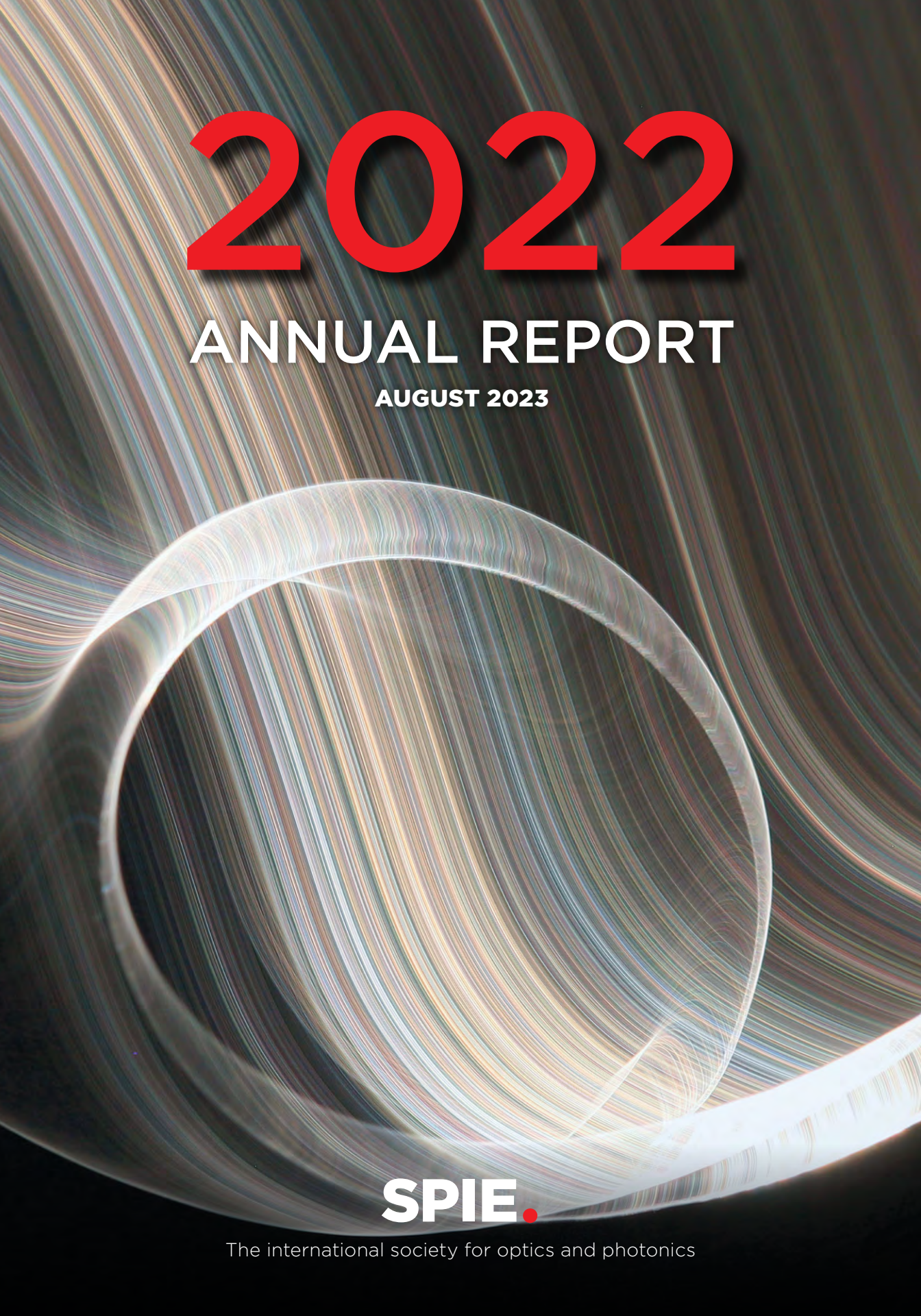

2022

ANNUAL REPORT

AUGUST 2023

SPIE.

The international society for optics and photonics

SPIE Photonics West Exhibition 2022

> It's been wonderful meeting our customers and vendors again in person. It's been fun hearing different perspectives.

– Tallon Rood,
Business Development Manager
Syntec Optics.

