CREOL

The College of Optics and Photonics
University of Central Florida

2024 ANNUAL REPORT

Annual Report Period:
July 2023 - June 2024

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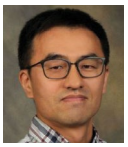
Dean & Director
Pegasus Professor of Optics & Photonics

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

Stephen Eikenberry
Professor, Optics & Photonics and Physics

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



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Mark Wagenhauser
Finance Director

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Luminar Technologies

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HR Coordinator

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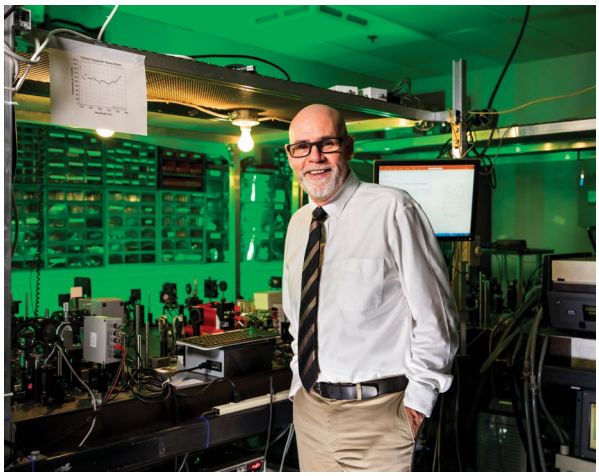
Isabelle Lebron
Undergraduate Student

Zheyuan Zhu
Postdoctoral Researcher

Andrea Blanco Redondo
Professor

Ivan Divliansky
Research Associate Professor

MESSAGE FROM THE DEAN



I am delighted to introduce the 2023-2024 CREOL Annual Report. This past year has been one of ongoing major growth at CREOL, made possible by the innovation, collaboration, and notable achievements of our faculty, researchers, and students. Our reputation for excellence in optics and photonics is stronger than ever.

We welcomed two new faculty members to our team—**Leland Nordin** and **Midya Parto**—who bring fresh perspectives and innovative research expertise to our community. I encourage you to read more about their expertise on page 8.

I would also like to take a moment to celebrate one of our own, **Peter Delfyett**, who was inducted into the Florida Inventors Hall of Fame this year. His groundbreaking work and passion for discovery exemplify the spirit of innovation that is at the heart of CREOL. More about his achievements can be found on page 9. Congratulations are also in order for **Shin-Tson Wu**, who was awarded UCF's inaugural Medal of Societal Impact, recognizing his pioneering research into the evolution of liquid crystal displays.

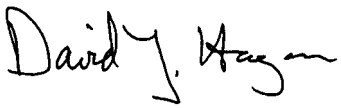
In addition to our academic and research milestones, we are proud to announce that we hosted our inaugural Summer Camp in 2023, introducing more students to the wonders of optics and photonics than ever before. Due to its immense success, we have plans to expand the program, ensuring we can continue inspiring future generations of photonic scientists and engineers.

This was also a banner year for community outreach and engagement. The April 8, 2024 solar eclipse brought publicity and interest to CREOL, as we educated the public about how our innovation is advancing our understanding of the cosmos. You can read more about our community connections on page 15.

Furthermore, I would like to extend my heartfelt congratulations to former CREOL Dean **Bahaa Saleh** and **Leonid Glebov**, who have retired and were awarded Emeritus Professor status. Their dedication, leadership, and contributions to CREOL and the broader field of optics have left an indelible mark, and we are fortunate to continue benefiting from their wisdom and legacy.

As you explore the highlights of this past year in our Annual Report, I encourage you to reflect on how these achievements—fueled by collaboration, curiosity, and the spirit of invention—propel us toward a future where the possibilities of optics and photonics are boundless.

Thank you for your continued support of CREOL. Together, we will keep shaping the future with light.



David Hagan
Dean and Director
Pegasus Professor of Optics and Photonics

2023-24 AWARDS

EXTERNAL AWARDS

FACULTY

Andrea Blanco-Redondo
Fellow, Optica

Debashis Chanda*
SONY Innovation Award
UNC Cleantech Award for Academic Innovation

Peter Delfyett
Florida Inventors Hall of Fame

Ronald Driggers**
Joseph W. Goodman Book Writing Award, SPIE/Optica

Jason Eichenholz '95MS '98PhD**
National Academy of Inventors

Aravinda Kar
President, Laser Institute of America

Mordechai Segev**
Rothschild Prize in Physics

STUDENTS

Gabryella Baldaci
Optics and Photonics Scholarship, SPIE

Swati Bhargava
Optics and Photonics Scholarship, SPIE

Yuqiang Ding
Third place, SPIE AR VR Optical Design Challenges

Joseph Haefner
Optics and Photonics Scholarship, SPIE

Andrew Howe
Optica Harvey M. Pollicove Scholarship

Zhenyi Luo
Diamond Award, Facebook Reality Labs – International Liquid Crystal Society
First Place, SPIE AR VR Optical Design Challenges

Shruti Jayaprakash Saiji
Detroit Metro SID Academic Award

Yuqiang Ding
Qian Yang '22MS '24PhD
Yannanqi Li
JSID Outstanding Student Paper Award

UNIVERSITY AWARDS

FACULTY

Aristide Dogariu
Luminary Award

Mubarak Shah*
Excellence in Mentoring Postdoctoral Scholars

Shin-Tson Wu
Inaugural UCF Medal of Societal Impact

STUDENTS

Isabelle Lebron
Founders' Day College Award

Alejandro Lopez Zelaya
Order of Pegasus

SERVICE TO UCF

Amy Perry
30 years

Mark Wagenhauser
30 years

Katie Connolly
15 years

Aristide Dogariu,
Luminary Award

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Shin-Tson Wu,
Medal of Societal Impact

