

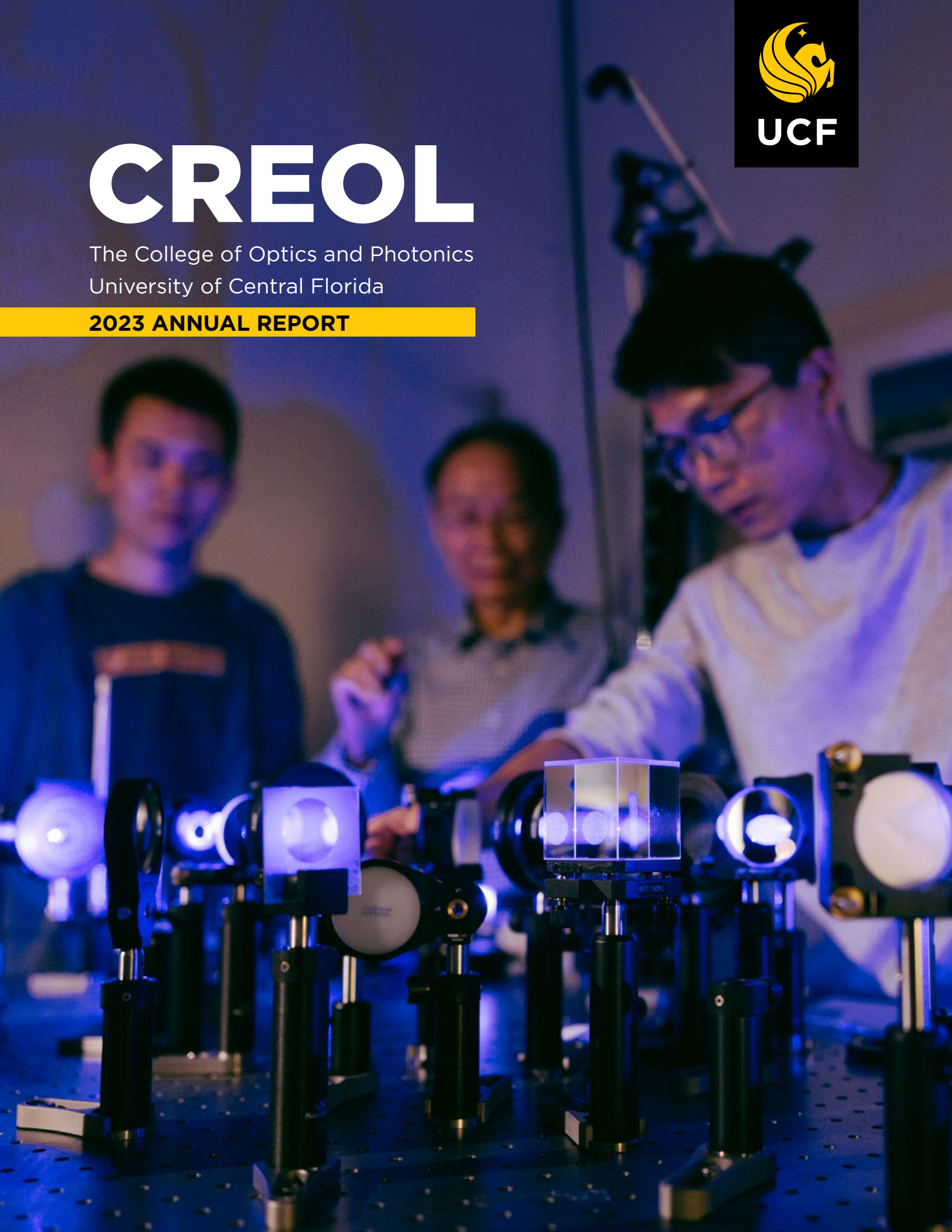


UCF

CREOL

The College of Optics and Photonics
University of Central Florida

2023 ANNUAL REPORT





CONTENT

4	COLLEGE LEADERSHIP	14	SPIE AWARD FOR ALUMNA SCHOLARSHIP FUNDED BY ALUMNUS
5	DEAN'S MESSAGE	15	2023 DISTINGUISHED ALUMNUS
6	AWARDS & RECOGNITION	16	EDUCATION AND TRAINING IN OPTICS AND PHOTONICS (ETOP)
8	<i>U.S. NEWS & WORLD REPORT</i> GLOBAL RANKING	17	INDUSTRIAL AFFILIATES SYMPOSIUM
9	NEW FACULTY FUELING GROWTH	18	ORDER OF PEGASUS HONOREE SPIE SCHOLARSHIP WINNERS
10	SPACE DEBRIS IMAGING	19	IAS POSTER WINNER SENIOR DESIGN WINNERS STUDENT OF THE YEAR
11	DE BROGLIE-MACKINNON WAVE PACKETS	20	DOCTORAL DEGREE GRADUATES
12	NEWS BRIEFS	22	FAST FACTS

SCAN OR VISIT [CREOL.UCF.EDU/ANNUAL-REPORT](https://creol.ucf.edu/annual-report)
FOR SUPPLEMENTARY DATA OR TO READ PAST ANNUAL REPORTS.



COLLEGE LEADERSHIP

2022-23 EXECUTIVE COMMITTEE



David Hagan
Dean & Director
Pegasus Professor of
Optics & Photonics



Stephen Eikenberry
Professor,
Optics & Photonics
and Physics



Kyu Young Han
Associate Professor,
Optics & Photonics



Romain Gaume
Associate Professor,
Optics & Photonics and
Materials Science & Engineering



Patrick LiKamWa
Associate Dean for
Academic Programs
Professor of Optics & Photonics and
Electrical & Computer Engineering



