



SPIE.

**GLOBAL
IMPACT**
Report

2024

Leading with Purpose: SPIE's Investment in the Future of Photonics

As a biomedical-optics professional, I am very aware of the invaluable impact that optics and photonics technologies have on people's lives, and as the 1997 recipient of the DJ Lovell scholarship, I am also keenly aware of the impact SPIE's support can have on a career. That initial investment in me as merely a student beginning their studies in biomedical optics helped me believe in my potential as a researcher. Upon attending my first SPIE conference and presenting my work, I began to understand the vast number of opportunities available to me thanks to the network of people found at SPIE conferences and began building the community that I have today. In the years since, I have met countless researchers and engineers with similar experiences of SPIE playing a crucial role in their career. As the 2024 SPIE President, I was incredibly proud to help lead a professional society that excels in terms of its own transformative impact on the international optics and photonics community and, by extension, the wider global population.

SPIE accomplishes its mission by being a connector and facilitator, through conferences, events, and exhibits, as well as the Digital Library, the world's largest collection of optics and photonics applied research. But it also does so by providing critical support, both financial and in-kind, to our scientists, engineers, and students. The year I was SPIE President, the aspect of the Society that I was most impressed by was the myriad ways in which SPIE serves its optics and photonics constituency with generous, engaging development activities such as scholarships, education and outreach programs, student chapter support, and the SPIE Endowment Matching Program.

In 2024, SPIE contributed \$6.4 million to the international optics and photonics community through our various programs. We added two new \$1-million endowments to the SPIE Endowment Matching Program, one with Boston University in support of graduate and post-doctoral students, and one with the National University of Singapore to support PhD students through the completion of their studies. These gifts bring the total in the SPIE Endowment Matching Program up to 13, which have provided more than \$5 million in matching gifts that have been leveraged by the institutions to result in over \$13 million in dedicated funds at the end of 2024.

As you'll read in the pages that follow, SPIE's support is much more than big numbers. As my career can attest, the impact of a scholarship, a travel grant, or belonging to a student chapter is hard to measure in dollars, but can be felt in the success of our individual research projects and career progressions, as well as the by the health and size of the broader optics and photonics community.

This report offers a picture of SPIE's global impact that affects individuals personally and professionally. From the recent recipients of our Outreach Grants and Student Conference Support awards, to SPIE Fellow Kristen Maitland's career-long involvement with SPIE and the recipients of our Endowment programs, you'll read about the people-focused impacts that our community development programs have already had - and will continue to have in the future.

Jennifer Kehlet Barton
2024 SPIE PRESIDENT



A COMMITMENT TO LIGHT, LEARNING, AND LEADERSHIP

SPIE Endowments are transforming optics and photonics worldwide. Across continents and disciplines, SPIE's Endowment Matching Program is igniting innovation, empowering researchers, and building a vibrant, inclusive, and visionary optics and photonics community.

In 2024, these investments have advanced science, built careers, and changed lives.

Empowering Early-Career Researchers and International Collaborations

From quantum spectroscopy in Italy to sustainable water monitoring in Nepal, young scientists funded by the **SPIE Early Career Researcher Accelerator Fund in Quantum Photonics at the University of Glasgow** are leading projects that blend cutting-edge photonics with real-world impact and fueling international collaborations that tackle global challenges.

Raul Alvarez Mendoza from the University of Glasgow is working with Dr Lorenzo Ubaldi from Politecnico di Milano, Italy to develop a quantum spectroscopy time-resolved fluorescence experiment. And Dr Justin Sperling and Dr Baptiste Poursat from the University of Glasgow are collaborating with Dr Rijan Maharjan from Phutung Research Institute, Kathmandu, Nepal with the shared goal of developing a new, low-cost, sustainable water monitoring sensor designed for deployment in decentralized rural areas, contributing to the monitoring and safeguarding of water quality for local populations.

Advancing Quantum Frontiers and Sensor Technologies

At JILA, University of Colorado Boulder, the **Baur-SPIE Endowed Chair in Optics and Photonics** is enabling groundbreaking research in quantum optomechanics. Cindy Regal and her team are exploring how micromechanical resonators can transmit quantum information and serve as ultra-sensitive sensors. The research could redefine how we measure and interact with the quantum world.

Sustained Scholarly Support

The **SPIE Optics and Photonics Champion Academy** continue to provide vital support to PhD students within **the University of Birmingham's School of Physics and Astronomy**. The endowment is currently funding eleven PhD students, whose research spans quantum sensing, photonics engineering, and laser-based measurement technologies. These students are progressing well and are expected to complete their doctorates by August 2028 and funding continues for one new student every two years.

“

The SPIE Graduate Fellowship has been an incredible honor and a driving force behind my research progress. It gave me the confidence and resources to present my work across different scientific and professional avenues.”

Quazi Rushnan Islam



Doctoral students working in The University of Manchester's Photon Science Institute lab.

Inspiring the Next Generation Through Hands-On Research

At the University of Wisconsin River Falls, the **SPIE/UWRF Optics Summer Research Scholars fund** enabled undergraduate students Peter Bendel and Hunter Davis to explore nature-inspired nanotechnology. They developed electron beam lithography processes to pattern materials that mimic the iridescent scales of the Morpho butterfly. Successfully replicating the butterfly's optical properties, the materials produce a measurable blue-shift in scattered light that could enable future optical metamaterials.

Expanding Access to Photonics Education

The **SPIE-Soileau Family Scholarship at CREOL, University of Central Florida**, provides critical financial support to undergraduate students in the Photonic Science and Engineering program. Prioritizing first-generation college students with unmet financial need, the scholarship helps recipients maintain academic momentum and stay engaged in their studies. Five students studying optics as their undergraduate degree received scholarships in 2024; Chad Jordan, Jeremy Goodenough, Edward Perez, Lauren Infante, and Brendan Wilson.

Championing Diversity and Inclusion in Science

At ICFO in Spain, the **SPIE@ICFO Chair for Diversity in Photonic Sciences** is creating pathways for women and gender-diverse individuals in STEM. In 2024, six fellowships were awarded to students from five countries, bringing multiple perspectives to research programs in quantum information, photonics, and optoelectronics. Additional programs like “Be an ICFOnian for a Day” and “Science by Women” offered mentorship, training, and community. Enabled through the partnership with SPIE, ICFO's leadership in diversity is changing who participates in science while also shaping what science becomes.

Honoring Excellence in Photonics

At CREOL, University of Central Florida, the **SPIE-Glebov Family Optics and Photonics Graduate Scholarship Fund** awards scholarships to the top-performing PhD candidates in the Optics and Photonics program at UCF. A highly competitive fellowship, the recipients in 2024 were Arjent Imeri, Gabriel Skowronek, Intouch Srijumngong, and Liza Quinn.

Supporting Life-Changing Research Journeys

The **SPIE-Manchester Postgraduate Scholarship in Photonics** supports both early-career researchers and returning researchers at **the University of Manchester's Photon Science Institute**. After a decade-long absence from academic research, Phil Burdett is now using polarization-sensitive optical coherence tomography to study systemic sclerosis, a rare and life-threatening autoimmune disease. Sruthi Raj Sreeraj, with a background in nanoscience, is developing quantum dots for secure communication and next-generation photonic devices. Both scholars are deeply engaged in their research and committed to sharing knowledge through teaching and collaboration.