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Maria Lopes
10 years

Mike McKee
10 years

Leonid Glebov
Emeritus Professor

Bahaa Saleh
Emeritus Professor

COLLEGE AWARDS

FACULTY

Kyle Renshaw
Excellence in Research

Romain Gaume
Excellence in Graduate Teaching

Ivan Divliansky
Excellence in Undergraduate Teaching

Sasan Fathpour
CREOL Optics and Photonics Research Incentive Award

STUDENTS

Dmitrii Konnov ’21MS ’24PhD
Student of the Year

Farzaneh Arab Juneghani
Student of the Year Finalist

Srinivas Varma Pericherla
Student of the Year Finalist

Qian Yang ’22MS ’24PhD
Student of the Year Finalist

Shaghayegh Yaraghi
Industrial Affiliates Symposium Best Poster

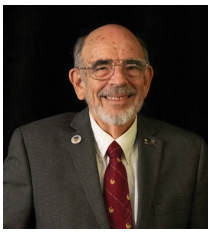
Aiden Nipper ’24 (CREOL)
Will DiSalvo ’24 (CREOL)
Rodrigo Guerra Montes ’24 (CECS)
Donovan Reynolds ’24 (CECS)
Winning Team: Senior Design Competition

ALUMNI

Vadim Smirnov ’00MS
Distinguished Alumnus

**Joint Faculty*
***Courtesy Faculty*

MJ SOILEAU HONORED WITH SHINING KNIGHT AWARD



UCF honored CREOL Founding Director and Emeritus Professor **MJ Soileau** with the John C. and Martha Hitt Honorary Alumni Award, the highest annual award granted to a friend of UCF.

In his more than 35 years of service to UCF, Soileau founded and led the Center for Research in Electro-Optics and Lasers (CREOL) and fueled its research program from $36 million in 1999 to more than $145 million in 2016. As a UCF distinguished professor, he served as a mentor and inspiration to his fellow faculty members and to students. In addition, Soileau, and therefore UCF, has received international recognition and acclaim for his innovative laser research.

In addition to his professional obligations, Soileau has served as a volunteer leader for many community organizations including the Orlando Science Center Board and the Astronaut Memorial Foundation and received the Directors Award from the Metro Orlando Economic Development Commission (now the Orlando Economic Partnership). He has also been active on committees and boards for many international professional or scholarly societies including the Optical Society (now Optica) and president of the International Society for Optics and Photonics (SPIE), which awarded him their highest honor in 2008.

To show their appreciation and devotion to UCF, Soileau and his wife, Cheryl, established two endowed funds: a graduate fellowship and a scholarship for undergraduate students. Soileau is particularly interested in helping first-generation students as he was the first in his family to attend not only college, but high school.

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RANKINGS

UCF'S OPTICS PROGRAM CONTINUES TO RANK AMONG WORLD'S BEST

U.S. News & World Report once again recognized CREOL, The College of Optics and Photonics as one of the world's top 30 universities for optics—a testament to ongoing excellence in research, international collaboration, and scientific literature contributions.

Within the United States, the *U.S. News & World Report* rankings place CREOL in the top four public universities for optics, and within the top 10 universities overall. This places CREOL's program in the company of Stanford, Harvard, Caltech, UCLA, Columbia, and MIT.

U.S. News & World Report also named the University of Central Florida one of the top five most innovative public universities. In Florida, UCF was recognized as the state's most innovative university for the seventh consecutive year.

CREOL is a key driver of that innovation, securing more than $90 million in external research funding over the last five fiscal years. The Bachelor of Photonic Science and Engineering degree is the only program of its kind in Florida, and one of only six accredited in the nation. It also boasts the highest percentage of female students among engineering majors at UCF.

"I'm incredibly proud of CREOL's continued recognition as one of the world's leading programs in optics," said CREOL Dean **David Hagan**. "This is a testament to the dedication, excellence, and collaborative spirit of our faculty, students, and researchers. Our program's contribution to UCF's status as one of the most innovative universities in the nation further highlights the impact of our research and educational efforts. Our future is bright, and I'm truly excited about all that we will accomplish together."

CREOL EXPANDS, WELCOMING TWO NEW FACULTY MEMBERS

In order to meet growing demands in the tech industry for talent in optics and photonics, CREOL has been adding to its faculty ranks over the past two years, with plans to continue in the near future. During the 2023-2024 school year, CREOL welcomed **Leland Nordin** and **Midya Parto '16MS '19PhD**.

Before landing at UCF, Nordin earned his master's and doctoral degrees in electrical and computer engineering from The University of Texas at Austin and completed a postdoctoral research fellowship at Stanford University. As a joint faculty member of both CREOL and the Department of Materials Science and Engineering, Nordin's research will focus on the growth of two in-demand technologies: semiconductor materials and optoelectronic devices.

"The critical mass of great researchers at CREOL is unparalleled," said Nordin. "I'm eager to collaborate with my new colleagues and contribute to the pioneering research and technological advancements coming out of UCF."

Parto's history with CREOL goes back to 2014 when he started as a graduate student. After receiving his Ph.D. under the supervision of **Demetrios Christodoulides**, he held a postdoctoral position for a year before heading to Caltech. Parto's research focuses on leveraging ultrafast optical nonlinear processes to implement various system-level, large-scale photonic systems to perform information processing and computing.

"My primary goal is to help mentor the next generation of talented scientists and engineers in optics," said Parto. "In the past, CREOL has provided a significant number of graduates who have taken up different roles in industry as well as academia both within the US and abroad. I hope I can make a meaningful contribution to this output in the future."