Photo credit: ALEX CAO
Art Installation-Human Organs.
2022 International Day of Light photo contest

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TO THE SPIE COMMUNITY

For SPIE, 2022 was a comeback year. The pandemic showed us the importance of what has been the fabric of SPIE for decades: connecting people from similar and diverse areas of optics and photonics by providing opportunities for professional networking and social interactions. The past year showed us that while we do well with small, topically focused virtual meetings, each one of us needs the face-to-face, in-person connections and hallway conversations: this holds true whether we come from industry, academia, or government. SPIE showed itself to be strong, caring, and agile and brought us back to doing what we do best — engaging the optics and photonics community through scientific, technical, and social events.

SPIE is known for its events; however, SPIE gives back to the community in other ways too. The SPIE Digital Library is the single largest repository of optics and photonics information and, as such, your number-one resource when you train and educate future generations of the optics and photonics workforce. And remember that when you publish with SPIE, any revenue generated ultimately goes back to support the community. SPIE spends millions of dollars — nearly $4 million in 2022 alone — through community support and development, including scholarship, awards, endowments, and grants. I am proud to be a part of SPIE and am particularly glad that I was able to give back to the Society and its Members during this past year, especially given the support it has given me over the years.

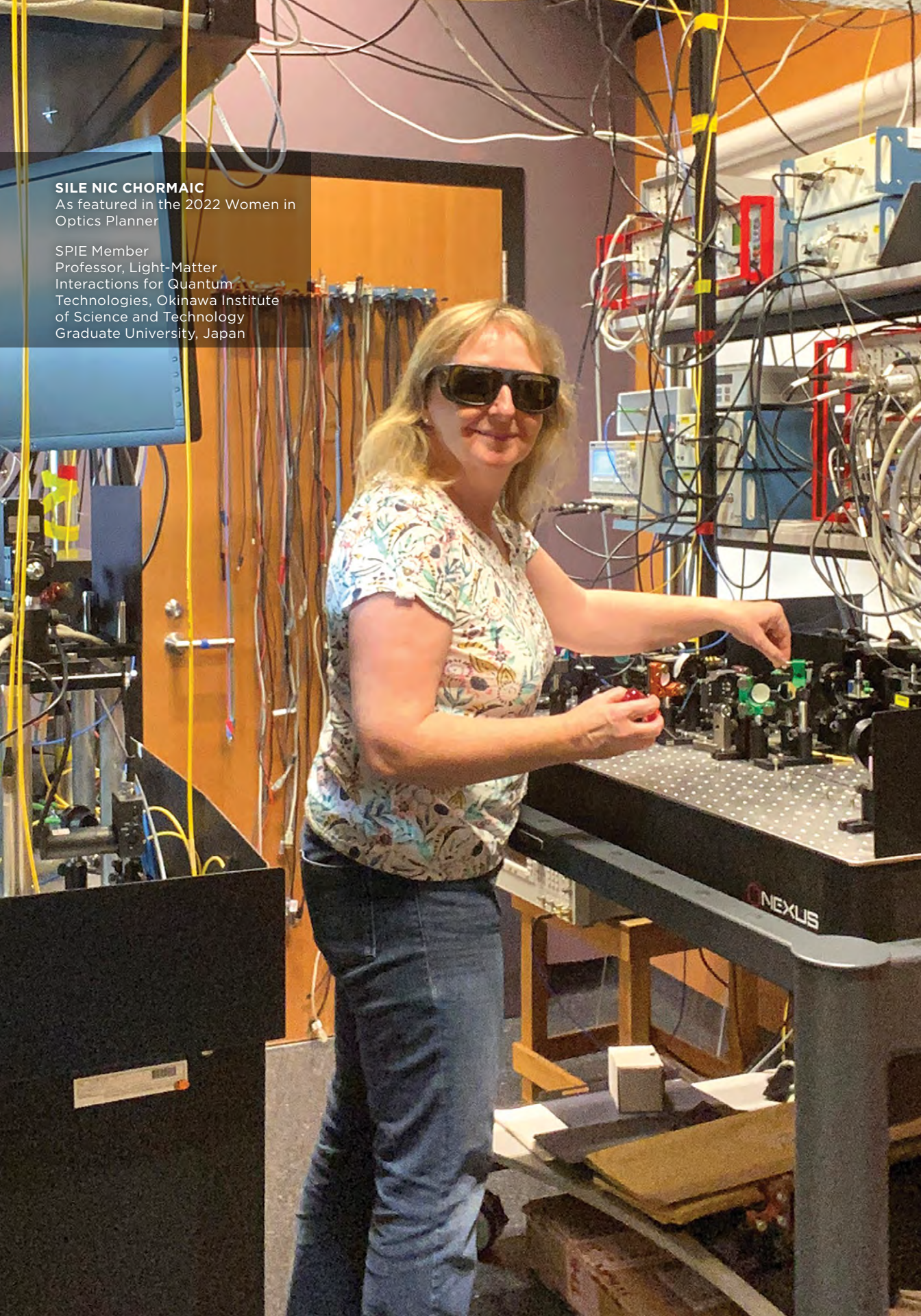
My goal over the past year was to serve as an ambassador for SPIE, to make myself available to our global community, to listen and learn by meeting with as many constituents as I could, to continue building our commitment to equity, diversity, and inclusion, and to bring our diverse community together. I travelled to many SPIE events outside my domain and hopefully provided a listening ear to anyone who wanted to share their joys and struggles. Through this time, I learned that the challenges each community faces are similar — increasing the participation of women, addressing workforce shortages, and celebrating being back in person. I hope I contributed to the Society and our community in a meaningful way, and I hope you can take time to do the same.

