

2023

SPIE
ENDOWMENT
MATCHING
PROGRAM

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SPIE ENDOWMENT MATCHING PROGRAM

The SPIE Endowment Matching Program was established in 2019 to increase international capacity in the teaching and research of optics and photonics. In alignment with the SPIE mission of partnering with researchers, educators, and industry to advance light-based research and technologies, endowment partnerships represent strategic collaboration to nurture and develop future generations of the field.

To date, the program has provided over \$4 million in matching gifts, resulting in more than \$11 million in dedicated funds. This commitment is part of the \$24 million SPIE has contributed in support of the community over the past five years.

The SPIE Endowment Matching Program supports optics and photonics education and the future of the industry by contributing a match of up to \$500,000 per institution with optics and photonics degrees, or with other disciplines allied to the SPIE mission.

2023 HIGHLIGHTS

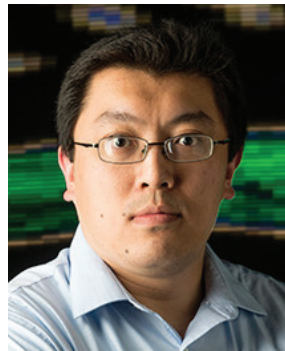


SPIE Graduate Fellow in Optical Sciences and Engineering

University of Rochester's Institute of Optics, United States

Quazi Rushnan Islam, a fourth-year doctoral student at the University of Rochester's Institute of Optics, is the inaugural SPIE Graduate Fellow in Optical Sciences and Engineering at the University of Rochester's Institute of Optics. Islam is working to improve our eyesight through her research on improving contact lenses, interesting work that has the potential to benefit many. The reason why anyone has problems with eyesight, is because light is not falling on the retina correctly; corrective lenses — like any standard optical system — address this by refocusing light rays. This particularly impacts multifocal lenses whose complex shapes of Fresnel patterns cause more frequent blinking and whose edges therefore attract more protein deposits. While the technology of making Fresnel patterns in the material has already been achieved, Islam's research focuses on how to integrate this technology into the manufacturing line to mass-produce better contact lenses.

The fellowship, she says, isn't just a critical milestone in terms of financial support — it's having an impact on a personal level as well. "A PhD is long," says Islam. "It's a marathon. I know I'm doing great work, and I know it's going to help people one day, but sometimes having that external validation really helps. Part of SPIE's vision is to empower students — people like me — who want to learn more about optics. That aspect resonates with what I'm trying to do with science, that I'm trying to learn more about optics." Islam presented aspects of her work at the 2023 SPIE Optics + Photonics.



SPIE Faculty Fellowship in Optics and Photonics

Vanderbilt University, United States

Yuankai "Kenny" Tao, the recipient of the SPIE Faculty Fellowship in Optics and Photonics at Vanderbilt University, developed a new graduate optics elective course, focusing on imaging system design and optimization, which broadens the technical skill set of the graduate trainees, and was able to provide free educational licenses for ZEMAX OpticStudio for his students. Working with the Ansys Academic program and using funds from the fellowship, Dr. Tao was able to also start the project component of the course where the graduate students identify optical systems to design or optimize based on their research needs. The students go through the formal design process of defining specifications, constraints, and merit functions.

Vanderbilt faculty have started to emphasize more consistent undergraduate and graduate-level course offerings in optics and have plans to offer multiple optics-focused electives every semester.

Dr. Tao's group has several ongoing technology development and translational projects focused on ophthalmology, debuting their latest point-of-care ophthalmic imaging prototype at SPIE Photonics West. The system is designed to enable longitudinal monitoring of retinal disease progression in premature infants directly in the neonatal intensive care unit.

Dr. Tao states: "One of the unique benefits of this SPIE Fellowship is the intellectual flexibility it affords to pursue novel research and teaching directions."



SPIE Endowed Chair in Optical Sciences

University of Arizona
Wyant College of
Optical Sciences,
United States

Dr. Matt Eichenfield is the first faculty member at the

University of Arizona to hold the SPIE Endowed Chair in Optical Sciences. Dr. Eichenfield leads the University of Arizona's program to translate advances in quantum materials and devices into high-performance quantum system functionality. His Quantum Nano-phoXonics Laboratory comprises an expanding experimental integrated device group focused on design, fabrication, and testing of chip scale photonic, phononic, and acoustoelectric devices. Their research interests include CMOS compatible photonics, sensors, ultra-scalable photonic circuits for quantum processing, integrated optomechanical devices, acoustoelectric devices, quantum photonic circuits, RF signal processing miniaturization, and quantum memories.