The added faculty are needed to keep up with CREOL's student enrollment growth as UCF focuses on fueling the talent pipeline for the tech industry. The University is undergoing a major expansion with a focus on growing research in semiconductor technologies, artificial intelligence, and space and planetary instrumentation, commercialization and exploration.

"Companies are crying out, saying they could double their business if they could just hire more employees," said CREOL Dean David Hagan. "A tremendous amount of work and planning has been done to make sure CREOL students are poised to help fill that demand."

Leland Nordin

Midya Parto

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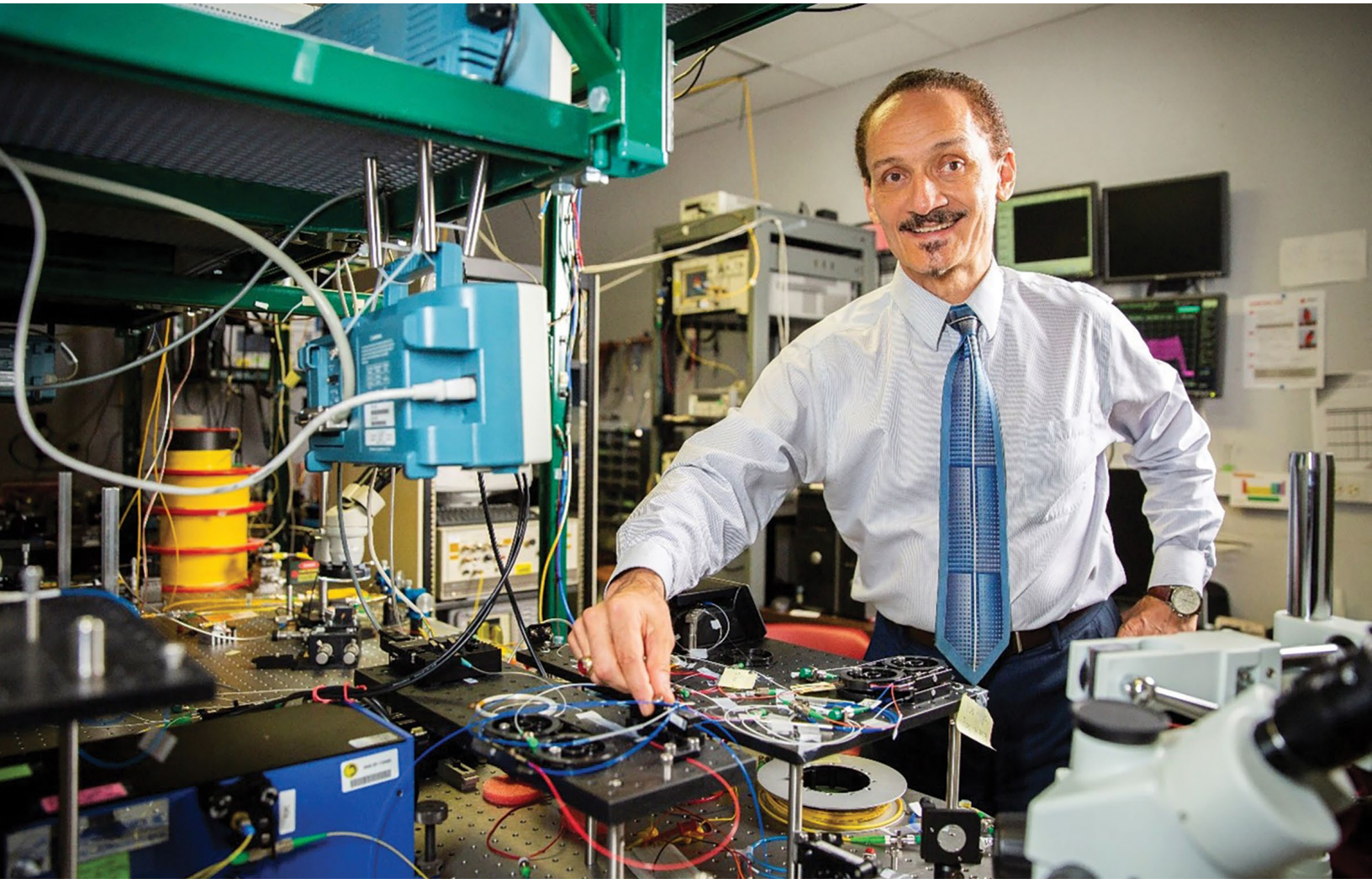
FACULTY



DISTINGUISHED UCF OPTICS, PHOTONICS PROFESSOR INDUCTED INTO FLORIDA INVENTORS HALL OF FAME

CREOL Professor **Peter Delfyett** was inducted into the Florida Inventors Hall of Fame for his groundbreaking inventions in optics and photonics.

Delfyett, who also serves as the director of the Townes Laser Institute and is a university trustee chair professor and CREOL Pegasus Professor came to UCF in 1993 and now holds 45 U.S. patents.

He is elated to have been chosen, and he credits his recognition to UCF's willingness to cultivate an environment favorable for innovative research.

"It is a true honor to be inducted into the Florida Inventors Hall of Fame," Delfyett says. "What I think it really speaks to is not just my efforts, but the efforts of my graduate students and the support we have from the administration to create a positive environment that's conducive for discovery and inventiveness."

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Since its founding in 2013, the Florida Inventors Hall of Fame has inducted 77 inventors, who collectively hold over 5,200 U.S. patents.

"The Class of 2024 represents the best of innovation in Florida, and their achievements underscore the critical role that innovation plays in driving progress and improving the quality of life for people in our state, our nation and around the world," says Paul Sanberg, chair of the Florida Inventors Hall of Fame Advisory Board and president of the National Academy of Inventors. "Their groundbreaking work not only advances scientific discovery but also strengthens the economy and enhances our global competitiveness."