“

Your contribution gives me access to world-class resources and a collaborative environment to advance research in material science. I am truly grateful for your belief in my potential and the future impact of this work.”

Sruthi Raj Sreeraj

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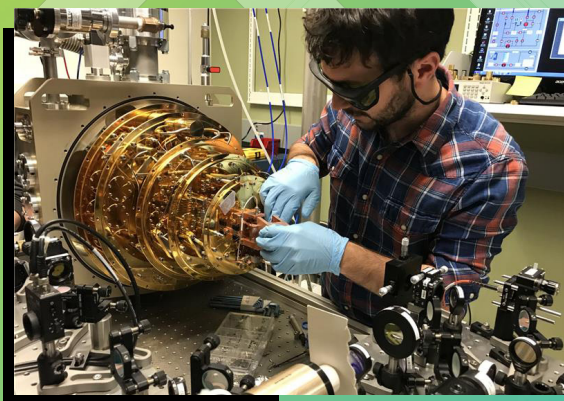
I didn't think it would be possible to get funding to return to university this late in my career.

Allow me to thank you once again for your generous sponsorship...this has given me the opportunity to finally complete the PhD I missed out on previously, and work on an exciting research project at one of the best physics departments in the UK”

Phil Burdett

Enabling Visionary research

Yuankai “Kenny” Tao is translating optical imaging technologies for ophthalmic diagnostics, including developing a handheld device to track retinopathy of prematurity in infants. **The SPIE Faculty Fellowship at Vanderbilt University** has enabled his research group to create new intraoperative imaging and analysis tools that greatly improve the precision of subretinal injections, supporting the next generation of gene therapies. Recently, they have introduced a novel imaging modality, shearing interferometric fluorescence tomography (SIFT), which enables high-speed, high-resolution fluorescence tomography and holds promise for advanced retinal imaging applications.



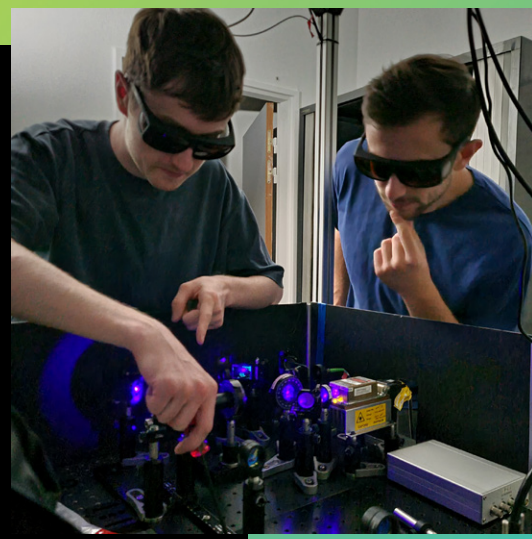
Max Urmei of the Regal group at JILA works on next-generation quantum sensors.

Powering Research that Makes Waves

The Eichenfield lab at the University of Arizona's Wyant College of Optical Sciences is making remarkable advances in phononic technology, using acoustic waves in engineered materials. Collaborating with Sandia National Laboratories, the **SPIE Endowed Chair in Optical Sciences** generated giant nonlinear interactions between phonons, a breakthrough that brings us closer to smaller, more efficient, and more powerful wireless and quantum devices. With a full toolkit for reconfigurable phononic and phonon-photon systems now in development, their work is rapidly moving from theory to real-world engineering platforms that could transform next-generation wireless, sensing, and quantum technologies.

Helping Researchers See Success

At the University of Rochester's Institute of Optics, Quazi Rushnan Islam is conducting research aimed at improving the next generation of contact lenses. **The SPIE Graduate Fellow in Optical Sciences and Engineering** uses femtosecond laser pulses to modify the refractive index of materials below the material damage thresholds. This work has progressed steadily from a conference presentation to a journal publication and then to a patent filing.



Patrick Cameron, beneficiary of the SPIE Global Early Career Research Program, left, with intern Remy Grasland, aligns a new photon-pair source that will test new cameras.

Kaila Peeples

BENEFICIARY OF THE SOILEAU FAMILY-SPIE OPTICS AND PHOTONICS UNDERGRADUATE SCHOLARSHIP

A career in optics and photonics was not a given for Kaila Peeples until just a few years ago. The first in her family to attend college — let alone show any interest in STEM-related studies — the University of Central Florida (UCF) student had attended an arts-focused school, playing the bassoon and considering a career in marketing or something “more artsy.”

Then, a class with Peeples' 11th-grade calculus teacher — “the best math teacher ever” — generated a personal paradigm shift. “She completely changed my mind about math,” says Peeples. “I was like, ‘Okay, maybe I can do something a little more STEM-related.’” Peeples considered computer engineering, leading to a career in visual effects, but once she arrived at UCF, Peeples' thinking changed again. “I found out about photonics through an introduction to engineering class with Mike McKee, our advisor. He gave an amazing speech on photonics, and I was completely blown away.”

In her sophomore year, Peeples was a recipient of a Soileau Family-SPIE Optics and Photonics Undergraduate Scholarship at UCF's College of Optics and Photonics (CREOL). Established in 2020 as part of the SPIE Endowment Matching Program, the scholarship stipulates preference for students who are the first in their families to attend college. “It's an honor to get a scholarship related to photonics from SPIE,” says Peeples. “Receiving it gave me pride in myself and made me realize what an amazing community we have. It inspired me in many ways and pushed me to want to do more within photonics.”

That new-found pride in community led to a serious escalation in her STEM-related activities on campus, including getting involved in GEMS — Girls Excelling in Math and Science: “I loved meeting other women in STEM, and it was such an amazing experience that I became a mentor within GEMS.” Through GEMS, she discovered CREOL's WiLO, the Organization of Women in Lasers and Optics — SPIE Fellow and CREOL professor Kathleen Richardson is its faculty advisor — and that experience confirmed Peeples' growing interest in mentorship. “I wanted to be a part of that, to continue interacting with and supporting other women in STEM. I come from a family full of women, and I know that my experience is something that other students can relate to. Extending a helping hand and being a support system to other people, that's really important to me.”

Peeples continues her mentoring work as her own technical career develops, a commitment that dovetails winningly with that of MJ Soileau, a fellow first-generation student, UCF emeritus professor, and part sponsor of the Soileau Family-SPIE scholarship that Peeples received. “Being able to support other students has been an amazing thing,” says Peeples. “But I am also excited for when I actually grow in my career, to come back and do even more, to mentor students who will be coming up behind me. I want to stay in contact with GEMS, to come back and work with CREOL. Anything I can do to help the photonics community, I would love to do that.”



Peeples, pictured here at her first conference, is clear on the importance of mentorship: “Extending a helping hand and being a support system to other people, that's really important to me.”

“

“It's an honor to get a scholarship related to photonics from SPIE,” says Peeples. “Receiving it gave me pride in myself and made me realize what an amazing community we have. It inspired me in many ways and pushed me to want to do more within photonics.”