Mark Wagenhauser
Finance Director

DEAN'S EXTERNAL ADVISORY COUNCIL

Chair:
**Clara Rivero-Baleine '01, '03MS,
'05PhD**

Lockheed Martin Missiles
and Fire Control

Jeff Crystal '83
Elbit Systems of America

John R. (Rich) DeSalvo '93PhD
L3Harris Technologies

Jihua Du '00PhD
Lumentum

Orges Furxhi
True Colors Infrared Imaging

Zhibing Ge '04MS, '07PhD

Alexei Glebov
OptiGrate - IPG Photonics

Carl Kutsche '98PhD
Idaho National Laboratory

Brian Lawrence '97PhD
Vapotherm

Teresa Pace
L3Harris Technologies

Chrys Panayiotou '87MS
Indian River State College

Alan Symmons
Vital Materials Co., Limited

Matthew Weed '09, '13PhD
Luminar Technologies

DEAN'S INTERNAL ADVISORY COUNCIL

Austin Brigham '22
Undergraduate Research Assistant

Lawrence Lipe
Graduate Admissions Specialist

Benjamin Logan
Undergraduate Research Assistant

Jessica Peña '19 '22MS
Graduate Research Assistant

Kyle Renshaw
Assistant Professor

Axel Schülzgen
Professor

Zheyuan Zhu '20PhD
Postdoctoral Researcher



MESSAGE FROM THE DEAN

It is with great pride and enthusiasm that I share with you the 2022-23 CREOL Annual Report. As we reflect on the past year, CREOL continues to be a hub of innovation, collaboration, and excellence in optics and photonics as evidenced by our *U.S. News and World Report* ranking among the top 25 optics programs in the world (page 8).

I am thrilled to acknowledge the outstanding achievements of our faculty, researchers, students, and alumni who received prestigious awards and recognitions (page 6). These accolades are a reflection of the caliber of talent within CREOL. Also of note is the retirement of my friend and colleague, **Jim Moharam**, who was awarded Emeritus Professor status.

The accomplishments of our students are numerous, some of which are highlighted on pages 18 and 19. Whether it be academic excellence, leadership in extracurricular activities, or innovation in research projects, our students continue to make us proud. Their achievements are a testament to the nurturing environment at CREOL that fosters both academic and personal growth.

From pioneering scientific discoveries to transformative advancements in photonics technologies, our faculty and researchers have continued to push the boundaries of knowledge. The real-world applications of their discoveries continue to help bridge academia with industry and government, like the space debris imaging work highlighted on page 10.

As we look to the future, CREOL is expanding its faculty to bring in new areas of expertise to bolster our research efforts. The additional faculty will also serve and educate students as we work to increase enrollment in all our undergraduate and graduate degree programs. More about two recent hires, **Andrea Blanco-Redondo** and **Darren Hudson**, can be found on page 9.

This year has been marked by significant achievements, groundbreaking research, and the unwavering dedication of our faculty, researchers, students, and staff. Together, we have set the stage for another year of success and growth. I extend my sincere gratitude to each member of the CREOL community for their hard work, passion, and support as we work to create a brighter future through education and research.

Sincerely,

David Hagan
Dean and Director
Pegasus Professor of Optics and Photonics

2022-23

AWARDS



July 1, 2022 – June 30, 2023

EXTERNAL AWARDS

FACULTY

Alexander Cartwright*

Fellow, Optica

Debashis Chanda

Global Research Outreach Award,
Samsung International

Demetrios Christodoulides**

Arthur L. Schawlow Prize,
American Physical Society

Peter Delfyett

Fellow, American Association for
the Advancement of Science;
Alumni Achievement Award,
The Graduate Center of CUNY

Kathleen Richardson

Darshana and Arun Varshneya
Frontiers of Glass Lectures Award,
The American Ceramic Society

Eric Van Stryland

Willis E. Lamb Award for Science and
Quantum Optics, Physics of Quantum
Electronics Winter Colloquium

Shin-Tson Wu

Academician, Academia Sinica
(Taiwan)

STUDENTS

Matthew Cooper

D.J. Lovell Scholarship, SPIE

Adriana Guevara

Education Scholarship, SPIE

En-Lin Hsiang '23PhD

Education Scholarship, SPIE;
Outstanding Graduate Student
Award and Scholarship, IEEE
(Orlando Section)

Yannanqi (Nancy) Li '21MS '23PhD

Scholarship, IEEE (Orlando Section);
Gold award, Meta Reality Labs -
International Liquid Crystal Society;
Runner Up AR VR optical design
challenge, SPIE

Michael McMahon '22

X-Force Fellowship, National Security
Innovation Network

Isabella Pardo '23

Optica Woman Scholar

Shaghayegh Yaraghi '21MS

Graduate Student Academic Award,
Society for Information Display Metro
Detroit Chapter

Junyu Zou '23PhD

Outstanding Graduate Student
Award and Scholarship, IEEE
(Orlando Section)

ALUMNI

Félicie Albert '04MS

Fellow, Optica

Erwan Baleine '06PhD

Technical Innovation Special
Award, Lockheed Martin Missiles
and Fire Control

Ramy El-Ganainy '07MS '09PhD

Fellow, Optica

Konstantinos Makris '06MS '08PhD

Fellow, Optica

Mircea Mujat '01MS '04PhD

Fellow, Optica

Fenglin (Maple) Peng '17PhD

Early Career Achievement Award, SPIE

UNIVERSITY AWARDS

FACULTY

Ayman Aboraddy
Trustee Chair Professor

Michael Chini***
Luminary Award

Aristide Dogariu
Trustee Chair Professor

Shin-Tson Wu
Excellence in Research

STUDENTS

Layton Hall '22MS
Order of Pegasus

SERVICE TO UCF

Peter Delfyett
30 years

Peter Kik
20 years

Stephen Kuebler
20 years

Jim Moharam
Emeritus Professor

*UCF President

**Courtesy Faculty

***Joint Faculty

CREOL AWARDS

FACULTY

Rodrigo Amezcua Correa
*Excellence in
Undergraduate Teaching;
Research Incentive Award*

Kyu Young Han
*Teaching Incentive
Program Award*

Konstantin Vodopyanov
Excellence in Graduate Teaching

Shin-Tson Wu
Excellence in Research

STUDENTS

**Chinmay Shirpurkar '21MS
'23PhD**
Student of the Year

Alireza Fardoost '19MS
Student of the Year Finalist

Cesar Lopez-Zelaya '21
*Student of the Year Finalist;
Industrial Affiliates Symposium
Best Poster*

Franklin Ivey '23 (CECS)
Sean McCormack '23 (CREOL)
Ifran Tello '23 (CECS)
Ethan Teodosio '23 (CREOL)
*Winning Team: Senior
Design Competition*

ALUMNI

Franklyn Quinlan '05MS '08PhD
Distinguished Alumnus



Faculty award winners (from L to R)
**Rodrigo Amezcua Correa, Shin-Tson Wu, and
Konstantin Vodopyanov.**



Peter Delfyett, new American Association for the
Advancement of Science Fellow



RANKINGS

UCF'S OPTICS PROGRAM RANKED AMONG TOP 25 BEST GLOBAL UNIVERSITIES



U.S. News & World Report's global university rankings recognize UCF's optics program among the best worldwide, acknowledging CREOL's excellence in research and innovation.