Delfyett's body of research is extensive and punctuated by honors spanning scientific disciplines and recognizing different aspects of his career. He received an inaugural Presidential Early Career Award for Scientists and Engineers (PECASE) award from the U.S. National Science Foundation (NSF) in 1996 — just three years after arriving at UCF.

In 2021, he was UCF's first sitting faculty member to be inducted into the National Academy of Engineering and in the following year, he earned the lifetime honor of being named an American Association for the Advancement of Science Fellow.

His induction into the Florida Inventors Hall of Fame further fuels his research ambitions and desire to discover new frontiers in optics and photonics.

"I've been around for a long time where a lot of the work that we have done over the years is really now starting to get the recognition," Delfyett says. "It's great to have this coming from the Florida Inventors Hall of Fame. It's like getting the hometown recognition."

CREOL FACULTY NAMED UCF TRUSTEE CHAIRS

CREOL Professor **Ayman Abouraddy** was appointed and Professor **Aristide Dogariu** was reappointed to the UCF trustee chair professorship. The prestigious recognition honors faculty with national and international reputations for excellence and with extraordinary accomplishments in teaching, research, and service.

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IN MEMORIAM: MANSOOR SHEIK-BAHAE

Former CREOL Research Scientist and Distinguished University of New Mexico Professor **Mansoor Sheik-Bahae** passed away on July 10, 2023, following a battle with cancer.

Sheik-Bahae was best known for developing the Z-scan technique to measure the nonlinear optical properties of materials. During his 7 years at CREOL, his research also contributed to the use of Kramer's Krönig relations in nonlinear optics and to the creation of the field of cascaded second-order nonlinear optics.

"He was also just such a kind and engaging personality," said CREOL Emeritus Professor **Eric Van Stryland**, adding that Sheik-Bahae would often organize basketball games and other events to bring people together during CREOL's formative years. "This greatly helped the camaraderie and atmosphere at CREOL, as well as helping initiate collaborative efforts in research. He was simply a joy to have here for as long as he was willing to stay."

RESEARCH

"We are eager to collaborate with Ursinus College and leverage our collective strengths to make meaningful contribution to the field of glass science and sustainability."

—Dr. Kathleen Richardson

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INVENTING THE FUTURE OF INFRARED GLASS RECYCLING

A 1.2-million-dollar award from The American Center for Optics Manufacturing (AmeriCOM) will fund a collaboration to revolutionize the recycling and recovery process of infrared glass—something that could have far-reaching implications for sustainability and technological advancement.

CREOL Professor **Kathleen Richardson** will work alongside researchers at Ursinus College's physics department to advance the understanding of multicomponent chalcogenide infrared glass (ChG), and its potential for reuse from a manufacturing standpoint.

Infrared (IR) light is invisible to the human eye because its wavelength is longer than the visible spectrum, but it can be detected using infrared-specific materials. Also, conventional glasses used to transmit and focus visible light, are opaque in the IR. This creates a need for IR materials, such as Chalcogenide glasses (ChG) which have a wide range of application in the field of optics, photonics, and electronics. But as the attractiveness of using amorphous IR ChG in broadband optical systems for defense and civilian applications continues to expand, so do the issues associated with raw material costs.

"We envision this effort to be a low-risk, high-impact initiative to evaluate methods to support the recovery of ChG materials currently discarded during manufacturing, improving the sustainability of the material manufacturing process of IR glass," Richardson said. "We are eager to collaborate with Ursinus College and leverage our collective strengths to make meaningful contribution to the field of glass science and sustainability."

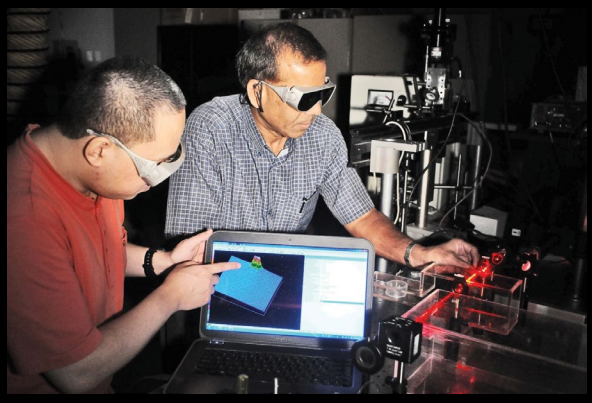
The grant from AmeriCOM will support the training of undergraduate and graduate students, purchasing of materials and processing, and their subsequent characterization. Through partnerships like the one between UCF and Ursinus, academic institutions can play a pivotal role in driving technological innovation and advancing scientific knowledge.

UCF RESEARCHERS LEAD $1.5M PROJECT TO IMPROVE EFFICIENCY OF SOLAR CELLS

The task: to develop a novel metallization process that could improve the efficiency and lower the cost of solar cells, making solar energy more accessible to consumers.

CREOL Professor **Aravinda Kar** is part of a team working with the College of Engineering and Computer Science and the University of Delaware's Institute of Energy Conversion.

The project is one of 19 selected for funding from President Biden's Investing in America agenda, and one of eight projects that aim to reduce costs and increase efficiency of panel recycling processes through Biden's Bipartisan Infrastructure Law.



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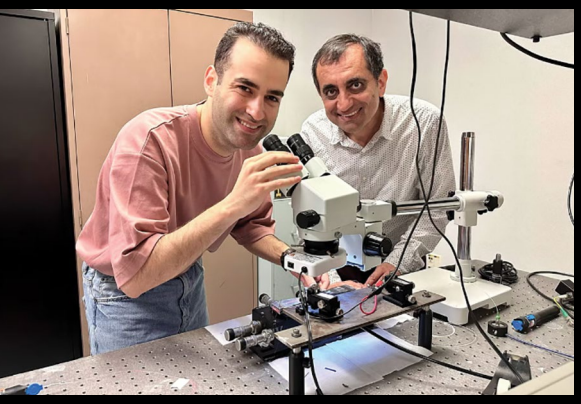
CREOL RESEARCH COULD REDUCE LAG, IMPROVE RELIABILITY OF ONLINE GAMING, MEETINGS



Whether you're battling foes in a virtual arena or collaborating with colleagues across the globe, lag-induced disruptions can be a major hindrance to seamless communication and immersive experiences.