Dr. Eichenfield states that "... SPIE is truly an outstanding institution in the world of optics that does important work in advancing optical technologies and education. I am humbled to have been chosen for this prestigious position, and I will strive to make my work in quantum information sciences and engineering, photonics, and communications technologies positively represent the University of Arizona, Wyant College, and SPIE."

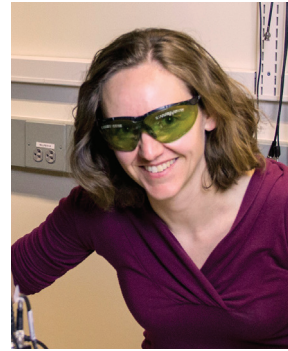
SPIE Early Career Researcher Accelerator Fund in Quantum Photonics

University of Glasgow, United Kingdom

The SPIE Early Career Researcher Accelerator Fund in Quantum Photonics was created by SPIE and the university to support graduate students working in quantum photonics. It encompasses two programs at Glasgow: the SPIE Early Career Researcher in Quantum Photonics Scholarship and the SPIE Global Early Career Research program, the latter promoting international cross-laboratory collaborations between leading quantum-photonics research groups, pairing university early-career researchers with counterparts from external laboratories for six-month-long shared projects.

In 2023, five early-career researchers were supported for cross-laboratory collaboration: Khaled Kassem, University of Glasgow, and Assistant Professor

Shu-Whei, University of Colorado, Boulder, received support for research on laser frequency comb for scan-free HOM; Povilas Jurksaitis, Vilnius University, and Vytautas Zickus, University of Glasgow, received support for research on HOM sensing of fluorescence; and Dr. Akhil Kallepalli, University of Strathclyde, received support for research on machine learning-enhanced quantum imaging for biophotonics.



Baur-SPIE Endowed Chair in Optics and Photonics

JILA (University of Colorado, Boulder and the National Institute of Standards and Technology), United States

The Baur-SPIE Chair in Optics and Photonics has enabled research in the Regal group at JILA on carefully controlled vibrations of micromechanical systems in which quantum features and applications become possible. The research depends on pushing on micro mechanical drums of thin silicon nitride with optical light. The radiation forces can be used to control mechanical objects in analogy to laser cooling of atomic gases. This field is often referred to as quantum optomechanics.

The chair has engaged a broad and collaborative team of graduate students, postdocs, and undergraduate students to consider the most recent concepts in mechanical systems in the quantum regime and ideas in sensing with intricate resonators with engineering acoustic properties.

Recent studies have included control of dissipation in a variety of resonators, which is key to applications in sensing and quantum studies. The team has been studying what happens to the quality factor of resonators with nonuniform mass distribution, and how to understand optomechanical devices under nonuniform temperature profiles, which can easily form at the 100 millikelvin temperatures the researchers operate their mechanical quantum systems.

As a quantum system, mechanical devices are particularly versatile in their capabilities to couple to many degrees of freedom effectively. Hence the team aims to harness the mechanical resonators as transducers between hard to connect quantum systems such as microwave and optical photons. As sensors, the drum-like resonators may find use as uncooled bolometers or in general as force sensors.

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The SPIE-Glebov Family Scholarship

CREOL, University of Central Florida,
United States

The Glebov Family Scholarship is part of several endowed CREOL scholarships that are used as supplements to the UCF graduate fellowships. These fellowships are competitively awarded to our top applicants into the Optics and Photonics PhD program. The supplements are only offered to the highest achieving applicants as a means of ensuring that we remain competitive with respect to the other schools that are also vying for the same applicants. In Spring 2023, the SPIE-Glebov Family scholarship in the amount of \$5,000 per year for four years, was offered to a candidate who subsequently declined the offer of admission. The funds will be used to attract future top PhD applicants in Spring 2024.