As a member of SPIE, you can contribute to the Society's mission to serve our community. SPIE is only as strong as its Members; you can give back by not only participating in its conferences and exhibitions, but giving some of your time to its governance, helping to shape its future. If you are not sure what that means or how to do that, please reach out to me or any of the officers or staff and we will be glad to help.

Through war, the prospect of recession, and the return of a new normalcy, we have stuck together, and we will continue to build a bright future in optics and photonics. Even though many large enterprises are worried about a possible recession and are struggling to retain their employees, there are no shortages of job opportunities for our optics and photonics students. This is where I struggle — on the one hand, I am excited for our rising professionals, but on the other hand, this boom makes it more difficult for academics such as myself to find researchers who want to stay in academia! However, it does remind me that our industry is strong — globally strong — and our community is robust. Thank you!

The theme for all my letters to you as SPIE President was related to our tag line, "Connecting minds." So, I will conclude this final note with the same. I hope to continue to connect with you even though I am no longer SPIE President (my current title is 2023 SPIE Immediate Past President). I hope you will still come and say "Hello" when you see me, and maybe even take a selfie together.

Anita Mahadevan-Jansen
2022 SPIE President
Vanderbilt University
United States



SILE NIC CHORMAIC
As featured in the 2022 Women in Optics Planner

SPIE Member
Professor, Light-Matter Interactions for Quantum Technologies, Okinawa Institute of Science and Technology Graduate University, Japan

LETTER FROM THE SPIE CEO

Reuniting the optics and photonics community after the protracted Covid moratorium, SPIE held a full schedule of events in 2022. It was a year of reunion — and of smiles.

SPIE was founded in 1955 to convene like-minded engineers and scientists. Unlike many societies that coalesced around scholarly publication, SPIE concentrated on meetings, exhibits, and educational courses, disseminating technical papers from early meetings through a simple newsletter. This original purpose of organizing our community to gather, discuss, and advance optics and photonics technology, shaped our founding and is embedded in our DNA.

We fulfill this purpose through an organization fueled by volunteers. For SPIE meetings, our volunteers develop symposia, create conference programs, chair sessions, mentor students, teach courses, and facilitate interactions. For SPIE publications, our volunteers guide and edit journals, review papers, and oversee book series. And for the Society, our volunteers govern the organization, chair and participate in committees, elevate Fellows and Senior Members, and select scholarship and award recipients. Our volunteers contribute a lot of time and energy, and power much of what SPIE does. It's a rewarding endeavor.

To support these many activities, SPIE staff unfailingly serve with professionalism. Most SPIE staff join us without a background, or even awareness, of optics and photonics, but are quickly caught up in the excitement as they learn about our technology through their interaction with Members, volunteers, and constituents. And SPIE staff do admirable work. I routinely hear praise from constituents about a staff person who alleviated a concern, solved a problem, demonstrated exceptional professionalism or remarkable kindness, or went above and beyond in some unexpected way.