That's why CREOL researchers — in collaboration with UCLA — have developed new technology to make data transfer over optical fiber communication faster and more efficient.

Their new development, a novel class of optical modulators, is detailed in a new study published in the journal Nature Communications. Modulators can be thought of as like a light switch that controls certain properties of data-carrying light in an optical communication system.

"Carrying torrents of data between internet hubs and connecting servers, storage elements, and switches inside data centers, optical fiber communication is the backbone on which the digital world is built," said study co-author and CREOL Professor **Sasan Fathpour**.

Ehsan Ordouie '23PhD was a CREOL doctoral student when the research was conducted and is the study's lead author. He said the innovative device enables both phase diversity and differential operations on a single photonic integrated circuit, thereby canceling the dispersion penalty, or signal quality degradation, and noise in optical communication links.

"Our experiments demonstrate that this approach eliminates the inherent nulls in the frequency response, which is a significant advancement for photonic time-stretch systems and coherent optical communication systems," Ordouie said.

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MAKING NEWS

WITH EVERYTHING HAPPENING AT CREOL, IT'S NO SURPRISE FACULTY AND STUDENTS ARE OFTEN FEATURED IN NEWS ARTICLES, PODCASTS, AND TV SEGMENTS. SCAN EACH QR CODE TO READ AND WATCH, OR VISIT **CREOL.UCF.EDU/NEWS**

Dean **David Hagan** was interviewed by WESH 2 News to discuss CREOL's first-ever photonics-based Summer Camp for high school students. Scan to watch the interview.

Graduate Student **Cesar Lopez Zelaya** was featured in LIA Today published by the Laser Institute of America.

As featured in UCF Today: CREOL will be an integral part of UCF's launch of a $6M initiative to create a Venture Lab supporting budding entrepreneurs. Scan to read more.

FPCE Endowed Professor **Andrea Blanco-Redondo** was interviewed on the *All Things Photonics* podcast to discuss "The Almighty Soliton". Scan to listen.

UCF featured Trustee Chair Professor **Peter Delfyett** in the Research in 60 seconds video series where he discussed making lasers faster and more efficient. Scan to watch the video.

Professor **Stephen Eikenberry** and undergrad student **Alejandro Lopez Zelaya** were interviewed by FOX 35 Orlando and Telemundo 31 during coverage of UCF's "Not-So-Total Solar Eclipse" event on April 8, 2024. Read more on the next page.

Professor **Stephen Eikenberry** was interviewed by Telemundo during CREOL's annual Optics Day event.

COMMUNITY

CREOL SHINES BRIGHT DURING "NOT-SO-TOTAL" SOLAR ECLIPSE EVENT AT UCF

On April 8, 2024, the sky darkened as a partial solar eclipse swept across Central Florida. The event, dubbed the "Not-So-Total Solar Eclipse," drew crowds to the UCF's Reflecting Pond for an afternoon of skywatching and science, and CREOL took a starring role in the excitement.

CREOL had been preparing for the event since Optics Day, where curious minds of all ages and backgrounds were welcomed to explore the wonders of optics and photonics. The annual event is an opportunity for the community to become more familiar with CREOL in a relaxed, non-classroom setting. Attendees also got to see with their own eyes the cutting-edge research conducted in CREOL's labs, plus their own pair of eclipse glasses.

When the eclipse began, the community turned to CREOL's faculty and students to better understand the phenomenon. Telemundo 31 broadcast live from UCF, airing a program that was seen in Orlando, Tampa, and Miami. Professor **Stephen Eikenberry**, who specializes in building astronomical instruments, gave multiple interviews about the significance of the eclipse.

"It's a lot of fun for us," Eikenberry told FOX 35. "It's great to have outreach to the community, get the excitement about science that's going on here today. You can really feel the energy in the air."

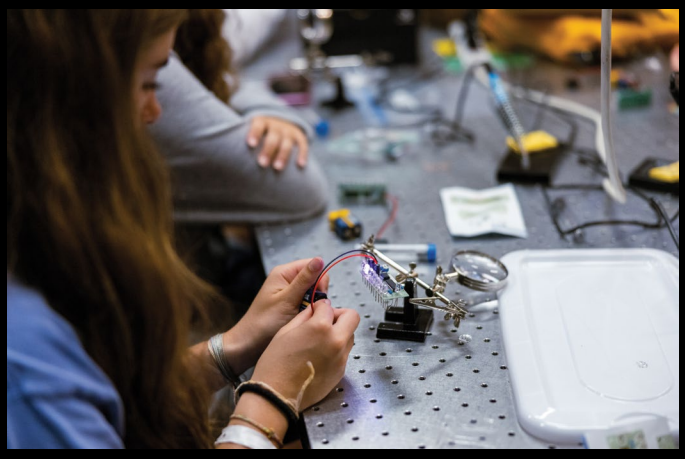
The event featured telescopes equipped with solar filters, educational booths, and plenty of CREOL students sharing their knowledge. Attendees learned about everything from the mechanics of eclipses to the complex ways light behaves, making it a perfect blend of fun and education.