The SPIE/UWRF Optics Summer Research Scholars Fund

The University of Wisconsin-River Falls
(UWRF), United States

Joey Schulte, a sophomore Physics major at UWRF, worked on an education-related project in the summer of 2023 as the SPIE/UWRF Summer Optics Research Scholar. A common undergraduate laboratory experience for students in Optics classes is the investigation of the transverse cavity modes in a laser, where the modes can be selected either by placing apertures in the cavity or by adjusting the alignment of the cavity mirrors. Schulte first aligned a Helium-Neon (HeNe) laser cavity using a flat-windowed, un-mirrored tube and two external mirrors, and then used that to experimentally investigate the transverse modes created. He then moved on to try to model the different modes using Synopsys' CODE V software. The goal of the work is to produce an effective teaching tool for students to learn both hands-on techniques along with ray-tracing and electromagnetic wave propagation modeling.

The Soileau Family-SPIE Optics and Photonics Undergraduate Scholarship Fund

CREOL, University of Central Florida,
United States

This scholarship supports undergraduate Photonic Science and Engineering students who are preferably "first generation in college" with unmet financial needs. Four students studying optics as their undergraduate degree received scholarships this year: Car-

los Granja Angulo, Kaila Peebles, Chad Jordan, and Jeremy Goodenough. Awarded students will continue receiving the funding as long as they make successful academic progress and remain in the Photonic Science and Engineering Program.

The SPIE Optics and Photonics Champion Academy

University of Birmingham,
United Kingdom

The SPIE Optics and Photonics Champion Academy supported two cohorts of students in 2023 for a total of 11 students. Champions have been developing podcasts, soundbites, and articles to date, which were launched in September. SPIE supported students have attended 11 events and delivered 14 pieces of content promoting the field of optics and photonics.

SPIE@ICFO Chair for Diversity in Photonic Sciences

Institute of Photonics Sciences (ICFO),
Spain

The SPIE@ICFO Chair for Diversity in Photonic Sciences, a five-year educational funding initiative, was established in 2019 and designed to increase international capacity in the teaching and research of optics and photonics. The award is the first of its kind in Europe and supports the appointment of a Chair at ICFO to leverage the center's activities to further enhance its promotion of diversity, starting with its multiple programs supporting the education and careers of young women from diverse backgrounds with an interest in photonics.

In 2023, SPIE@ICFO Chair awarded six fellowships for the Maria Yzuel Fellowship Awards and organized the following schools:

1. Research Frontiers School: "Photonics with Free Electrons" (5 – 7 July). 70 undergraduate and graduate students (and a few researchers) from 17 countries participated in lectures, talks, poster sessions, and discussions. Five SPIE@ICFO Chair Travel Fellowships and two SPIE@ICFO Chair Research Fellowships were awarded.

2. ICFO-KNUST Research Frontiers School: "Photonic Sciences: Applications and Opportunities" (9 – 13 October) in Kwame Nkrumah University of Science and Technology (KNUST) Ghana. 49 undergraduate and graduate students (and one researcher) participated in seminars, lectures, workshops, and poster sessions with representation from Ghana, Kenya, Rwanda, Nigeria, Finland, and India. One SPIE@ICFO Chair Research Fellowship was awarded.

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3. ICFO-TIFR Hyderabad Research Frontiers School: “Hot Topics in Photonics” (25 – 27 October). 52 undergraduate and graduate students (and a few researchers) participated in workshops on Optical Parametric Oscillators, Ultracold Atoms, CO₂ Mitigation Accelerated by Photons, Structured Light, Nanophotonic Theory, Biophotonics and THz Photonics. One SPIE@ICFO Chair Research Fellowship was awarded.

4. ICFO-UNAM Research Frontiers School: “Photonics in the NanoWorld” (18 – 22 September). 42 undergraduate and graduate students (and one researcher) from three countries participated in talks, seminars, workshops, poster sessions and discussions. Two SPIE@ICFO Chair Research Fellowships were awarded.



ICFO-UNAM Research Frontiers School: “Photonics in the NanoWorld” (18 – 22 September).

ADDITIONAL SPIE MATCHING ENDOWMENT PARTNER

The University of Manchester: The SPIE-Manchester Postgraduate Scholarship in Photonics (established in 2024)

MORE INFORMATION

For more details about the SPIE Endowment Matching Program, visit spie.org/endowment