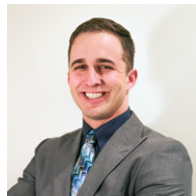
SPIE NAMED AND SPONSORED SCHOLARSHIPS



Matthew Werneken, of Columbia University, USA, received the **D.J. Lovell Scholarship**, the Society's largest named scholarship. The scholarship honors the memory of longtime SPIE Member D. J. Lovell who authored the book *Optical Anecdotes* for SPIE Press. Funded by SPIE, this scholarship recognizes the recipient's top ranking among the group of SPIE named scholarship recipients.



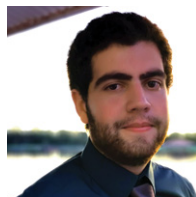
Esther Lin, of the University of Toronto, Canada, received the **Optical Design and Engineering Scholarship**. The scholarship, which honors well-respected members of the SPIE technical community Bill Price and Warren Smith and is funded by SPIE and the Price Fund, supports a full-time undergraduate or graduate student in optical design and engineering.



Luke Colberg, of Montana State University, USA, received the **Laser Technology, Engineering, and Applications Scholarship**. Funded by SPIE and by the officers, directors, and members of the Forum for Military Applications of Directed Energy (F-MADE), this scholarship recognizes the student's scholarly achievement in laser technology, engineering, or applications.



Haiqiu Yang, of Columbia University, USA, received the **Joe and Agnete Yaver Memorial Scholarship**. The scholarship, funded by SPIE and community donors, honors the contributions and vision of the Yavers who were instrumental to the success of the Society. It supports SPIE Members and staff pursuing further education that facilitates the advancement and application of optics and photonics research and technology.



Pedro Ornelas, of the University of the Witwatersrand, South Africa, received the **John Kiel Scholarship**. The scholarship honors SPIE Founding Member John Kiel and his longstanding and significant contributions to the Society. This scholarship is funded by SPIE and recognizes the student's potential for long-term contribution to the fields of optics and optical engineering.



Kayley Waltz, of Johns Hopkins University, USA, received the **BACUS Scholarship**. The scholarship is sponsored by BACUS, the Photomask International Technical Group of SPIE, and supports students who are pursuing work in photomask- and microlithography-manufacturing for the semiconductor industry.



Guzel Musina, of the University of Houston, USA, received the **Teddi Laurin Scholarship**. The scholarship raises awareness of optics and photonics and fosters growth in the industry by supporting photonics students. Funded by SPIE and Photonics Media, it honors the memory of Laurin Publishing and Photonics Media founder Teddi Laurin.

SPIE-Managed Scholarship



Sherry Yi-Ting Feng, of the University of Rochester, USA, received the **Michael Kidger Memorial Scholarship in Optical Design**. The scholarship, funded by the Kidger Family, supports a student engaged in optical design, including lens design, illumination design, and computational optical design.



The SPIE D.J. Lovell Scholarship was an invaluable vote of confidence in my research potential and affirmed my career goals in optical instrumentation development. The scholarship took financial pressure off of my senior year and encouraged me to utilize SPIE's incredible network to identify and connect with potential graduate advisors. This was the best decision I made in my applications!"

Matthew Werneken

United States, D.J. Lovell Scholarship recipient.



I am incredibly thankful to have received the Teddi Laurin Scholarship. As a graduate student and a new mom, balancing my academic responsibilities with caring for my child has been challenging. This scholarship has made a significant impact by allowing me to purchase a computer and essential books, which have enabled me to continue my studies in optics and photonics without compromising my ability to stay productive. It has truly been a tremendous help in this important phase of my academic journey. Thank you for your generous support!"

Guzel Musina

United States, Teddi Laurin Scholarship recipient.

SPIE OPTICS AND PHOTONICS SCHOLARSHIP RECIPIENTS

Wihan Adi

Univ. of Wisconsin-Madison (United States)

Gabryella Baldaci

Univ. of Central Florida (United States)

Soumyabrata Banik

Univ. of St. Andrews (United Kingdom)

Swati Bhargava

CREOL, The College of Optics and Photonics, Univ. of Central Florida (United States)

Mónica Canabal-Carbia

Univ. Autònoma de Barcelona (Spain)

Hyesuk Chae

Yonsei Univ. (South Korea)

Vsevolod Cheburkanov

Texas A&M Univ. (United States)

Bohua Deng

Tsinghua Univ. (China)

Anand Dev Ranjan

Indian Institute of Science Education and Research Kolkata (India)

Henry Donaldson

Univ. of Rochester (United States)

Armand Duvenage

Univ. of Pretoria (South Africa)

Ana Elizabeth Espinosa-Mómox

The Univ. of North Carolina at Charlotte (United States)

Md Omar Faruque

McGill Univ. (Canada)

Carlos Miguel Garcia Rosas

Institut National de la Recherche Scientifique (Canada)

Giulia Guarda

Istituto Nazionale di Ottica (Italy)

Alexis Guidi

The Univ. of British Columbia (Canada)

Joseph Haefner

CREOL, The College of Optics and Photonics, Univ. of Central Florida (United States)

Manchen Hu

Stanford Univ. (United States)

Matthias Jenne

The Univ. of British Columbia Okanagan (Canada)

Jurim Jeon

Pusan National Univ. (South Korea)

Daniel Kermany

Texas A&M Univ. (United States)

Yewon Kim

Yonsei Univ. (South Korea)

Fedor Kovalev

The Australian National Univ. (Australia)

Gokul Krishnan

Univ. of Connecticut (India)

Wiktor Krokosz

Univ. of Warsaw (Poland)

Jason Lau

Univ. of Rochester (United States)

Jaekwon Lee

Univ. of Illinois Urbana-Champaign (United States)

Jing Li

Peking Univ. (China)

Shiyu Li

The Univ. of Southern California (United States)

Fangyu Liu

Tsinghua Univ. (China)

Tomás Lloret López

Univ. of Alicante (Spain)

Olivia Long

Stanford Univ. (United States)

Maria Josef Lopera Acosta

Vrije Univ. Brussel (Belgium)

Chuan Luo

Wyant College of Optical Sciences (United States)

Anne Lynch

Oak Park and River Forest High School (United States)

Md Mahadi Masnad

Institut National de la Recherche Scientifique (Canada)

Diana Paulina Moreno Miranda

Univ. de Guanajuato (Mexico)

Hugo Abel Moreno-Rodriguez

Tecnológico de Monterrey (Mexico)

Jeeban Kumar Nayak

Indian Institute of Science Education and Research Kolkata (India)

Bartosz Niewelt

Univ. of Warsaw (Poland)

Daniel Nwatu

Helmut-Schmidt Univ. (Germany)

Daniella Lúmara Peres

Univ. of Sao Paulo (Brazil)

Matthew Peters

Univ. of Victoria (Canada)

Vinícius Pereira Pinto

Univ. de São Paulo (Brazil)

Felipe Maia Prado

Univ. de São Paulo (Brazil)

Sirasit Prayotamornkul

Univ. of California, San Diego (United States)