UCF was once again named one of the world's top 25 universities for optics, recognizing CREOL, the College of Optics and Photonics, for excellence in research, international collaboration, and contributions to scientific literature.

In *U.S. News & World Report* rankings released in November 2022, UCF's optics program ranks No. 24 among worldwide universities — positioning UCF among the top 9% of the 278 programs identified globally. The ranking places the program No. 9 among universities in the United States and No. 4 among U.S. public universities. Other notable U.S. universities in the top 25 include Caltech, Harvard, Stanford, UCLA, Columbia and MIT.



RECOGNIZED FOR
ACADEMIC RESEARCH AND
REPUTATION

To be considered for the 2022-23 *U.S. News & World Report* global ranking, an institution had to publish a minimum of 200 papers from 2016 to 2020. Ten criteria were used to determine the final ranking, including international collaboration, conferences, and several factors related to the number and quality of publications and citations.

Earlier in 2022, *U.S. News & World Report* ranked UCF No. 12 in the atomic/molecular/optical (AMO) physics category for graduate programs. The ranking recognizes the high quality of collaborative education and research conducted between UCF's Department of Physics and CREOL.

"These rankings are a testament to the hard work and brilliance of our faculty, students, and researchers," said CREOL Dean **David Hagan**. "CREOL is leading the way in optics and photonics education and research, addressing global problems and making a direct, positive impact on many industries, including communications, defense, energy, and medicine."

CREOL WELCOMES TWO NEW FACULTY MEMBERS - PLANS TO ADD MORE

The College of Optics and Photonics plans to add more faculty members over the next two years to fuel the growth needed to keep up with global industry demand.

The first two new hires occurred in April when **Andrea Blanco-Redondo** and **Darren Hudson** joined the CREOL faculty.

Blanco-Redondo received her Ph.D. in electrical engineering from the University of Basque Country in Spain. She came to UCF from Nokia Bell Labs, where she was the head of silicon photonics research. She is a well-recognized leader in the field of topological photonics, silicon photonics, and nonlinear optics.

Hudson came to UCF from CACI-Photonics Solutions, where he was a Senior Technical Manager. While at CACI, he secured a \$5M program from the U.S. Air Force Research Lab to demonstrate high-power supercontinuum spanning UV (ultraviolet) to IR (infrared). Hudson received his Ph.D. in physics from the University of Colorado in Boulder.

“I am delighted to have Drs. Blanco-Redondo and Hudson join us,” said CREOL Dean **David Hagan**. “In addition to their teaching duties, I look forward to what their students will accomplish under their guidance.”

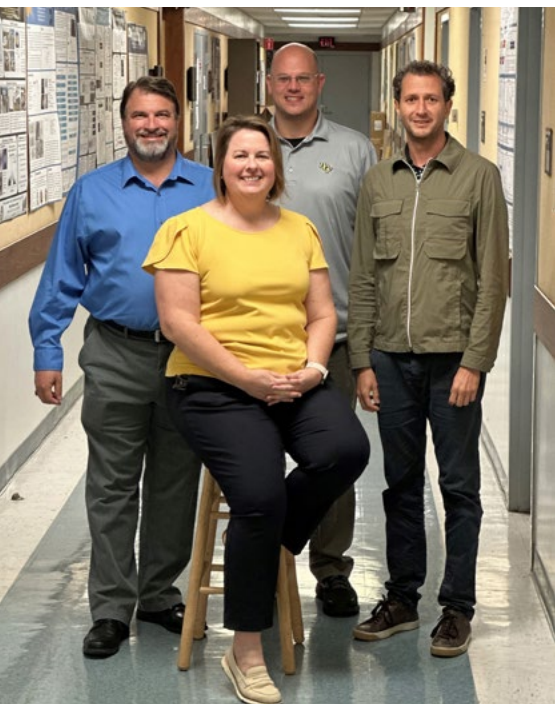
As a result of new investment by the State of Florida and strategic priorities set by UCF leadership, CREOL is undergoing a major expansion and expects to fill approximately 10 new faculty positions in the next two years. This is in addition to new faculty positions throughout the university focused on growing research in semiconductor technologies, artificial intelligence, and space and planetary instrumentation, commercialization, and exploration.

“Thanks to support from the state and the foresight of the university, we look forward to supporting UCF’s expanded priority research areas,” said Hagan.



READ MORE AT
[CREOL.UCF.EDU/NEWS](https://creol.ucf.edu/news)

RESEARCH



*The PQ12: Photonic Quantum Inspired Imager project team (from L to R): CREOL professor **Stephen Eikenberry**, professor of physics and UCF Planetary Sciences Group members Kerri Donaldson Hanna, CREOL doctoral candidate and U.S. Space Force Major **Matthew Cooper**, and CREOL professor **Rodrigo Amezcua Correa**.*



READ MORE AT
[CREOL.UCF.EDU/NEWS](https://creol.ucf.edu/news)

UCF WINS AIR FORCE RESEARCH LAB COMPETITION TO DEVELOP SPACE DEBRIS IMAGING TECHNOLOGY

The award funds research, led by the College of Optics and Photonics, to create space debris imaging, which is crucial to avoiding catastrophic collisions and mission-ending damage.

An interdisciplinary team of faculty researchers from CREOL, The College of Optics and Photonics, and UCF's physics department has won the opportunity to develop a system that uses photonics to more accurately visualize space debris — an increasing problem since the start of the space age.

The UCF team won the National Security Innovation Network (NSIN)-sponsored Air Force Research Laboratory (AFRL) Quantum-inspired Efficient Information Extraction for Electro-optic Systems Grand Challenge — earning \$125,000 to fund their research. The competition continues over the next nine months with four development phases, through which up to \$500,000 may be awarded to develop high-resolution space imaging solutions.

