fulfilled his ambitions to perform research at the cutting edge of nonlinear optics. He had the opportunity to present his work at numerous conferences, including traveling to Europe to present his findings at an international nonlinear optics workshop and engage in spirited academic debates with other researchers in the field.

“I couldn’t have asked for a better experience,” Lawrence says.

Lawrence explains studying for a Ph.D. is fundamentally about problem solving. Often he would start with the desired result and work backwards to find how to achieve it. Because this fits his favorite mode of study, the time flew by and he was soon walking across a stage to add “Ph.D.” after his name.

Over the time it took earn his doctorate, some of his friends at GE had launched a startup. Lawrence joined them and immediately found himself leaning on the problem solving skills acquired over his career to develop products for the fiber-optics industry. His career took him back to GE as a researcher and eventually into leadership roles. These positions then led to his current role as chief technology officer for a medical device company called Hill-Rom.

While today’s role doesn’t take him frequently into the lab, the fundamentals of problem solving remain as valuable. That’s one of the key strengths Lawrence would encourage in rising students, along with the flexibility to explore new opportunities.

“Be willing to push yourself out of a comfort zone,” Lawrence says.



David Hagan, Interim Dean of CREOL, The College of Optics & Photonics; Alexei Glebov, President of OptiGrate; John Greivenkamp, President, SPIE Board of Directors; Kent Rochford, SPIE CEO

\$900k Donated to CREOL Scholarships

Glebov and Soileau Families Team With SPIE to Endow Two Major Scholarships

SPIE and the University of Central Florida announced in February 2020 a \$650,000 scholarship fund. The SPIE-Glebov UCF graduate student scholarship is part of a \$2.5 million SPIE education funding initiative for optics and photonics.

The \$325,000 in funding from SPIE will be matched in full by the College's Research Foundation and the Glebov family, to create scholarships for graduate students at CREOL.

"The generosity of Leonid Glebov and Larissa Glebova ensures promising opportunities for graduate students studying optics and photonics at UCF CREOL," said SPIE CEO Kent Rochford. "We are delighted to join with the

Glebovs in creating a scholarship fund that will exist in perpetuity to help support the next generations of scientists and engineers who will create the future using optics and photonics."

An additional \$125,000 in funding from SPIE is a match to a gift from UCF Professor M.J. Soileau and his wife, Cheryl. Combined, the gifts will create a \$250,000 Soileau Family-SPIE Optics and Photonics Undergraduate Scholarship Fund for undergraduate students in the College of Optics and Photonics (CREOL), with preference given to students who are the first in their families to attend college.

"I learned early that wealth does not equal worth," says Soileau, who was the first in his family to attend not only college but also high school. "My family is pleased to partner with SPIE to support scholarships for students studying optics and photonics to help them realize their worth."

Oak Ridge Scientist joins CREOL Faculty



A highly regarded name in the field of optics was recruited a year ago to CREOL, the College of Optics and Photonics, for his expertise in multiple areas of research.

Yehuda Braiman, Ph.D., brings more than 20 years

experience as a distinguished research and development scientist at Tennessee's Oak Ridge National Laboratory, along with a joint faculty professorship at the

University of Tennessee, Department of Mechanical, Aerospace and Biomedical Engineering.

Along with experience in lasers and optics, his research interests include developing fast and energy-efficient cryogenic (ultralow temperature) computer memory and studying mechanisms of ultralow sliding friction in the area of materials science.

"The extraordinary strength of the CREOL faculty was one of my main motivations in coming to UCF," says Braiman. "In such a short amount of time I have found myself becoming a part of a welcoming family." Braiman's current laboratory focuses on semiconductor diode lasers and phase-locking of diode arrays.



Two Long Time CREOL Family Members Retire



Gail Drabczuk retired on August 13, 2020. She has been a part of the CREOL family since 1996, and prior to that she worked at UCF HR for one year. She provided HR support to the college and brought a cheerful energy. Gail is enjoying her retirement spending time at the beach and hopes to start traveling soon.