Enrico Maria Renzi

The Graduate Ctr., CUNY (United States)

Awnik Roy

The Miami Valley School (United States)

Nihar Ranjan Sahoo

Indian Institute of Technology Bombay (India)

Shant Sargsyan

Yerevan State Univ. (Armenia)

Benjamin Schreyer

Univ. of Maryland (United States)

Steve Shea

Montana State Univ. (United States)

Caitlin Smith

The Univ. of Auckland (New Zealand)

Angela Soria Garcia

Univ. Complutense de Madrid (Spain)

Emiliano Staffoli

Univ. degli Studi di Trento (Italy)

Maria Stepanova

Univ. of California, Irvine (United States)

Heberley Tobón Maya

Univ. Jaume I (Spain)

Wan-Pin Tsai

National Taiwan Univ. of Science and Technology (Taiwan)

Sean Worthington

The Univ. of British Columbia Okanagan (Canada)

Qi Wu

Shanghai Jiao Tong Univ. (China)

Keishi Yang

Osaka Univ. (Japan)

Raymond Yu

The Univ. of Southern California (United States)

Samuel Ignacio Zapata-Valencia

Univ. Jaume I (Spain)

Jinsong Zhang

McGill Univ. (Canada)

Haowen Zhou

Caltech (United States)



“

The SPIE scholarship has enabled me to pursue my PhD without financial burden, enhancing my ability to contribute significant advancements in photonic technologies.”

Manchen Hu,
PhD student, United States.

“

Having the peace of mind that my tuition is covered and that I have access to high-quality tools significantly impacts the way I conduct research and learn. This was made possible thanks to SPIE and its Optics and Photonics Education Scholarship. I am truly grateful!”

Maria Josef Lopera Acosta
PhD student, Belgium.

“

The SPIE Scholarship has been pivotal in advancing my studies in optics and photonics, allowing me to invest in academic and professional development, explore new learning opportunities, and foster personal growth. Receiving this award motivates me to continue pursuing the goal of conducting community-oriented science.”

Vinícius Pereira Pinto
MSc student, Brazil.



Critical science: A collaborative approach

A CANNY ABILITY TO NAVIGATE THE OPTICS-AND-PHOTONICS ECOSYSTEM — AND A TOUCH OF SERENDIPITY — HAVE LANDED DR. AKHIL KALLEPALLI IN RESEARCH HEAVEN



Akhil Kallepalli, middle, with three of his students, left to right: Sankhonil Mukhopadhyay, Fraser Eadie, and Renata Loberto. SPIE Fellow Caroline Boudoux, a professor at Polytechnique Montréal on a visit to Kallepalli and his team, is at the far right.

When Dr. Akhil Kallepalli — then a postdoctoral researcher in Professor Miles Padgett’s Optics Group at the University of Glasgow — decided to pursue research time in Professor Andrew Forbes’ Structured Light Laboratory at the University of Witwatersrand in 2023, he turned to the SPIE Early Career Researcher Accelerator Fund in Quantum Photonics. Simultaneously, Kallepalli applied for extra funding from the Scottish Universities Physics Alliance (SUPA). “I told both organizations what I was doing,” he says, “and the SPIE application supported my request for the SUPA travel grant. The SUPA travel grant, serendipitously, was assessed by my current head of department at the University of Strathclyde; he saw my CV and reached out to invite me to apply as a Chancellor’s Fellow in Strathclyde’s Department of Biomedical Engineering.” That role, which Kallepalli took on just over a year ago, offers reduced teaching responsibilities to allow for research, as well as fast-tracking Kallepalli from an assistant to associate professor. At Strathclyde, he also heads up his own lab of graduate students whose work focuses on clinical translation of classical and quantum optics. “So applying for the SPIE award led me not just to a productive relationship with Andrew,” notes Kallepalli, “but to my current position as well.”

Kallepalli always knew he wanted to be an academic in optics: “I did satellite-based image analysis for my bachelor’s, airborne hyperspectral imaging for my master’s, biophotonics for my PhD, and fundamental physics for my postdoc.” In 2020, he had recently returned from Photonics West when he started working with Padgett. “I focused on biophotonics and biomedical optics as they related to Miles’ interest in general and quantum optics,” he says. “I also knew that Miles had wonderful relationships with colleagues all over the world, and the nexus of clinical translation — my particular interest — of classical and quantum optics — Miles’ and Andrew’s areas of expertise — is something that really stood out to me. Naturally, I gravitated towards Andrew Forbes.” Today, Kallepalli’s time in Forbes’ Structured Light Lab continues to generate ongoing collaborations.

“Collaborations are invaluable,” says Kallepalli. “I learned early in my career that most innovations happen at the nexus of two research fields. If you’re able to find solutions to problems in a novel way, you’ve got a very, very good balance there that you can play with. The collaborations that Andrew and I established during my time at his lab are ongoing: We’re trying to understand how quantum imaging can find a place in biomedical diagnostics. I plan to send a couple of my PhD students to his group next year, and he’s hoping to have a couple of his PhD students visit my group. I love to find ways of overlapping our areas of research so both of us can work on individual problems but solve something we couldn’t do just by ourselves.”

By the end of this year, Kallepalli will have five PhD students in his lab whose projects encompass Fourier ptychography microscopy for malaria imaging; leveraging 3D-printing to create microscopy hardware; exploring functional near-infrared spectroscopy for brain imaging; understanding glioblastoma tumors’ microenvironment; and pursuing the project with Forbes, which looks at the interaction of biological tissue with single photons. “What we are trying to do is understand how light interacts with biological tissue and where it can best be applied,” says Kallepalli of his team’s focus. “These explorations are based on collaborations, connections, and professional networks, and we take those tools to different people’s labs, so the projects are quite diverse. In my team, each individual student has about a 10% overlap with the others, so we’re perpetuating a culture of collaboration. If everybody’s project has an overlap, they naturally work together.”

That sense of creating a collaborative environment, mentoring young researchers, and facilitating connections is a role that Kallepalli embraces. “Miles mentioned to me a long time ago that the people you end up working with are almost more important than the problem you’re trying to solve, because if the people are fantastic and the culture is great, you will solve any problem as best as is possible.”

Kallepalli’s recently returned from a visit with Professor Joseph Culver’s group at Washington University in St. Louis, interested in what innovations might be possible to improve the depth resolution of the functional infrared-spectroscopy systems that that group specializes in. (Notably, Culver’s lab includes 2025 SPIE-Franz Hillenkamp Postdoctoral Fellow Morgan Fogarty). There will be follow-up trips, alongside the PhD student who is part of the collaboration between Kallepalli and Culver’s teams: “We want to build a functional near-infrared spectroscopy system at Strathclyde to study the rehabilitation process of stroke patients.” And, per his MO, Kallepalli wants to ensure emerging researchers are involved and engaged.