“We are excited to work with UCF for the next phase of this grand challenge,” said Sarah Krug, AFRL sensors directorate and laser radar optics research engineer, in an NSIN release. “We have confidence in their well-defined solution to our problem, and we look forward to seeing how their photonic lantern technology influences quantum-inspired high-resolution sensing.”

“We are honored that the AFRL chose to support our approach to this growing problem,” said CREOL professor **Stephen Eikenberry**. “We look forward to combining our proven photonic lanterns with new innovations in hardware to accurately identify and characterize space debris with unprecedented resolution.”

Current studies estimate 100 million pieces of space debris in orbit — many too small to track with current imaging technology. Debris as small as a marble traveling at an orbital velocity of 17,500 mph can cause mission-ending damage to spacecraft and satellites.

“Our team’s advanced techniques and photonic lantern hardware expertise enables us to use new solutions which can approach the quantum resolution limit,” said CREOL professor **Rodrigo Amezcua Correa**. “In other words, our system will produce clear images using new technology we will create at UCF.”

CREOL RESEARCHERS ACHIEVE THE FIRST OBSERVATION OF DE BROGLIE-MACKINNON WAVE PACKETS BY EXPLOITING LOOPHOLE IN 1980'S-ERA LASER PHYSICS THEOREM

A research paper by CREOL professor **Ayman Abouraddy** and research assistant **Layton Hall '22MS** was published in the peer-reviewed scientific journal, *Nature Physics*. *Observation of optical de Broglie-Mackinnon wave packets* highlights the team's research using a class of pulsed laser beams they call space-time wave packets. The research, funded by the U.S. Office of Naval Research, is the first example of a pulse propagating invariantly in a medium with anomalous dispersion, a feat that has been thought to be impossible since the 1980's.

Their work resolves a dilemma from the early days of the development of quantum mechanics almost 100 years ago. Louis de Broglie made the crucial conceptual breakthrough of identifying waves with particles, sometimes called wave-particle duality. However, waves spread in space and time, whereas particle sizes do not.

In the 1970's, L. Mackinnon proposed a solution to constructing a stable 'wave packet' that does not spread and can thus accompany a traveling particle. This proposal unfortunately went unnoticed.

Abouraddy's research group has been working on a new class of pulsed laser beams, space-time wave packets. Hall realized that in a medium endowed with a special kind of dispersion (so-called 'anomalous' dispersion) that would normally stretch the pulse, these wave packets would resist the dispersion and instead travel rigidly. Such wave packets correspond to Mackinnon's proposal, and thus hold the key to finally achieving de Broglie's dream.

"In our laser experiments we observed for the first time what we have called de Broglie-Mackinnon wave packets and verified their predicted properties," said Abouraddy.



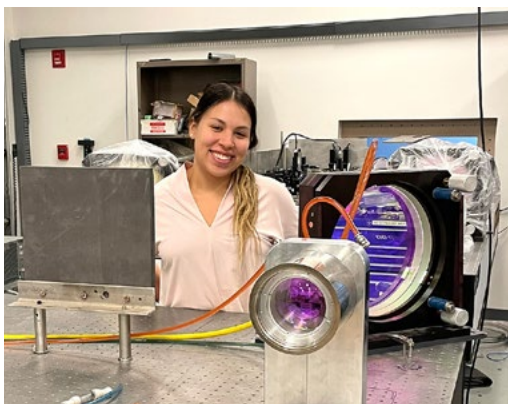
READ MORE AT
[CREOL.UCF.EDU/NEWS](https://creol.ucf.edu/news)



NEWS BRIEFS



SCAN FOR FULL-LENGTH
ARTICLES OR VISIT
CREOL.UCF.EDU/NEWS



Isabella Pardo '23 was recognized as one of the first 20 Optica Women Scholars in the world.

SPIE.

CREOL Dean **David Hagan** was elected to a three-year term as a SPIE Society Director. This position gives him the opportunity to network with



SPIE members around the world while also representing CREOL. Scan to read more about the SPIE Society Board.



After 35 years of service to CREOL and UCF as a professor of optics and photonics, **Jim Moharam** retired and was granted Emeritus Professor status. Jim is pictured here with his wife, Lynn.



Doctoral candidate **Shaghayegh Yaraghi** received an Academic Award from The Society for Information Display (SID) Metropolitan Detroit Chapter for her research in display and interface technology.



UCF Distinguished Professor and Pegasus Professor **Peter Delfyett** was featured in Optica's *Optics & Photonics News* feature, "Breaking Barriers, Advancing Optics." Scan to read the full article.



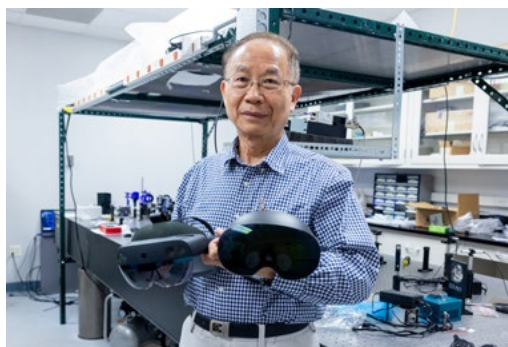
Eric Van Stryland was honored with the 2023 Willis E. Lamb Award for Science and Quantum Optics for his pioneering contributions to quantum and nonlinear optics.



UCF featured 21st Century Scholar Chair Professor **Konstantin Vodopyanov** in the *Research in 60 Seconds* video series where he discussed “singing” molecules. Scan to watch the video.



Professors **Yehuda Braiman** (not pictured), **Konstantin Vodopyanov** (left) and postdoc researcher **Justin Cook '17MS '21PhD** (right) were each awarded Defense University Research Instrumentation Program (DURIP) funds by the U.S. Department of Defense (DoD) for the acquisition of major equipment to augment current or develop new research capabilities in support of DoD-relevant research.



Trustee Chair Professor **Shin-Tson Wu** was featured in a *UCF Today* profile where he reflected on his career and the importance of helping others.



During UCF Day of Giving in April, CREOL achieved a 41% increase in the number of gifts and a 720% increase in the total amount raised over the previous year. In addition, three new scholarships were funded! Scan to watch the post-campaign video - you may recognize a couple of faces!