Left: Emeritus Professor MJ Soileau speaks with students on Optics Day

FIRST PHOTONICS SUMMER CAMP HELD FOR HIGH SCHOOL STUDENTS

Inventing the future of Optics and Photonics starts with the next generation. CREOL welcomed 25 high school students from as far away as California to learn about light. Local teachers partnered with CREOL Professors **Peter Delfyett, Shin-Tson Wu,** and **Andrea Blanco-Redondo** to hold lectures and labs on a wide range of topics including the electromagnetic spectrum, reflection and refraction, and even basic soldering.

The camp was covered on WESH 2 News, which highlighted parents and students who came to learn about engineering opportunities in Optics and Photonics. Thanks to the camp's success, CREOL plans to expand the program to three weeks in 2024, to accommodate more students and excite them about CREOL's cutting-edge innovation.



ALUMNI

JASON EICHENHOLZ RECOGNIZED FOR CONTRIBUTIONS TO SCIENCE AND SOCIETY

CREOL alum **Jason Eichenholz ’95MS ’98PHD** was inducted into the National Academy of Inventors (NAI) and the Academy of Science, Engineering, and Medicine of Florida (ASEMFL).

Eichenholz is the 19th UCF researcher to join NAI. Election as an Academy Fellow is the highest professional distinction awarded solely to inventors, and honors their contributions to science, society and consumer technologies. This year’s class of fellows include 162 individuals representing 35 U.S. states and 10 countries.

ASEMFL brings together the nation’s most distinguished scholars who live and work in Florida. ASEMFL selected Eichenholz “for pioneering contributions to the development and commercialization of lidar, with emphasis on autonomous vehicle applications, and to methods of Open Innovation in photonics.”

Eichenholz is the co-founder and chief technology officer of Luminar Technologies and serves as a CREOL courtesy faculty member.

Eichenholz leads Luminar’s efforts to advance lidar technology in driverless vehicles. A pioneer in laser- and optics-enabled innovation, product development and commercialization, Eichenholz holds more than 83 U.S. patents and is a fellow of SPIE and Optica.

Eichenholz thinks about his life in three chapters, with the first being his formal technical education training, the second being his professional career spent applying technology to solve important problems and now the third chapter which he dedicates to moving from a life of success to significance.

“I am most excited about my ‘chapter three’ and the amazing things I can do next in moving from … reputation building to legacy building and doing so by leveraging my strong connections to UCF,” Eichenholz said.

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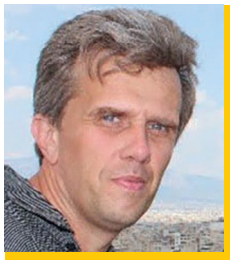


VADIM SMIRNOV HONORED AS CREOL 2024 DISTINGUISHED ALUMNUS

For more than 25 years, **Vadim Smirnov ’00MS** has brought dynamic and innovative change to the optics Industry. After co-founding OptiGrate Corp in 1999, he went on to co-author more than 10 U.S. patents and 120+ papers. He’s currently OptiGrate’s Chief Technology officer and Director of Holography and Diffractive Optics.

Smirnov pioneered the early development of Volume Bragg Grating (VBG) technology in Photo-thermo-refractive (PTR) glass. He was the principal investigator of more than 10 research projects on technology development of VBG for spectroscopy, high-energy femtosecond lasers, and spectral beam combining.

His work facilitated development of novel laser systems based on intracavity VBGs, low-frequency Raman spectrometers, hyperspectral imagers, ultra-narrow filters for quantum optics, and high energy compressors for ultra-short pulses. Today, his work continues to further development of PTR glass technology and its applications.

Smirnov is a Fellow of SPIE.

CREOL ALUMNUS BRINGS FOCUS TO HIGH-POWERED LASER DELIVERY RESEARCH

The results of the research **Matthew Cooper '23PhD** and his colleagues conducted have been published in the journal Optica — and could lead to a new generation of fiber-based laser beam delivery systems.

"I was truly excited when we first reached these results," Cooper said, "Because we just didn't know what would happen at these power levels."

Power levels 50,000 times greater than that of a common laser pointer, Cooper said.

The experiment consisted of testing hollow-core fibers, which are special types of optical fibers that look a bit like a very thin straw, with a tiny hole running through the middle. They're not used as commonly as solid-core fibers, but they can transmit light faster and with less distortion. Despite that advantage, more research and development is needed to help hollow-cores reach their full potential. That's where Cooper and his research advisor, CREOL Professor **Rodrigo Amezcua Correa** came in.

"We have been working on hollow-core fibers for almost 20 years," Amezcua Correa said. "We don't yet understand the limits, and it is a very new regime for light."

They are, however, one step closer to understanding those limits after their test. It consisted of carefully increasing the power through two hollow-core fiber lengths at various linewidths. They slowly added 220 watts at a time, monitoring the power delivery's stability and efficiency. Eventually, the laser stabilized at 2.2 kilowatts — more than two or three times the average microwave oven. This has not previously been achieved.

"The results of this particular experiment proved out the ability for these types of fiber structure to handle such extreme powers," said Cooper.

Cooper and Amezcua Correa say it will likely shift the focus of the optics field.

"Basically, we were doing things you cannot do with any other conventional fibers," Amezcua Correa said. "They're quite remarkable. It opens up possibilities that weren't available before. There is a lot of interest for many areas of applications."

CREOL Professor **Axel Schülzgen** served in an advisory role for this research.

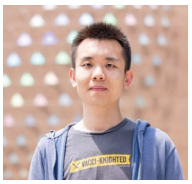
READ MORE

STUDENTS

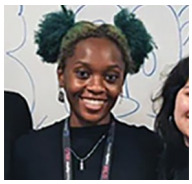
CREOL STUDENT INDUCTED INTO UCF ORDER OF THE PEGASUS

Undergraduate student **Alejandro Lopez Zelaya** was one of 31 UCF students who were inducted into the 2024 Order of the Pegasus. The Order is the most prestigious and significant award a student can obtain at UCF, an honor which acknowledges outstanding academic achievement, university involvement, leadership and community service. Zelaya was honored both as a CREOL student and a pre-med Burnett Honors College Scholar. In addition to his role as a research assistant, Zelaya also serves as a member of the President's Leadership Council.