“My students all do outreach,” he says. “They submit conference papers. My first PhD student just got a grant to attend a conference in Manchester. He went to the SPIE Biophotonics Summer School this year, and he’ll spend two months in South Africa next year working with my colleague Professor Pieter Neethling at Stellenbosch University. I met Pieter on a visit to Stellenbosch in 2023 and had a wonderful time engaging with him; now he’s going to host one of my students, and one of his students is going to visit my lab in exchange.” Kallepalli pauses, but only for a moment. “It is my responsibility to make these opportunities available to the students,” he says, “to make the right opportunity for the right student available at the right time, and to provide opportunities for my students that allow them to have the best possible experience.”

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It is my responsibility to make these opportunities available to the students.”

A lasting impact with a multiplying effect

KRISTEN MAITLAND ENJOYS A CAREER STEEPED IN NETWORKING, ENGAGEMENT, AND PROFESSIONAL DEVELOPMENT

If anyone has had their optics-focused career marked by ongoing engagement with SPIE, it's Kristen Maitland.

As an electrical engineering undergraduate at California Polytechnic State University at San Luis Obispo, Maitland became an SPIE Student Member when a professor encouraged her to join the Society. "I was a Student Member on the Membership & Communities Committee which connected me early on to SPIE leadership and staff," she says. "All of these academics and industry professionals were so wonderful and welcoming, helping me build a career-focused network from that early stage." She applied for SPIE scholarships, becoming a recipient in 2003, 2004, and 2005. Those awards didn't just help cover her education, they provided a less visible boost: "It felt like an honor to be selected for these recognitions," notes Maitland. "It felt like a vote of confidence in my professional capability."

The support she received from SPIE proved inspirational. Maitland founded an SPIE Student Chapter at the University of Texas, Austin, where she attended graduate school for biomedical engineering; she was also a faculty sponsor to the SPIE Student Chapter at Texas A&M University, where she worked from 2008 to 2022 as an associate professor of biomedical engineering and director of the university's Microscopy and Imaging Center. "I really felt like SPIE chapters were a great opportunity for students to connect around their academic interests," says Maitland. "I'd had such positive experiences with student chapters myself, and, by then, I was an advocate for SPIE."

Maitland, now a senior program manager in imaging with the Chan Zuckerberg Initiative, has been an SPIE Fellow since 2018. She sat on the SPIE Board of Directors from 2017 to 2020, and has contributed to the Society's Engagement, Scholarship, Symposia, Education & Outreach, Strategic Planning, Nominating & Leadership Development, and Conference Program committees, among other SPIE-related activities.

"SPIE really stands out with its conferences," says Maitland. "They are top-notch, offering amazing experiences and opportunities for attendees to learn about what's going on in the field and to make professional, in-person connections." (In a career-trajectory move demonstrating one of the pinnacles of networking successes, Maitland, together with her husband, was originally recruited to Texas A&M at an SPIE conference). Another thing SPIE does well, she says, is connecting academic research with industry and developing technologies: "It's great for students in particular because they can come in with that academic-research focus, and, through SPIE, they get exposed to opportunities in industry and are able to pursue those opportunities. SPIE is great at helping them transition from a student into an industry professional."

Her appreciation for that level of networking and connectivity that SPIE facilitates grew partly from Maitland's experience 20 years ago at the Ven Biophotonics Graduate Summer School, a program which this year was run by SPIE.

"That program is so focused on the students, starting off their careers, interacting with leaders in the field," she says. "There are technical presentations, but the greatest benefit is the social interactions. Those really helped me in terms of my career, because I grew professionally with this innate network of colleagues who knew me from my student years. They looked out for me and advocated for me." That kind of networking opportunity, she says, is key: "It's not just about presenting your research,



Maitland, center, working in the lab with one of her last PhD students, Cyril Soliman, right, and then-undergraduate researcher Beatriz Lara, left, in 2019.

but about the personal connections you make. As a doctoral student, I would spend my own money to attend SPIE conferences, because I understood that interacting with others was critical to growing my career."

That career has always focused on biomedical optics. At Texas A&M, Maitland developed light-based technologies for biomedical applications, building optical-imaging systems whose applications included early cancer detection, tuberculosis detection, and cell-culture monitoring. "I love working on lots of different things," Maitland explains. "Whenever a new researcher said, 'I wish I could do this,' I would say, 'Well, I think we can build something for that!'" That breadth of interest generated a diversity of skills among Maitland's students in her lab: "They grew as systems engineers, with computational abilities as well as knowledge of tool development and instrumentation, imaging a variety of human and animal cells. It was a lot of fun."

When the Chan Zuckerberg Initiative (CZI) opportunity arose, Maitland decided to pursue her love of biomedical optics in a role that allows her to support the imaging community more broadly. "CZI's mission is to support the science and technology that would enable us to cure, prevent, and manage disease by the end of this century," explains Maitland. "One thing we do, by supporting interdisciplinary collaborations on a global level, is develop novel imaging technologies that can map, measure, and model complex biological systems. I help define that strategy and fund imaging-systems research. For me, it's a refreshing new view on science, and I'm learning a lot."

It's a level of enjoyable professional learning that, Maitland maintains, got its early start with SPIE. "SPIE does so much, from funding students and international outreach programs to connecting like-minded optics professionals across the globe," says Maitland. "It's been a wonderful part of my career development."

“

It felt like an honor to be selected for these recognitions," notes Maitland. "It felt like a vote of confidence in my professional capability.”

STUDENT CONFERENCE SUPPORT

SPIE provides travel grants and registration fee waivers to assist Student Members to attend SPIE conferences. The program encourages students to present their work and engage with the broader optics and photonics community. It aims to make student conference participation more accessible and open doors to professional growth and networking. In 2024 396 Student Members received support to attend and present their research at 11 SPIE symposia.



Attending and presenting at Optics + Photonics had a tremendous impact on advancing my education and career aspirations. The networking opportunities were invaluable, providing a broader perspective on optics and photonics, and allowing me to engage with diverse research in the field.”

Abdul Rehman
PhD student, United States,
attended SPIE Optics + Photonics.



Presenting my PhD work allowed for invaluable discussions with peers, while also affording me the opportunity to attend captivating presentations across various sections of the conference. Interacting with esteemed professors, researchers, and industry professionals enriched my understanding and network. Witnessing cutting-edge innovations from industry further heightened the experience.”

Sandra Pozzer
PhD student, Canada,
attended SPIE Defense + Commercial Sensing.



This afforded me the opportunity to make connections with an experienced scientist in my field, resulting in me being invited to present at an upcoming NASA meeting.”

Emily Farr
PhD student, United States,
attended SPIE Astronomical
Telescopes + Instrumentation.



My talk was the last one of the conference – and my first talk at SPIE! – and I was nervous. Afterwards, people came up to me whose talks I had listened to and learned from throughout the week, and we excitedly discussed deformable registration until staff members started putting away chairs. It was so exciting to feel included in the SPIE community, and like I could really contribute something to the field of medical imaging.”

Grace Minesinger
PhD student, United States,
attended SPIE Medical Imaging.



At Photonics Europe, I had the opportunity to present my poster during the session. While presenting, I also had the chance to network and get acquainted with new colleagues, opening up possibilities for future collaborations.”

Sargis Gavalajyan
MSc student, Armenia,
attended SPIE Photonics Europe.