ALUMNI

FENGLIN “MAPLE” PENG ’17PHD RECEIVES THE 2023 SPIE EARLY CAREER ACHIEVEMENT AWARD – GOVERNMENT/INDUSTRY FOCUS

The SPIE Early Career Achievement Award recognizes significant and innovative technical contributions in the engineering or scientific fields of relevance to SPIE.

Peng is a research scientist at Meta Reality Labs where she works on novel optics and display systems to enable future AR/VR. Her accomplishments in AR/VR include introducing an alternative for the commonly known linear reflective polarizers in the pancake system. In a pancake VR system, a reflective polarizer is required to fold the optical path and reduce the display-to-eye track length.

The linear reflective polarizer with well-established production lines was naturally used for this application. Peng introduced the use of cholesteric liquid

crystal film as circular reflective polarizers. The circular reflection removes the clocking sensitivity, leading to simpler manufacturing. The compact and large field-of-view pancake VR systems are associated with optical design challenges. One of them is the brightness roll-off introduced by the mismatch between display emission angle and pancake chief ray angle. Peng proposed and led the development of a novel diffractive liquid crystal film based on Pancharatnam-Berry phase to direct the emission angle. Her innovation addressed the brightness roll-off, improved the eye-box uniformity, contrast, and increased the system efficiency by as much as 50%.

Peng has authored several SPIE proceedings papers and is a member of the Advances in Display Technology Committee for SPIE Photonics West. In 2016, Peng received an SPIE Optics and Photonics Education Scholarship.

Dr. Peng joined Meta’s Optics and Display Research team as a research scientist in 2017, after earning her PhD from CREOL. She put her innovative thinking to work in the frontier of AR/VR development and has filed more than 30 patents with 17* granted.

**as of January 2023*

READ MORE AT
[SPIE.ORG/NEWS](https://www.spie.org/news)



GE-WU SCHOLARSHIP

Thanks to the generosity of **Zhibing Ge ’04MS ’07PhD**, a new CREOL scholarship was established during UCF’s Day of Giving 2023. The Ge-Wu Scholarship will be awarded to an undergraduate student pursuing a degree in photonic science and engineering.

Want to learn more about supporting our students? Contact Development Director Garrett Preisser at garrett.preisser@ucf.edu.



FRANKLYN J. QUINLAN HONORED AS CREOL 2023 DISTINGUISHED ALUMNUS

When **Franklyn Quinlan '05MS '08PHD** was a high school physics teacher, he never dreamed he would one day receive the Presidential Early Career Award for Scientists and Engineers (PECASE). But in 2019 he won the highest honor bestowed by the United States Government to outstanding scientists and engineers beginning their independent research careers and showing exceptional promise for leadership in science and technology.

Nominated by the U.S. Department of Commerce, he was recognized for creating new pulsed-laser systems that allowed him and his team to defy 40-year-old theory to generate the world's most stable electromagnetic signals spanning radiofrequency, microwave and optical ranges, and a 10,000-fold improvement in the ability to measure those signals. In other words, because of his research, the world's most stable microwave signals are now generated by techniques pioneered by Quinlan.

Why is this important? Many key technologies increasingly rely on tightly controlled electromagnetic signals with extremely small timing jitter. Timing jitter slows high-speed communications, blurs radar images, causes GPS location errors, and limits the performance of atomic clocks. Quinlan's technique reduces the jitter allowing technology to function better.

Quinlan is the leader of the Precision Photonic Synthesis Group in the Time and Frequency Division at the National Institute of Standards and Technology (NIST) which maintains official U.S. time. He and his colleagues have relied on clocks and oscillators that operate at microwave frequencies, but he notes an eminent and significant change he and colleagues are working on.

"We have shifted up the electromagnetic spectrum and have developed clocks, lasers, and oscillators in the optical," said Quinlan. "The advantage of doing that is you get these much more precise measures of time."

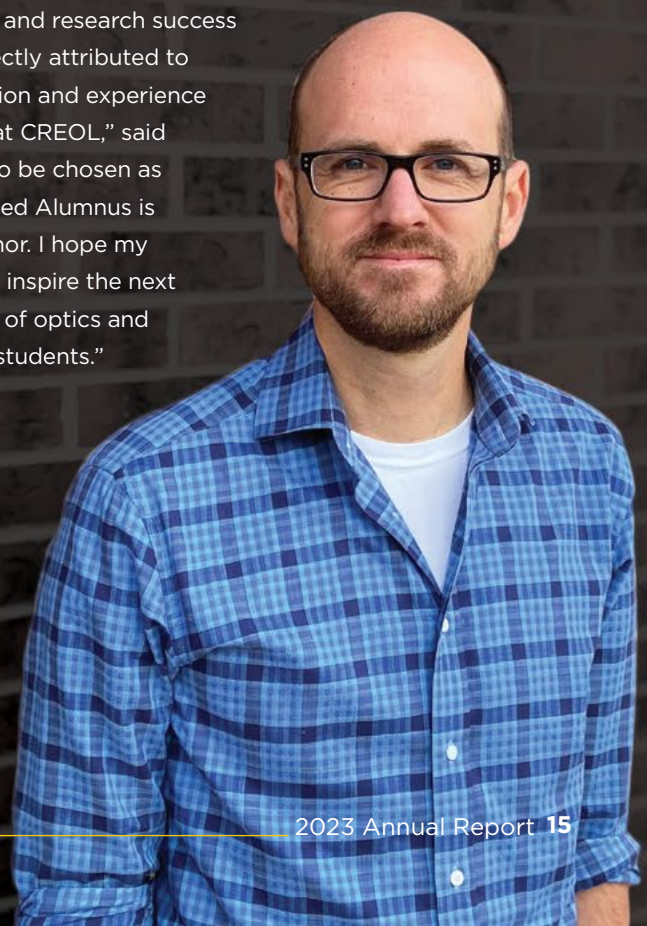
While working as a physicist at NIST, he received the 2015 Young Scientist Award from the European Frequency and Time Forum. He was also elected a Senior Member of the Institute of Electrical and Electronics Engineers (IEEE) in 2018 and an Optica Fellow in 2019.

He received several honors while earning his master's and doctorate degrees from CREOL including being named a UCF Provost Fellow, a CREOL Dissertation of the Year award, and a UCF Outstanding Dissertation Award. Quinlan also earned three patents during his time at CREOL (he now has five) working under professor **Peter Delfyett** whom he credits for teaching him how to be a researcher.