Richard Zotti retired on August 28, 2020. He has been a part of the CREOL family since 2000. During his tenure as CREOL's only machinist, he worked with research groups to provide innovative research equipment as well as senior design students to assist in building their projects. He has now relocated to Sebastian, FL, where he enjoys fishing and boating.

Doctoral Dissertations and Post-Graduation Employment

Optics & Photonics Ph.D.



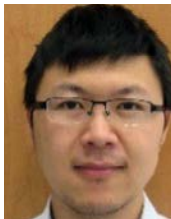
Helena Lopez Aviles

Novel Linear and Nonlinear Effects in Optical Fibers
Advisor: Demetrios Christodoulides
Title: Sr. Optical Engineer
Employer: Coherent, CT



Mina Bayat

Cryogenic Performance Projections for Ultra-Small Oxide-Free Vertical-cavity Surface-Emitting Lasers
Advisor: Dennis Deppe
Title: TBD
Employer: TBD



Hao Chen

Quantum Dot Light Emitting Devices (QLEDs)
Advisor: Yajie Dong
Title: Optical Display Engineer
Employer: Apple Inc.



Guillermo Fernando Camacho Gonzalez

Hybrid Integration of Second and Third-order Highly Nonlinear Waveguides on Silicon Substrates
Advisor: Sasan Fathpour
Title: Sr. Engineer
Employer: Intel Corporation, Rio Rancho, NM



Evan Hale

Novel Solid State Lasers Based on Volume Bragg Gratings
Advisor: Leonid Glebov
Title: Laser Scientist
Employer: Fibertek, Inc.



Juan He

Stable, Highly Luminescent Perovskite-polymer Composites for Photonics Applications
Advisor: Shin-Tson Wu
Title: Display Engineer
Employer: Apple, Inc.



Yuge Huang

High-Fidelity Mini-LED and Micro-LED Displays
Advisor: Shin-Tson Wu
Title: Research Scientist, FB Reality Lab
Employer: Facebook Inc.



Fedor Kompan

Holographic Optical Elements for Visible Light Applications in Photo-thermo-refractive glass
Advisor: Leonid Glebov
Title: Sr. Scientist
Employer: IPG Photonics, Oxford MA



Walker Larson

Partial Coherence and Ancillary Degrees of Freedom in Classical and Quantum Optical Metrology
Advisor: Bahaa E. A. Saleh
Title: Nonlinear Fiber Optics Scientist
Employer: SAIC



Huiyuan Liu

Mode Coupling in Space-Division Multiplexed Systems
Advisor: Guifang Li
Title: Sr. Engineer
Employer: Acacua Communications



Marcin Malinowski

Third-order Optical Nonlinearities for Integrated Microwave Photonics Applications
Advisor: Sasan Fathpour
Title: TechTeam Test
Employer: Nokia, NY



Midya Parto

Artificial Magnetism and Topological Phenomena in Optics
Advisor: Demetrios Christodoulides
Title: Post Doctoral Scholar
Employer: California Institute of Technology



Qitian Ru

Broadband Mid-infrared Frequency Combs Generated via Frequency Division
Advisor: Konstantin Vodopyanov
Title: Student
Employer: Pursuing second degree.



Jose Rafael Guzman Sepulveda

Optical Sensing of Structural Dynamics in Complex Media
Advisor: Aristide Dogariu
Title: Full-Time Researcher
Employer: The National Polytechnic Institute of Mexico

**Yangyang Sun**

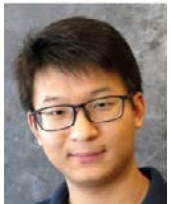
Computational Imaging Systems for High-Speed, Adaptive Sensing Applications
 Advisor: Shuo "Sean" Pang
 Title: Display Exploration Engineer
 Employer: Apple, Inc.