OUTREACH GRANTS PROGRAM

In 2024, SPIE Outreach Grant recipients carried out a variety of engaging optics and photonics-related educational initiatives around the world. In Madagascar, a Science Open Day focused on optics-themed activities. Australia hosted a series of informative sessions on photonics technologies and careers, aligned with the International Day of Light. In Pakistan, a program helped bridge gaps in optics education.

These projects were among 14 winning proposals supported by SPIE. A diverse mix of not-for-profits, student chapters, cultural centers, and industry networks reached audiences ranging from elementary school students to the general public. The SPIE Outreach Grants, awarded annually, funded events and activities that promoted awareness of light-based technologies, including classroom kits, community displays, and interactive multi-day experiences.

Initiated by SPIE Members — including students, professionals, and retirees — the grants fostered collaboration with universities, science centers, schools, youth clubs, and international societies. One standout project in the U.S. featured an immersive escape room for high-school students, developed in partnership with the Optical Microscopy in Medicine Lab at the Morgridge Institute for Research. It combined optical-metabolic imaging with teamwork and problem-solving.

In Mexico, the Universidad de Guanajuato hosted a two-day celebration of the International Day of Light, offering workshops, lab tours, educational games, and solar observation paired with a night astronomy camp. In South Africa, the Postgraduate Student Society and Stellenbosch Laser Student Chapter continued their annual physics outreach road trip, which had been running since 2009. The SPIE-funded initiative aimed to inspire high-school students from diverse backgrounds to pursue careers in physics and science.

These global efforts demonstrated SPIE’s commitment to making optics and photonics accessible, engaging, and inspiring for learners of all ages.

Stellenbosch Laser
Student Chapter
during their physics
outreach road trip.



Student conference support recipient presenting her research at SPIE Medical Imaging.

Optics with impact

SPIE-SUPPORTED ICTP OPTICS LAB AND ITS ASSOCIATED PROGRAMS HAVE FAR-REACHING IMPACT

As part of his role within the Science, Technology and Innovation Unit and its Multidisciplinary Laboratory (Mlab) at the Trieste-based Abdus Salam International Centre for Theoretical Physics (ICTP), Post-Doctoral Fellow Humberto Cabrera Morales runs optics experiments, and, in conjunction with ICTP Emeritus Scientist Joe Niemela, supervises master's and doctoral students from around the developing world. Then, encompassing a professional goal critical to the career trajectories of the young researchers, Cabrera Morales works with the students to publish their work in high-level academic journals.

The wide-ranging and far-reaching impact that this collaborative work has across the world, shines in its details: In 2024, Cabrera Morales led hands-on training of five students from Pakistan and Tunisia; organized eight major outreach and conference activities locally and abroad; collaborated with his students to publish 24 journal papers; and helped two of his students start their own labs in their home countries of Togo and Pakistan. "The students come here with energy, with good ideas, and we work hard together," says Cabrera Morales. "We have been very successful because we combine our skills and our knowledge."

The lab itself, a key element of the SPIE-ICTP Anchor Research Program in Optics, stems from a suggestion he made to current ICTP Emeritus Scientist Joe Niemela in 2011, when Cabrera Morales was a post-doctoral student in Venezuela as well as a regular participant at the ICTP's Winter College. "Joe mentioned that SPIE was supporting an optics project here at the ICTP, a core research program in optics, but we didn't have an on-campus laboratory," says Cabrera Morales. "So I proposed to him to start an optics lab with low-cost devices, something I was already doing in Venezuela. I was publishing papers, I was training students, and I suggested to Joe that we could replicate this at the ICTP."

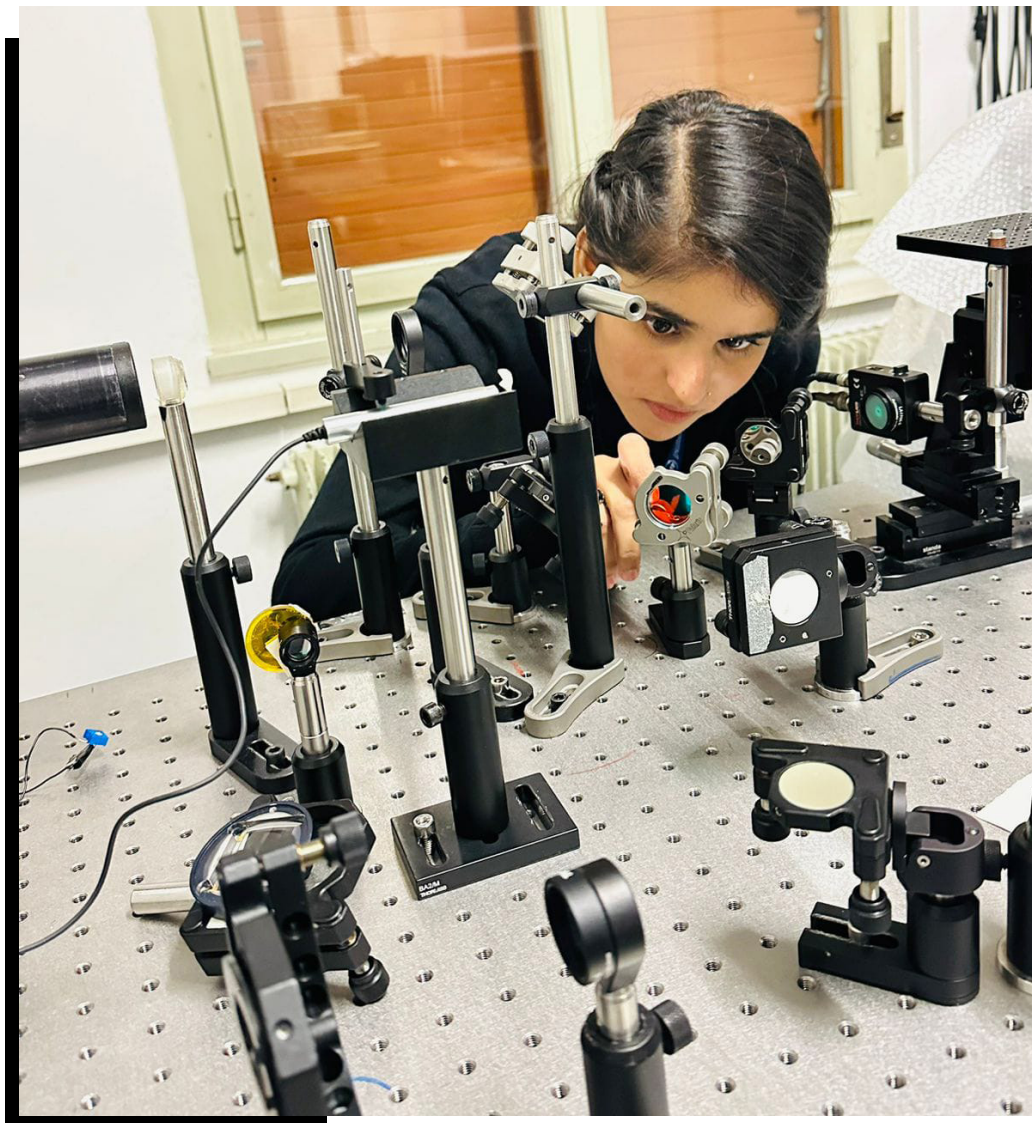
The optics lab was established in 2014, partially with funds from SPIE, and the organization continues to contribute financial support towards Cabrera Morales' staff position, with fellowships for developing country scientists mainly coming through ICTP programs. The official lab mission is to enable early-career scientists in their career-development paths, to provide advanced training to exceptional graduate students, and to serve the local community in outreach activities that can involve young researchers from developing countries as facilitators. It's clear that Cabrera Morales is achieving this and more: during our online chat, his enthusiasm was infectious, and his obvious pride in his students' achievements was inspiring.