This combination of dedicated staff and volunteers makes SPIE the dynamic Society that it is. Members and constituents bring optics and photonics expertise, and staff arrange the forum to speak, present, learn, publish, and engage in meaningful and productive interactions. It's a terrific — and impactful — partnership.

Together, we advance optics and photonics. And together, we do a lot of good. As you'll see in this year's Annual Report, we continued to strongly support our community in 2022. We dramatically increased the number of grants we provide student authors, enabling more students to present their work at SPIE events. We awarded over $300,000 in scholarships to recipients from 28 countries. After donating nearly $4 million to universities through the SPIE Endowment Matching Program, we worked to continue the program in 2023. Through our SHARE (SPIE Helping Advance Research Everywhere) program, we provided free SPIE Digital Library access to 111 countries. And at our first SPIE Photonics Industry Summit, we brought high-level US government speakers together with industry executives to advocate for our indispensable field and prepare for opportunities ahead.

Most importantly, in 2022 we observed first-hand the importance of personal connection in our community. As the year progressed, virtual meeting interest evaporated and SPIE meeting attendance steadily approached pre-Covid numbers. SPIE membership increased as well, reaching an all-time high at Photonics West 2023, just weeks after the year ended. In retrospect, the demand for in-person meetings — and the reunions they facilitate — is not surprising for a Society conceived to do just that. SPIE was created to bring people together and we're delighted to be back to fulfilling that need, and of course, seeing all those smiles.

Kent Rochford
Chief Executive Officer
SPIE

Photo credit: MARC GERECKE
Halo Over Isfjorden
2022 International Day of Light photo contest

Photo credit: LUKE MACNEIL
A Place of Reflection
2022 International Day of Light
photo contest

SPIE MISSION AND PRIORITIES

MISSION

SPIE, the international society for optics and photonics, partners with researchers, educators, and industry to advance light-based research and technologies for the betterment of the human condition.

SPIE has operated as a not-for-profit since our founding in 1955, connecting, engaging, and serving our global constituency. Led by a dedicated team of volunteers — including our Board of Directors, governance committees, conference chairs, and journal editors — we bring engineers, scientists, students, and industry leaders together to advance light-based science and technology, strengthening the global optics and photonics community through conferences, knowledge-sharing, and professional development.

CORE PROGRAMS AND PRIORITIES:

During 2022, SPIE continued our mission by delivering programs in the following areas:

- Creating successful, engaging, in-person conferences, exhibitions, and professional-development opportunities.
- Bringing technical professionals, academics, and industry leaders together.
- Expanding our field's largest database of research, technical publications, and presentations via the SPIE Digital Library.
- Providing entrepreneurial opportunities that support innovation, through events such as the industry-focused Startup Challenge and the Prism Awards.
- Contributing to the optics and photonics community through our scholarships, fellowships, endowments, grants, and educational resources.
- Providing professional recognition, career development, skills-training, and lifelong learning to the optics and photonics community.
- Engaging in proactive outreach and advocacy to help shape the future.


SPIE. PHOTONICS WEST
Quantum West Plenary
Speaker:
Catherine P. Foley

WORLD-LEADING TECHNICAL MEETINGS

SPIE convenes world-class meetings for the global optics and photonics community. Our events serve scientists, researchers, engineers, and photonics companies with programs that include technical conferences, exhibitions, workshops, industry forums, and continuing-education programs.

In planning for 2022, we reaffirmed our commitment to in-person events: It is obvious that our community is eager to meet and network again face-to-face. Though some early 2022 events were impacted by Covid, we kept our focus clear: We continued to organize in-person events in both the US and Europe. By August, we were able to focus entirely on the in-person event experience at Optics + Photonics as we switched from an on-demand digital forum to a live event, with an after event-publication model that served people around the world who wanted to share their research and learn relevant results from others.

Selected highlights:

» SPIE Photonics West was the first truly international optics and photonics gathering since the pandemic.

» SPIE Medical Imaging marked its 50th anniversary, celebrating half a century of connecting engineers, researchers, and industry leaders in areas such as image processing, computer-aided diagnostics, informatics, and digital pathology. In recognition of this major milestone, the SPIE *Journal of Medical Imaging* published a special anniversary issue, and the 2022 conference included a lively panel of longtime SPIE attendees.