"My career and research success can be directly attributed to the education and experience I received at CREOL," said Quinlan. "To be chosen as Distinguished Alumnus is a great honor. I hope my story helps inspire the next generation of optics and photonics students."



READ MORE AT
[CREOL.UCF.EDU/NEWS](https://creol.ucf.edu/news)



INDUSTRY

CREOL HOSTS ETOP 2023

The Education and Training in Optics and Photonics conference was held May 15 – 18 and attracted 177 attendees to beautiful Cocoa Beach – some from as far away as Singapore. CREOL was selected as the 2023 organizer of the biannual conference which is supported by SPIE, Optica, IEEE-Photonics Society and the International Commission for Optics.

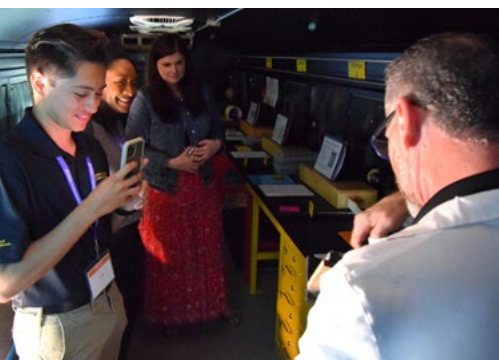
“While most industry events are technical in nature, the collaboration between educators, students, and industry is unique to ETO,” said CREOL Undergraduate Director, **Mike McKee** who led the planning efforts. “There is a real value in everyone coming together to discuss the future of optics and photonics education.”

Attendees enjoyed keynote presentations and workshops, networking, a field trip to UCF to tour CREOL labs, and student research posters presented amongst the palm trees overlooking the ocean on the host hotel’s outside deck.

Plenary speaker, Carl Weinman, Nobel Laureate and Professor of Physics and Education at Stanford University.



Plenary speaker, Margaret Doinguez, Optical Engineer and Associate Branch Head of the Optics Branch at NASA Goddard Space Flight Center.





SEMICONDUCTORS AND SPACE PHOTONICS AT ANNUAL INDUSTRIAL AFFILIATES SYMPOSIUM

Two hundred attendees from across the U.S. and beyond descended on CREOL in early March for the annual Industrial Affiliates Spring Symposium. The areas of focus at this year's Symposium were semiconductor and space photonics. After a warm welcome from UCF Provost Michael Johnson, the formal program started with CREOL Dean **David Hagan** providing an overview of the college and plans for future growth. Esteemed guest presentations were provided by Todd Sizer from Nokia Bell Labs, Nemanja Jovanovic from Caltech, and Sergio Leon-Saval from the University of Sydney.

The Symposium is an intentional fusion of academia, industry, and government. This was on full display during the Industry Panel that focused on the federal CHIPS Act. Moderated by CREOL professor **Peter Delfyett**, the panel provided keen insights on the opportunities and hurdles that lay ahead for the CHIPS Act to provide the intended results. Panel members were Jay Kumler from JENOPTIK, David Lang from OPTICA, Jennifer O'Bryan from SPIE, Jim Vandever from BRIDG, and Francisco Sanchez, former Under Secretary for International Trade for the U.S. Department of Commerce.

Symposium attendees were also treated to a short course on photonic lanterns, a "Doing Business with UCF" panel presentation, lab tours, a poster session, and multiple networking socials.

The Symposium concluded with recognition of the poster presentation winner, **Cesar Lopez-Zelaya, '21** (see page 19), CREOL's Student of the Year, **Chinmay Shirpurkar '21MS '23PhD** (see page 19), and Distinguished Alumnus of the Year, **Franklyn Quinlan '05MS '08PhD** (see page 15).

SAVE THE DATE

The 2024 Industrial Affiliates Spring Symposium is scheduled for **February 29 and March 1**.



STUDENTS



CREOL STUDENT INDUCTED INTO UCF ORDER OF PEGASUS

PhD student **Layton Hall '22MS** was chosen as one of only 30 UCF students to be inducted into the 2023 Order of Pegasus. Graduate student criteria for the honor include academic achievement, professional or community service, leadership, and publication or research experiences. Nine graduate students were chosen for the honor. Order of Pegasus is the most prestigious and significant award a student can attain at the University of Central Florida. Students selected for this honor represent the most dedicated, passionate, and highest-achieving Knights.

THREE OPTICS AND PHOTONICS STUDENTS RECEIVE 2022 SPIE SCHOLARSHIPS INCLUDING TOP HONOR

In 2022, SPIE awarded \$293,000 in education scholarships to 78 outstanding SPIE student members, based on their potential contribution to optics and photonics, or a related discipline. Three University of Central Florida optics and photonics students received scholarships.

CREOL doctoral candidate **Matthew Cooper** received the largest and most prestigious SPIE scholarship, the D.J. Lovell Scholarship, named for the radiometry and infrared optics consultant, author of *Optical Anecdotes*, and SPIE Fellow who died in 1984.

SPIE Education Scholarship winner, **Adriana Guevara**, is a fourth-year undergraduate student pursuing her bachelor's degree in photonic science and engineering.

En-Lin Hsiang '23 is a member of Shin-Tson Wu's research group focusing on advanced display technologies. He also received a SPIE Education Scholarship.



From L to R: Hsiang, Guevara, Cooper



STUDENT POSTER WINNER

Cesar Lopez-Zelaya '21 was the winner of the 2023 Industrial Affiliates Symposium Outstanding Student Poster Presentation for his poster titled: Dispersion Measurements of Liquids from 0.5 micron to 2 microns and their Spontaneous Raman Spectra. Lopez-Zelaya is a master's student in the Nonlinear Optics Group, advised by **David Hagan** and **Eric Van Stryland**.

SECOND ANNUAL CREOL SENIOR DESIGN COMPETITION



The Distance-Monitored Inkless Laser Engraver project (D-MILE) won CREOL's second annual Senior Design Competition. The winning team included two photonic science and engineering undergraduate students: **Ethan Teodosio '23** and **Sean McCormack '23** (2nd and 3rd from left) as well as **Franklin "Bo" Ivey '23** (left) and **Ifran Tello '23** (right) both from the College of Engineering and Computer Science.