Last year, for example, he worked with a visiting student, Isma Javed, the current president of the SPIE Student Chapter at Pakistan's Information Technology University in Lahore. The lab had previously implemented various optical-spectroscopy and microscopy-detection systems for biosensing applications: "We primarily investigated photocatalytic degradation of pollutants in the environment; the separation and detection of biomolecules using electrophoresis and thermal lensing as a detection system; and also explored materials characterization using thermal-length spectroscopy and beam-deflection spectroscopy," Cabrera Morales explains.

"Isma arrived with no prior hands-on experience in optical setups," notes Cabrera Morales. "Together, we decided to go ahead with a low-cost, 3D-printed inverted microscope based on a Fresnel Biprism, a fully automatic device. This is a novelty with applications in biology, because for biological samples you need to have an inverted microscope." Javed, says Cabrera Morales, is a great example of the impact of the lab-related programs: in a year and a half, she gained experimental experience, enhanced her expertise in optics, developed an accessible, market-ready device, and published several journal articles relating to

her work. She also taught at ICTP's Winter College last year as well as at an ICTP-run program in Kenya, and helped to organize a major outreach activity in Trieste. "These are all good things we can do," he says. "And two of the most important things we can offer these students is giving them access to experimental setups and facilities that they don't have in their home countries, along with a professional scientific environment for them to work in." Thanks to her time with MLab, Javed was able to complete the experimental aspect of her doctoral work at ICTP.

"You can see how happy the students are when they arrive here," says Cabrera Morales, whose research focus includes optical interferometry, microscopy imaging, and photothermal and laser-based spectrometry among other areas. "This motivates me to do my best that I can for them, with them. And then" — best of all, really, in terms of the lab's ongoing collaborative impact — "once they leave for their own labs or on to universities, we remain colleagues."



Isma Javed, in the ICTP's Mlab, aligning experimental photothermal spectroscopy technology.

“

Two of the most important things we can offer these students is giving them access to experimental setups and facilities that they don't have in their home countries, along with a professional scientific environment for them to work in.”

A multi-spectral green thumb for optics, plants, and outreach

AT THE UNIVERSITY OF GUANAJUATO, DIANA MORENO APPLIES OPTICS TO AGRICULTURE AS WELL AS REVELING IN HER SPIE STUDENT CHAPTER ACTIVITIES

Diana Moreno, currently completing her master's at the University of Guanajuato, is immersed in the growing field of agriphotonics, applying optics and photonics to improve our approach to agriculture. In part, her research aims to reduce the use of pesticides and optimize the use of fertilizers for plant growth, while assessing the plants' nutritional condition and dehydration. "This work contributes to more efficient water use, especially given the global scarcity of water for crops," says Moreno. "It also addresses issues of the overuse of fertilizers and pesticides which contaminate the soil."

Moreno and her colleagues' research also includes using noninvasive, versatile methods for early diagnosis of plant diseases. For her master's thesis, Determination of Plant Health via Spectroscopic Analysis of Leaf Cuticle, Moreno is using spectrometers, lenses, lasers, and mirrors to collect data for numerical analysis. "We obtain a range of spectra that we then differentiate and classify between visually healthy and diseased plants," she says. "We are using software to make these distinctions and, in the future, hope to predict and better detect these diseases." They also plan to incorporate emerging technologies such as artificial intelligence and image analysis, as well as other relevant technological elements: "We do not yet have hyperspectral and multispectral cameras, so we will have to wait to implement these technologies."

"In the future, I plan to use optics to evaluate soils, to identify those best suited for growing certain types of plants and to improve crop productivity, creating a basis for better decision-making," explains Moreno. "I'd like to develop a comprehensive approach where optics and photonics optimize and enhance current agricultural practices."

Moreno is garnering recognition for her optics and photonics work, in both research and outreach. This year, she is the recipient of an SPIE Optics and Photonics Scholarship; in addition, the OASIS University of Guanajuato SPIE Student Chapter received the 2024 Presidential Award for Outstanding Student Chapter for its 2023 work — the year that Moreno was chapter president.

On the cusp of starting her PhD, Moreno will be using the scholarship funds to cover the transition from completing her master's degree in electrical

engineering with a focus on optoelectronics, to initiating her doctoral studies. But, for Moreno, this scholarship means more to her than just financial support. "The SPIE scholarship adds value to my academic and professional credentials because being recognized by such an important society speaks highly of my talent to others in these fields of study," she notes. "It's a great acknowledgment for those of us who want to become researchers and



The OASIS University of Guanajuato SPIE Student Chapter received the 2024 Presidential Award for Outstanding Student Chapter for its 2023 work, the year that Moreno was chapter president.

contribute to the evolution of science, especially in my country where there are not many people working in scientific fields, and even fewer women. When people, especially women, learn that I received an SPIE scholarship, they start to feel encouraged, and it becomes a great source of motivation."

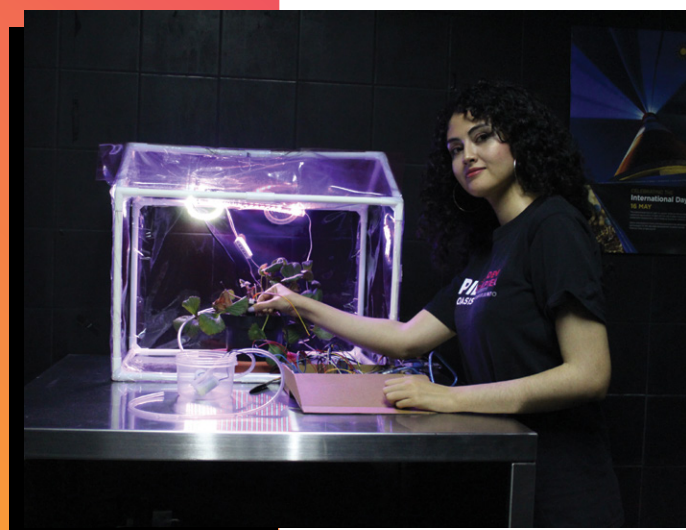
That Presidential Award for Outstanding Student Chapter honors a team effort, one in which Moreno held the primary leadership role. Her chapter received this award in recognition for their work in founding an astronomy club; orchestrating creative activities that combined outreach, technical knowledge, and professional development; and initiating the Optics and Photonics for Applications conference, which brought together students and senior investigators. "I'm particularly proud of having created the astronomy club," she says. "It now serves both my university and the people of my small city, and it's the first club of its kind on our campus. In addition to that, we organized our first scientific congress, went on group trips, engaged in science outreach, and developed interactive games. We also cared for our physical environment by tending to the university garden, a desert-climate garden created by the chapter. I can honestly say that being an SPIE Student Chapter president pushes you more than you ever expected because you feel the responsibility to leave a lasting impact for those who will follow. That is my greatest pride knowing that I did it well."