» 2022's Advanced Lithography + Patterning was the first in-person iteration of the newly expanded conference name and scope. This event also introduced our new, industry-sponsored student grant and mentor programs. In tandem, they support conference participation, as well as further engagement with conference leadership and next-generation talent.

» Leveraging event locations — SPIE Defense + Commercial Sensing in Orlando — as well as industry connections and academic experts, we organized a collaborative lidar data-collection experiment to help establish standard performance tests for automotive-lidar systems. A follow-up report was published in the SPIE journal *Optical Engineering*.

» SPIE Astronomical Telescopes + Instrumentation highlighted the first new images from the James Webb Space Telescope (JWST) — shared publicly less than a week earlier — as well as previously unreleased engineering and test images.

» The launch of JWST also provided us with a high-profile plenary at SPIE Optics + Photonics, extending the enthusiasm for advances in space exploration that began when the first images were shared at SPIE Astronomical Telescopes + Instrumentation earlier in the summer.

As always, and especially in 2022, we owe a debt of gratitude to the incredible professionalism and dedication of our symposia leadership, conference chairs, authors, instructors, and exhibitor community. The success of SPIE and excellence of our meetings is not possible without you.

Photo credit: YEVEN SAMUCHENKO
Portal
2022 International Day of Light photo contest

LEADING PUBLICATIONS

The SPIE Publications Department — which includes the SPIE Digital Library, SPIE Press, conference proceedings, and 14 journals — produces, disseminates, and archives high-quality technical publications that meet the information needs of the optics and photonics community. As of December 2022, the SPIE Digital Library, the world's largest collection of applied optics and photonics research, included more than 590,000 articles and presentations, and more than 470 eBooks. SPIE also partners with more than 60 relevant scientific databases to enable researchers to easily find information published by SPIE.

In 2022, a total of 22,451 new publications were added to the SPIE Digital Library including more than 16,500 conference proceeding papers, 8,200 presentation recordings, 1,800 journal articles, and 530 eBook chapters. Nearly 68,400 authors representing 103 countries contributed to SPIE's publications activity last year.

Selected highlights:

» Launching two new journals, *Advanced Photonics Nexus* and *Photonics Insights*, in partnership with Chinese Laser Press.

» Seeing *Advanced Photonics* receive its first Impact Factor and CiteScore, both above 13, placing it in the top 10 percent of both indices.

» Implementing a new peer-reviewer training program using the Researcher.Life platform.

» Introducing patent citations as a new metric on the SPIE Digital Library via Lens.org. Authors and readers can now access both academic citation and patent citation data for papers.

» Becoming an official signatory of the San Francisco Declaration on Research Assessment (DORA), a worldwide initiative to improve evaluations of scholarly research.

Open Access continues to grow rapidly within scholarly publishing and SPIE is proactively pursuing related opportunities within both Journals and Press, as well as through new Read and Publish deals. These new agreements cover both institutional subscription access to content as well as all Open Access journal article proceeding charges for affiliated researchers. More than 280 institutions worldwide now have these agreements in place with SPIE.

SPIE remains committed to disseminating research as widely as possible. SHARE (SPIE Helping Advance Research Everywhere), which was launched in late 2020, provides free access to the SPIE Digital Library to researchers in World Bank-designated low-income countries. In 2022, researchers from 111 countries downloaded more than 342,432 papers from the SPIE Digital Library.

PROCEEDINGS OF SPIE

The Proceedings of SPIE are an important and valuable resource for both theoretical foundations and practical results, with millions of downloads a year from researchers and engineers across the globe.

In 2022, SPIE published a total of 395 proceedings volumes, up from 382 in 2021 and 357 in 2020. SPIE provided publishing services to 113 non-SPIE conferences. At year-end, the Digital Library included a total of 505,060 proceedings papers, 46,896 presentation recordings, 5,696 posters, 40,222 journal articles, and 10,867 eBook chapters, making it the world's largest collection focused on optics, photonics, and imaging.

JOURNALS

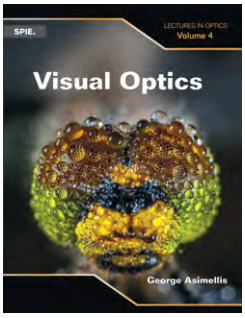
SPIE publishes 14 journals with a rigorous peer-review process, including five Gold Open Access journals and a Diamond Access journal.