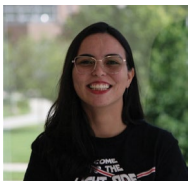
OPTICS AND PHOTONICS STUDENTS HONORED WITH SPIE SCHOLARSHIPS



Qian "Tim" Yang



Kaila Peeples



Gabryella Baldaci

Swati Bhargava

Joseph Haefner

In 2023 and 2024, SPIE awarded five CREOL students with education scholarships based on their potential contribution to optics and photonics.

2023 recipient **Qian "Tim" Yang** is a PhD candidate under the supervision of Professor **Shin-Tson Wu**. His research focuses on VR/AR light engines and liquid crystal optical elements for AR.

In 2024, **Gabryella Baldaci**, **Swati Bhargava** and **Joseph Haefner** were awarded SPIE Education Scholarships. Baldaci is an undergraduate student supervised by Professor **Xiaoming Yu**. Her research focuses on laser surface treatment of metal alloys and their applications.

As a PhD candidate, Bhargava's research aims to develop innovative photonic devices for precise control and manipulation of light. She works under the guidance of Professor **Miguel A. Bandres**. She also collaborates with Professor **Stephen Eikenberry** on the development of a hyperspectral microscopy system to enhance cancer diagnosis.

Also a PhD candidate, Haefner studies thin-film lithium niobate for high-speed communication applications under the guidance of Professor **Sasan Fathpour**. While completing his PhD Haefner served as an engineer for the United States Air Force and as an instructor at the United States Air Force Academy (USAFA).

Internally at CREOL, **Kaila Peeples** was awarded a 2023 Soileau Family-SPIE Optics and Photonics Undergraduate Scholarship. Peeples is interning at Lockheed Martin, and is pursuing a career in biophotonics or biomedical optics.

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

STUDENT POSTER WINNER

Shaghayegh Yaraghi was the winner of the 2024 Industrial Affiliates Symposium Outstanding Student Poster Presentation for her poster titled: Design Considerations and Fabrication of Rotated Chirped Bragg Gratings. Yaraghi is a PhD candidate in the Advanced Holography and Laser Research Laboratory, advised by **Ivan Divliansky**, as well as an instructor for the Foundations of Photonics Laboratory.

ANNUAL CREOL SENIOR DESIGN COMPETITION

The winning team of the spring Senior Design Competition consisted of two photonic science and engineering undergraduate students: **Aiden Nipper '24** and **Will DiSalvo '24** (left and 2nd from left) and two students from the College of Engineering and Computer Science: **Rodrigo Guerra Montes '24** and **Donovan Reynolds '24** (2nd from right and right). Their project, "Bird Initiated Rubbish Disposal System (BIRDS)" was designed to facilitate the training of birds through positive reinforcement for the purpose of mitigating the environmental impact of littering. Special thanks to our Industrial Affiliates members who served as judges: Ed Foote from LightPath Technologies, **Ty Olmstead '11PhD** from Ocean Optics, **Wilfredo Ortiz '17** from MKS Instruments and **Anna Tabirian '00PhD** from BEAM Engineering for Advanced Measurements Co.

CREOL STUDENT OF THE YEAR

Dmitrii Konnov '21MS '24 PhD was selected as the 2024 Student of the Year. Part of **Konstantin Vodopyanov's** mid-infrared combs research group, Konnov presented his research paper "Dual-Comb Molecular Spectroscopy from Mid-IR to THz" during the competition. Other Student of the Year finalists were **Farzaneh Arab Juneghani '21MS '24PhD** and **Srinivas Varma Pericherla '20MS '24PhD.**

STUDENTS

DOCTORAL DEGREE GRADUATES

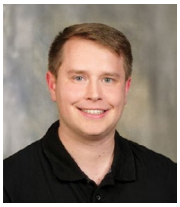
Aritra Biswas '21MS '24PhD
Dissertation: Applications of Plasmonic Biosensors in Achiral and Chiral Sensing
Advisor: Debashis Chanda
Employer: University of Central Florida
Title: Postdoctoral Researcher

Alireza Fardoost '19MS '23PhD
Dissertation: Imaging And Computation Using Vector Modes
Advisor: Guifang Li
Employer: University of Central Florida
Title: Postdoctoral Researcher

Matthew Cooper '23PhD
Dissertation: Multi-Kilowatt Fiber Laser Amplifiers and Hollow-Core Delivery Fibers
Advisor: Rodrigo Amezcua Correa
Employer: United States Space Force Korea
Title: Director of Personnel, Logistics, and Sustainment

Sanaz Faryadras '21MS '24PhD
Dissertation: Nonlinear Beam Deflection and Optical Properties of Semiconductors and Semimetals
Advisor: David Hagan, Eric Van Stryland
Employer: University of Central Florida
Title: Postdoctoral Researcher

Vahid Ebrahimi '21MS '23PhD
Dissertation: Deep Learning-Based Microscopy
Advisor: Kyu Young Han
Employer: MetroLaser, Inc.
Title: Senior Optical Scientist

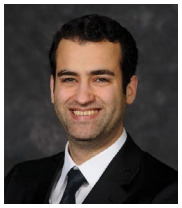


Layton Hall '22MS '23PhD
Dissertation: Consequences and Applications of Non-Differentiable Angular Dispersion and Space-Time Wave Packets
Advisor: Ayman Abouraddy
Employer: University of Central Florida
Title: Postdoctoral Researcher