Moreno, who initially fell for optics during a semiconductor physics class, is looking forward to sharing her excitement for and knowledge of optics and photonics with others. After completing her own master's, she plans to form a team of undergraduate and master's students who will work together with her in applying optics and photonics to agricultural-focused research. Another goal, further down the line, is to establish a company that trains experts in the agriphotonics field.

In the meantime, she plans to explore "all possible alternatives" where optics and photonics can replace traditional methods for conducting observations, measurements, and treatments in the field of agriculture. "At the moment, we are focused on improving the efficiency of disease detection," says Moreno, "but we won't stop there. Although we are aware of the limited resources in our country for the study of optics and photonics, I am fully committed to advancing this field."



When people, especially women, learn that I received an SPIE scholarship, they start to feel encouraged, and it becomes a great source of motivation."



In the lab, Moreno uses LED and ultraviolet lamps and an automatic watering system, nurturing plants for future analysis.

EMPOWERING FUTURE INNOVATORS

THE SPIE STUDENT CHAPTER PROGRAM

The SPIE Student Chapter Program is a global initiative designed to foster academic growth, professional development, and community engagement among students in optics and photonics. Through annual activity grants and structured support, SPIE enables student-led chapters to organize impactful events, collaborate with industry, and inspire the next generation of scientists and engineers. Student Chapter Members are provided with opportunities to strengthen leadership, communication, and networking skills for career advancement.

In 2024 156 Student Chapters received funding for their activities and events, ranging from student-led technical conferences, optics education outreach, and career panels, to leadership skills workshops, and lectures from experts in the field.

With over 300 Student Chapters worldwide and nearly 5,000 SPIE Student Members, SPIE's global chapter network play an instrumental role in moving the study of optics and photonics forward. Chapter members collaborate with colleagues, mentor younger students, connect with industry, and perform outreach in the community to pave the way for future advances in light-based technologies.



Charles University Student Chapter "Physics into your own hands" outreach event.

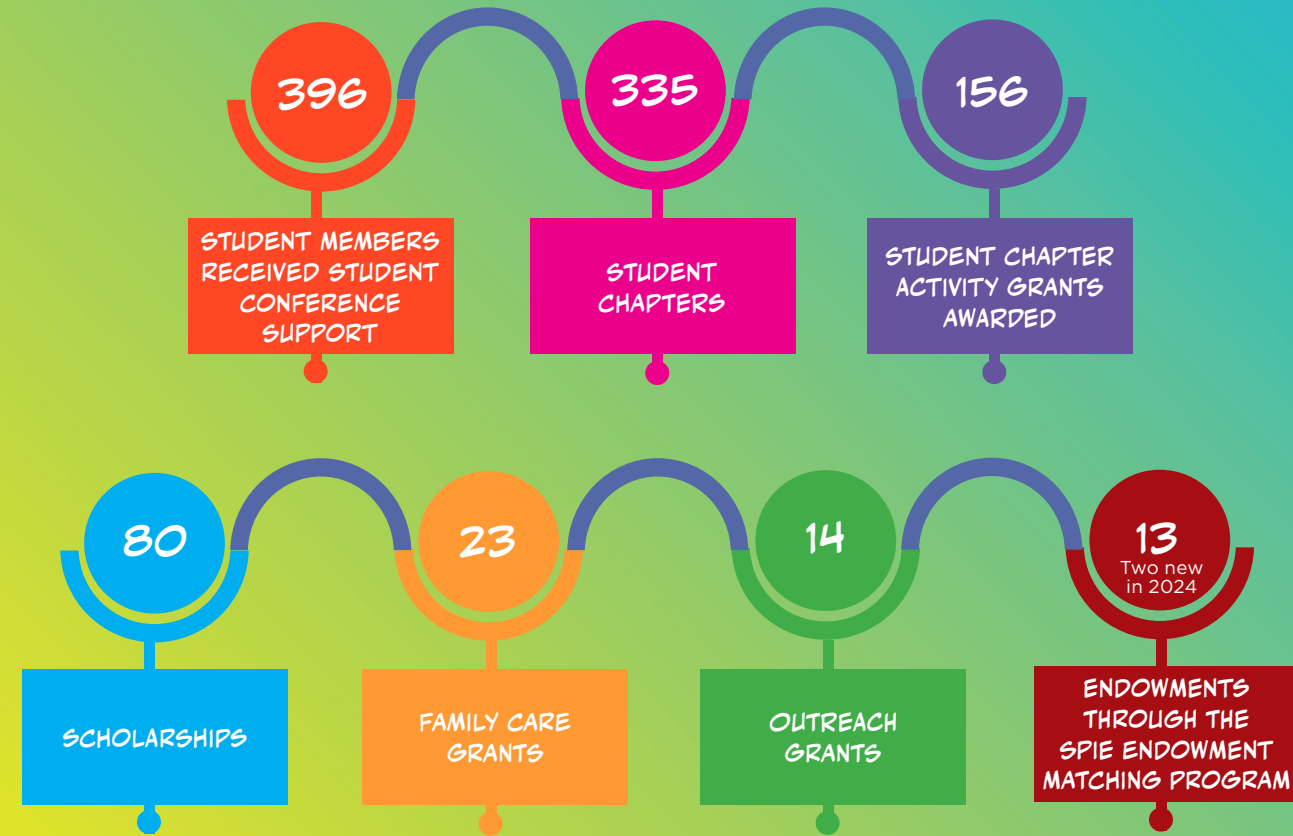


University of Guanajuato SPIE Student Chapter Member at the Annual Awards Banquet with SPIE President, Jennifer Barton.

Guanajuato, Mexico, was awarded the 2024 Presidential Award for Outstanding Student Chapter. 2024 SPIE President Jennifer Barton reported that the chapter stood out because of its exceptional accomplishments in 2023, including founding an astronomy club inside the SPIE chapter to broaden reach and increase membership; orchestrating many creative activities that combine outreach, technical knowledge, and professional development; and initiating the Optics and Photonics for Applications conference, which brought together students and accomplished senior investigators. She noted, "Their enthusiasm for SPIE and all things optics shines in the Annual Report — in both words and pictures."

\$6.4 MILLION IN TOTAL COMMUNITY SUPPORT IN 2024

\$338,000 AWARDED IN SCHOLARSHIPS



THE POWER OF SUPPORT HOW SPIE SHAPES CAREERS AND COMMUNITIES



SPIE.

SPIE International Headquarters
PO Box 10
Bellingham, WA 98227-0010 USA
Tel: +1 888 504 8171
customerservice@spie.org / SPIE.org

SPIE Europe Offices
2 Alexandra Gate
Ffordd Pengam, Cardiff, CF24 2SA UK
Tel: +44 29 2089 4747
info@spieeurope.org / SPIE.org

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