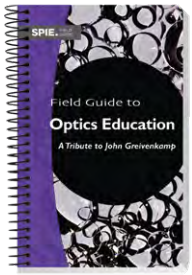
In late June, SPIE received updated Impact Factors and CiteScores. The four-year Scopus CiteScore, which looks at citation ratios for papers published over the past four years, increased for eight journals. The Web of Science Impact Factor, which only considers citation ratios for papers published over a period of two years, increased for six journals. *Advanced Photonics* received both its first Impact Factor and CiteScore — both above 13 — and ranks among the top journals in the optics categories. Three other journals — *Journal of Biomedical Optics, Neurophotonics,* and *Optical Engineering* — received their highest Impact Factors ever. *Neurophotonics* and the *Journal of Biomedical Optics* are the top two ranked biomedical optics journals in Web of Science.

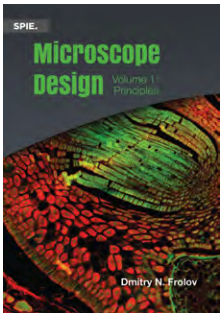
SPIE PRESS

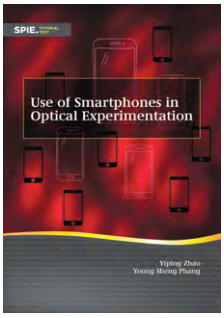
SPIE Press continues to be the largest independent society publisher of optics and photonics books. In 2022, we published 22 new books and signed 29 new contracts for future titles. A total of 472 books are now available in the SPIE Digital Library.

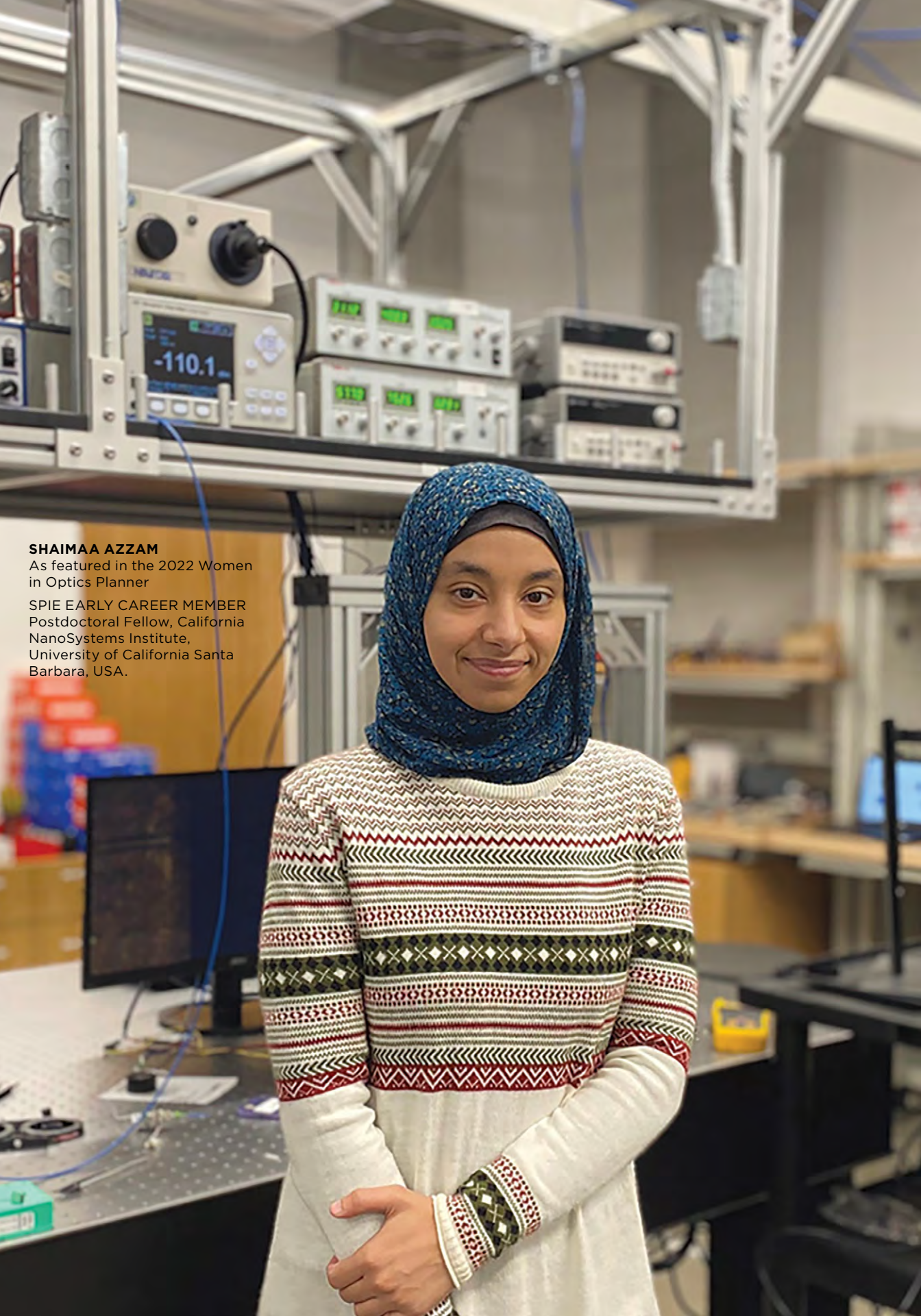
A particular highlight last year was the publication of the *Field Guide to Optics Education: A Tribute to John Greivenkamp.* Produced in honor of Greivenkamp, 2020 SPIE President and founding editor of the Field Guide Series, the book includes more than 50 contributions from leading optics and photonics educators. Thanks in part to the generosity of 20 sponsors, SPIE has distributed the book for free at several conferences, and will make the eBook freely available in perpetuity.