Mahdi Eshaghi '21MS '24PhD
Dissertation: Sensing Using Angular Momentum of Light: From Polarization to Optical Vortices
Advisor: Aristide Dogariu
Employer: University of Central Florida
Title: Postdoctoral Researcher

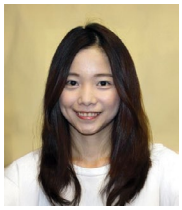
Jennifer Hewitt '21MS '24PhD
Dissertation: Human Visual Search Performance for Close Range Detection of Static Targets from Moving Sensor Platforms
Advisor: Kyle Renshaw
Employer: Air Force Research Laboratory

Dmitrii Konnov ’21MS ’24PhD
Dissertation: Dual Frequency Comb Mid-IR – THz Spectroscopy
Advisor: Konstantin Vodopyanov
Employer: University of Central Florida
Title: Postdoctoral Researcher, Teaching Lab Manager

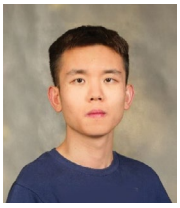


Ehsan Ordouie ’23PhD
Dissertation: Active Photonic Integrated Devices and Circuits on Thin-film Lithium Niobate Platform
Advisor: Sasan Fathpour
Employer: Exowatt
Title: Lead Optical Engineer

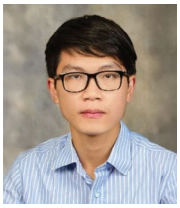
Lawrence Trask ’21MS ’24PhD
Dissertation: Opto-Electronic Oscillator Driven Electro-Optic Modulator Based Optical Frequency Comb
Advisor: Peter Delfyett
Employer: Naval Information Warfare Center Pacific



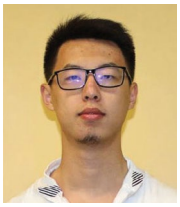
Chun-Hung Weng ’21MS ’23PhD
Dissertation: Minimizing Photobleaching in Fluorescence Microscopy by Spatiotemporal Control of Light
Advisor: Kyu Young Han
Employer: KLA
Title: Product Development Engineer



Qian Yang ’22MS ’24PhD
Dissertation: Visual Experience Enhancement in Augmented Reality Displays
Advisor: Shin-Tson Wu
Employer: Apple
Title: Display Engineer



Zhiyong Yang ’24PhD
Dissertation: Next-Generation High-Performance Virtual Reality and Augmented Reality Light Engines
Advisor: Shin-Tson Wu
Employer: Meta
Title: Display Research Scientist



Fangjie Zhou ’21MS ’23PhD
Dissertation: High-Efficiency Ultrafast Mid-Infrared Source for Strong Field Science
Advisor: Zenghu Chang
Employer: Photonics Industries, Inc.
Title: Senior Laser Engineer

FAST FACTS

U.S. NEWS AND WORLD REPORT

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#4
BEST U.S. PUBLIC UNIVERSITIES FOR OPTICS

#5
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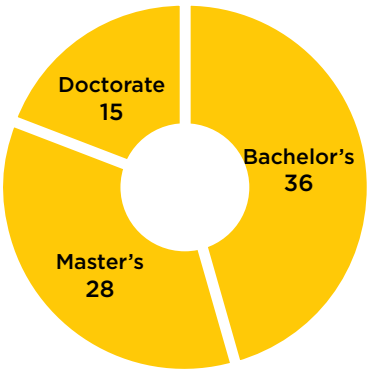
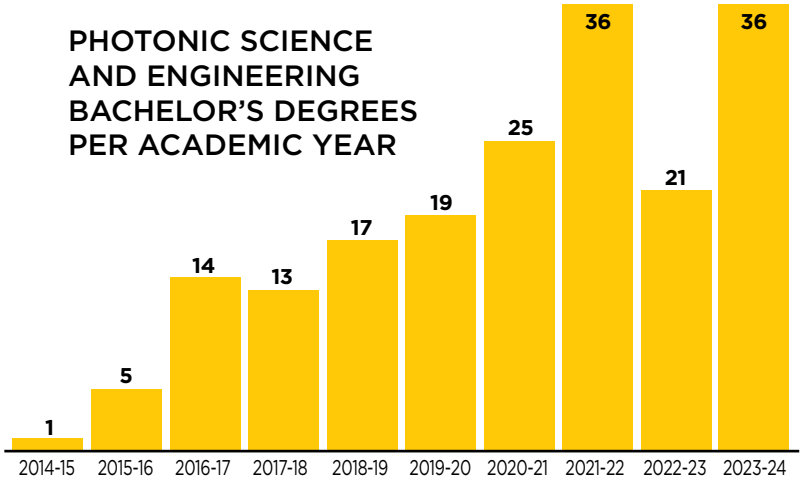


(summer & fall 2023 + spring 2024)

PHOTONIC SCIENCE AND ENGINEERING BACHELOR'S DEGREES PER ACADEMIC YEAR



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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

$83,000
BACHELOR'S

$95,000
MASTER'S

$140,000
DOCTORATE

FACULTY

35
FACULTY

PATENTS & PUBLISHING

164
PUBLICATIONS*

11
PATENTS

**Refereed Journal Publications*

MOST PUBLISHED FACULTY

Shin-Tson Wu
Kathleen Richardson
Rodrigo Amezcua Correa
Steven Eikenberry
Kyle Renshaw

$15,134,092
RESEARCH FUNDING FY24

HIGHEST FUNDED PRINCIPAL INVESTIGATORS

Kathleen Richardson
Rodrigo Amezcua Correa
Guifang Li
Shin-Tson Wu
Yehuda Braiman

$364,564
PHILANTHROPIC SUPPORT

88
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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.

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