The team created a printer that uses a 405 nanometer laser to etch into the desired materials like paper and wood eliminating the need for consumable products like ink that traditional printers use. The competition drew ten interdisciplinary teams with projects that varied greatly - from an automatic pet feeder that uses facial recognition to measure the correct amount of food to a lensless digital holographic microscope that delivers high-resolution and high-throughput imaging using compact, portable, and cost-effective optics to create a visible hologram. Special thanks to our Industrial Affiliates members who served as judges: Ed Foote, LightPath, **Wilfredo Ortiz '17**, MKS, Omar Sharaf, ficonTEC, and **Anna Tabiryan '98MS '00PhD**, BEAM Co.



CREOL STUDENT OF THE YEAR

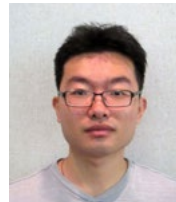
Chinmay Shirpurkar '21MS '23PhD was selected as the 2023 CREOL Student of the Year. Part of **Peter Delfyett's** ultrafast photonics research group, Shirpurkar presented his research paper Integrated Optical Frequency Combs for Applications in Optical Communications & Microwave Photonics during the competition. He authored and co-authored 18 journal articles and conference proceedings articles and was previously granted the UCF Doctoral Research Support Award (Fall 2021) and the CREOL Dean's Dissertation Completion Fellowship (Spring 2022). Other Student of the Year finalists were PhD student **Alireza Fardoost '19MS** and master's student **Cesar Lopez-Zelaya '21**.

STUDENTS

DOCTORAL DEGREE GRADUATES



Roberto Alejandro Alvarez Aguirre '19MS '23PhD
Dissertation: Structural Transformations in Photo-Thermo-Refractive Glass for Hologram Recording
Advisor: Leonid Glebov
Employer: University of Central Florida
Title: Postdoctoral Researcher



Xiaowen (Steven) Hu '20MS '22PhD
Dissertation: Machine Learning in Fiber Optics
Advisor: Axel Schülzgen
Employer: ASML
Title: Senior Project Engineer



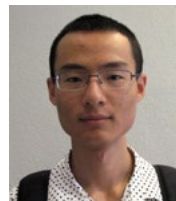
Hao-Jung Chang '21MS '22PhD
Dissertation: First and Third Susceptibility of Organic Molecules
Advisor: David Hagan & Eric Van Stryland
Employer: KLA-Tencor
Title: Product Development Engineer



Yannanqi (Nancy) Li '21MS '23PhD
Dissertation: Reflective Planar Optics with Cholesteric Liquid Crystal for Near-Eye Displays
Advisor: Shin-Tson Wu
Employer: Applied Materials Inc.
Title: Scientist



Nicholas Cox '21MS '22PhD
Dissertation: Third Order Nonlinear Optics in Solids
Advisor: David Hagan
Employer: University of Central Florida
Title: Postdoctoral Researcher



Zhao Ma '18MS '22PhD
Dissertation: Compact Lens Technologies: Curved Image Sensors and Volumetric Imaging Efficiency
Advisor: Kyle Renshaw



Robert Grimming '09MS '22PhD
Dissertation: "Uncooled Microbolometer Imaging Systems for Machine Vision"
Advisor: Kyle Renshaw
Employer: CAE
Title: Technical Specialist, Synthetic Environments



Lam Mach '20MS '22PhD
Dissertation: Volume Bragg Gratings with Complex Phase Structures: A Three-Dimensional Foundation for Laser-Beam Engineering
Advisor: Ivan Divliansky & Leonid Glebov
Employer: Intel Corporation
Title: Process Engineer in Unpatterned Defect Metrology



En-Lin Hsiang '23PhD
Dissertation: High-Dynamic-Range and High-Efficiency Near-Eye Display Systems
Advisor: Shin-Tson Wu
Employer: Apple
Title: Display Engineer



Jessica Peña '19MS '22PhD
Dissertation: Filament Propagation Through Atmospheric Conditions
Advisor: Martin Richardson
Employer: University of Central Florida
Title: Postdoctoral Researcher



Rachel Sampson '19MS '23PhD

Dissertation: Random-Channel Cryptography: Classical Key Distribution via Random Mode Mixing in Fibers

Advisor: Guifang Li

Employer: MIT Lincoln Laboratory

Title: Technical Staff



Chun Xia '22PhD

Dissertation: Light Concentrating Elements Based on Spatially Variant Self-Collimating Photonic Crystals

Advisor: Sasan Fathpour & Stephen Kuebler

Employer: Intel Corporation

Title: TD Module & Integration Yield Engineer



Chinmay Shirpurkar '21MS '23PhD

Dissertation: Integrated Frequency Combs for Applications in Optical Communications & Microwave Photonics

Advisor: Peter Delfyett

Employer: Infinera Corporation

Title: Senior Hardware Development Engineer

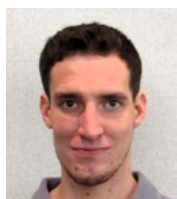


Yuanhang Zhang '19MS '22PhD

Dissertation: Multi-Plane Light Conversion: Devices and Applications

Advisor: Guifang Li

Employer: Huawei



Seth Smith-Dryden '20MS '22PhD

Dissertation: Low-Coherence Optical Diffraction Tomography and Optimization-Based Approaches to Quantitative Phase Imaging

Advisor: Bahaa E. A. Saleh

Employer: University of Central Florida

Title: Postdoctoral Researcher



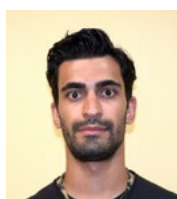
Boyang Zhou '20MS '22PhD

Dissertation: Direct Laser Writing below the Diffraction Limit by Exploring Multi-Pulse-Induced Physics

Advisor: Xiaoming Yu

Employer: Integer Holdings Corp

Title: Senior Laser R&D Engineer



Milad Gholipour Vazimali '20MS '22PhD

Dissertation: Integrated Electro-Optic, Microwave, and Nonlinear Photonic Devices on Thin-Film Lithium Niobate

Advisor: Sasan Fathpour

Employer: Apple

Title: Photonics Research Scientist



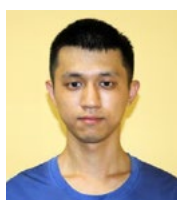
Junyu Zou '23PhD

Dissertation: Compact and High Optical Efficiency Near-Eye Displays With Liquid Crystal Flat Optics