**Javed Rouf Talukder**

High Performance Liquid Crystal Devices for Augmented Reality and Virtual Reality
 Advisor: Shin-Tson Wu
 Title: RFIC Design Team/Staff Engineer
 Employer: Qualcomm Inc., San Diego

**Felix Tan**

Design and Fabrication of Scalable Multifunctional Multimaterial Fibers and Textiles
 Advisor: Ayman Abouraddy
 Title: Postdoctoral Researcher
 Employer: UCF, Multi-material Optics Fiber Devices Group

**Jialei Tang**

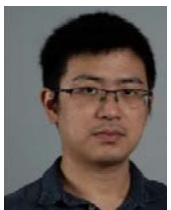
Fluorescence Microscopy with Tailored Illumination Light
 Advisor: Kyu Young Han
 Title: Sr. Product Engineer
 Employer: AMSL

**Salimeh Tofighi**

Transient Mid-IR Nonlinear Refraction in Air and Nonlinear Optical properties of Organometallic Complexes
 Advisor: David Hagan and Eric Van Stryland
 Title: Sr. Laser Engineer
 Employer: Photonics Industry International, NY

**Fan Wu**

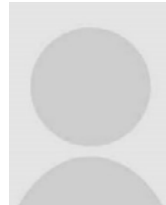
Thermodynamic Theory of Heavily Multimoded Nonlinear Optical Systems
 Advisor: Demetrios Christodoulides
 Title: Research Scientist
 Employer: UCF, CREOL Nonlinear Waves Lab

**Jian Zhao**

Imaging Through Glass-Air Anderson Localizing Optical Fiber
 Advisor: Axel Schulzgen
 Title: Post Doctoral Associate
 Employer: ECE Dept., Boston University

Electrical Engineering Ph.D.**Ali Abdulfattah**

2 Micron Fiber Laser Machining Transparent Conductive Glasses & Transparent Polymers
 Advisor: Martin Richardson
 Title: Postdoctoral Researcher
 Employer: UCF/LPL Laboratory

**Yousef Alahmadi**

Mode Conversions in Active Semiconductor MQW Integrated Optic Devices
 Advisor: Patrick LiKamWa
 Title: Assistant Professor
 Employer: King Abdul-Aziz City of Science & Technology

**Amirmahdi Honardoost**

Thin-Film Lithium Niobate Integrated Photonics on Silicon for Electro-, and Nonlinear-Optic Applications
 Advisor: Sasan Fathpour
 Title: Postdoctoral Scholar
 Employer: UC Berkley, EE & Comp Sci Dept

**Robert Short**

Measuring Target Acquisition Range Improvement Due to Boost Filtering Exploiting Deep-Electron-Well Infrared Detectors
 Advisor: Ronald Driggers
 Title: Test Engineer
 Employer: Redstone Arsenal

**Guanjun Tan**

High-dynamic-range Foveated Near-eye Display System
 Advisor: Shin-Tson Wu
 Title: Display Exploration Engineer
 Employer: Apple, Inc. Cupertino, CA.

Mechanical Engineering Ph.D.**Zachary Loparo**

Multi-Species Measurements at High Temperatures Using Advanced Mid-Infrared Laser Schemes
 Advisor: Konstantin Vodopyanov
 Title: Research Engineer
 Employer: Naval Surface Warfare Center, Indian Head, Indian Head, MD

CREOL, THE COLLEGE OF OPTICS AND PHOTONICS

FAST FACTS 2019-2020

2020 Fall Enrollment



UCF Total 71,913
CREOL Total 277

2020 Median Starting Salaries

\$70,000

Bachelor's
2019-2020 Graduates

\$92,500

Master's
2019-2020 Graduates

\$120,000

Doctoral
2019-2020 Graduates

2020 Top Alumni Employers

- L3Harris
- BAE Systems
- Lockheed Martin
- Apple
- Qorvo
- Elenion
- Intel
- National Polytechnic Institute
- Fibertek, Inc.
- Facebook

2020 Top 5 Principal Investigators

1. Ayman Abouraddy
2. Robert Crabbs
3. Martin Richardson
4. Guifang Li
5. Rodrigo Amezcua Correa

2020 Research Funding

 **15.2M** Fiscal Year Funding

2020 Patents & Publishing

183 Publications*

19 Patents Awarded

**Refereed Journal Publications*

2020 Top Published Faculty

- Ayman Abouraddy
- Demetrios Christodoulides
- Guifang Li
- Kathleen Richardson
- Shin-Tson Wu
- Xiaoming Yu

2020 Book Publications

Professor Shin-Tson Wu publishes the second edition of "Introduction to Flat Panel Displays"

Professor Konstantin Vodopyanov publishes a book titled "Laser-based Mid-infrared Sources and Applications"

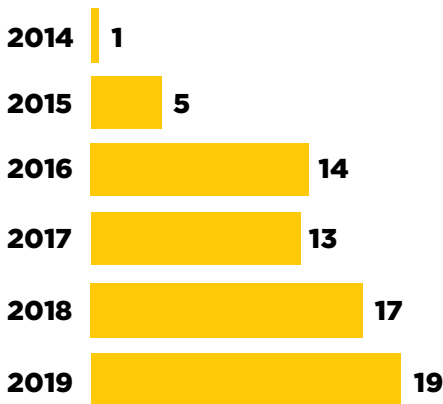
2020 New Journal Editors

Professor Guifang Li is new editor-in-chief of *Advances in Optics and Photonics* (AOP)

2020 National Rankings

#12 Atomic/Molecular/Optical Physics

PSE Degrees per Year



FY20 Funding Distribution



\$7,468,034	Federal
\$5,183,668	Federal Through Industry
\$2,456,295	Industry

Industrial Affiliates 2019-2020

Membership in the Industrial Affiliates (IA) program provides corporations, organizations and individuals many benefits, most of which are also of mutual benefit to CREOL. One of these is regular communication and contact with CREOL's research faculty and students as well as other IIA members who are developing new technologies and products for their business.

Our 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 connects. Through the IA program companies can also readily connect with other optics, photonics, and industrial organizations through local Florida organizations in which the College maintains an active participation.

Life Members

Cobb Family Foundation
Northrop Grumman Corp.
Nufern

Memorial Members

Dr. Arthur H. Guenther
Dr. William C. Schwartz

Medallion Members

Breault Research
IPG Photonics
MKS, Newport, Ophir, Spectra-Physics

Northrop Grumman Laser Systems
II-VI Aerospace & Defense
Synopsys
Paul G. Suchoski, Jr

Senior Members

AFL
BAE Systems
Amplitude Laser, Inc
ASML US
CST of America
Facebook Reality Labs (formerly Oculus)
FARO Technologies

LAS-CAD GmbH
Lockheed Martin
Optimax Systems, Inc
Optronic Laboratories Inc
Tektronix
Zemax
Zygo Corporation

Affiliate Members

Analog Modules
Andor Technology
Applicote Associates, LLC
Asphericon, Inc
AVO Photonics
Beam Co.
Coherent, Inc.
DataRay, Inc.
Edmund Optics
Elbit Systems of America
eVision, LLC
Finetech
Gentec-EO
L3Harris Corporation
HORIBA Jobin Yvon, Inc.
J.A. Woolham Co.
JENOPTIK Optical Systems, Inc.
Laser Institute of America
LG Electronics
LGS Innovations
Light Path Technologies

Luminar Technologies Inc.
Menlo Systems
NKT Photonics Inc.
nLight
Ocean Insight (formerly Ocean Optics)
Optigrate
OptoSigma Corporation
OIDA
Plasma-Therm
Plasmonics
Q-Peak, Inc
ScannerMax
SPIE - The International Society for Optics & Photonics
The Optical Society
Thorlabs
TwinStar Optics
ULVAC Technologies, Inc
Vescent Photonics
Yokogawa

* New 2020 Affiliate Members



CREOL The College of Optics and Photonics

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