Advisor: Shin-Tson Wu

Employer: Apple

Title: Display Module Engineer



Ruitao Wu '21MS '22PhD

Dissertation: Spatio-Temporal Fluctuations of Light Interacting with Complex Media

Advisor: Aristide Dogariu

Employer: Nanophotonics Research Center, Institute of Microscale Optoelectronics, Shenzhen University

Title: Associate Researcher

FAST FACTS

U.S. NEWS AND WORLD REPORT

#24

BEST GLOBAL
UNIVERSITIES
FOR OPTICS

#4

BEST U.S. PUBLIC
UNIVERSITIES
FOR OPTICS

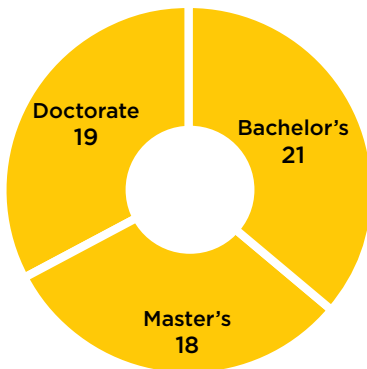
#20

MOST INNOVATIVE
UNIVERSITY

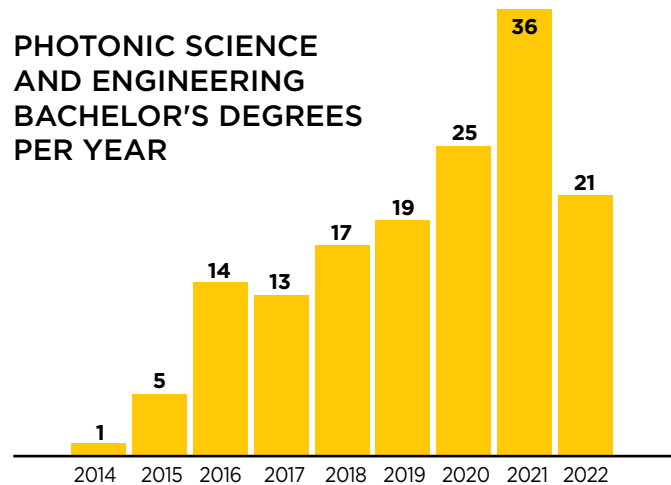


UCF IS A FEDERALLY
DESIGNATED HISPANIC
SERVING INSTITUTION

DEGREES AWARDED



PHOTONIC SCIENCE AND ENGINEERING BACHELOR'S DEGREES PER YEAR



TOP ALUMNI EMPLOYERS

Amazon
Apple
Google
Intel
L3Harris
Lockheed Martin
Meta
Microsoft
Northrop Grumman
Academia (Postdoc Research)
National Research Labs

*(in alpha order; via UCF
first destination survey)*



MEDIAN STARTING SALARIES

\$70,000

BACHELOR'S

\$95,000

MASTER'S

\$140,000

DOCTORATE

FACULTY

35

FACULTY

PATENTS & PUBLISHING

172

PUBLICATIONS*

13

PATENTS

**Refereed Journal Publications*

MOST PUBLISHED FACULTY

Ayman Abouraddy
Kathleen Richardson
Rodrigo Amezcua Correa
Shin-Tson Wu
Axel Schülzgen

\$18,998,724

RESEARCH FUNDING FY23

HIGHEST FUNDED PRINCIPAL INVESTIGATORS

Kyle Renshaw
Guifang Li
Ayman Abouraddy
Martin Richardson
Yehuda Braiman

\$455,084

PHILANTHROPIC
SUPPORT FY23

94

DONORS

INDUSTRIAL AFFILIATES

Membership in the Industrial Affiliates (IA) program provides corporations, organizations, and individuals many benefits including regular communication and contact with CREOL's research faculty and students and other IA members who are developing new technologies and products for their businesses. 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 active participation.

LIFE MEMBERS:

Cobb Family Foundation
Northrop Grumman
Nufern

MEMORIAL MEMBERS:

Dr. Arther H. Guenther
Dr. William C. Schwartz

MEDALLION MEMBERS:

Breault Research
IPG Photonics
MKS Instruments
Northrop Grumman Mission Systems
II-VI Aerospace & Defense
Synopsis

SENIOR MEMBERS:

AFL
Amazon Lab126*
ASML US
BAE Systems
CST of America
EXFO Optical Products
FARO Technologies
Google
LAS-CAD GmbH
Lockheed Martin
LUMENTUM
Meta Reality Labs
**NIF&PS Lawrence Livermore
National Laboratory***
Optimax Systems
Optron Laboratories
Tektronix
Zemax
Zygo Corporation

AFFILIATE MEMBERS:

Analog Modules
Andor Technology
Appicote Associates

Arizona Optical Metrology*

Asphericon
Avo Photonics
BEAM Co.
CMS Laser
Coherent
Corning*
Critical Frequency Design*
DataRay
Edmund Optics
Elbit Systems of America
eVision
Finetech
Gentec-EO
L3Harris
HORIBA Jobin Yvon
J.A. Woollam Co.
JENOPTIK Optical Systems Inc.
KBR
Laser Institute of America
LG Electronics
LightPath Technologies
Luminar Technologies
MegaWatt Lasers*
NKT Photonics
nLight
Ocean Insight
Optica
Optigrate, an IPG Photonics Company
OptoSigma
Plasma-Therm
Plasmonics
Q-Peak
Raytheon, An RTX Business
ScannerMax
SPIE
Thorlabs
TwinStar
ULVAC Technologies
Vescent Photonics
VIGO Photonics*
Yokogawa

**New Members as of June 30, 2023*



CREOL, The College of Optics and Photonics

UNIVERSITY OF CENTRAL FLORIDA

Creating a BRIGHTER future through EDUCATION and RESEARCH.

CREOL.UCF.EDU

4304 Scorpius Street, Orlando, FL 32816
407-823-6800 | CREOL@UCF.EDU

FOLLOW US ON SOCIAL MEDIA



@creolatucf



@ucf-college-of-
optics-photonics



@CREOLatUCF