SHAIMAA AZZAM
As featured in the 2022 Women in Optics Planner

SPIE EARLY CAREER MEMBER
Postdoctoral Fellow, California NanoSystems Institute, University of California Santa Barbara, USA.

EDUCATION, LIFELONG LEARNING, AND PROFESSIONAL DEVELOPMENT

SPIE is committed to providing continuing education and professional development products that meet the educational needs of SPIE's engineering, scientific, and business constituencies, and support and promote science, technology, and math education worldwide.

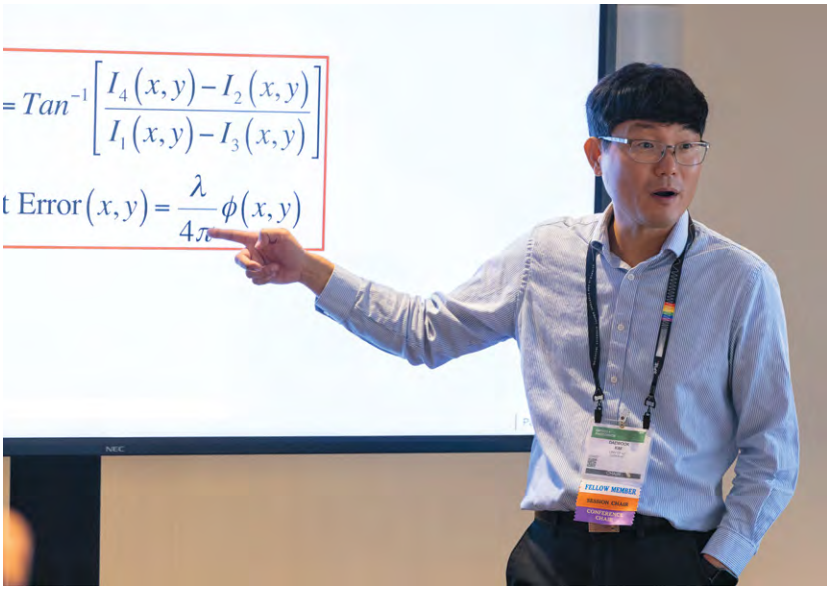
In 2022, our comprehensive range of more than 200 courses in optics and photonics — from *Introduction to Optomechanical Design,* to *Neurophotonics* — served industry, academics, and government entities. In addition, we implemented a training-focused, corporate-partnership program, leveraging SPIE education services to establish a new learning opportunity for the ongoing training and career advancement of optics engineers.

Top five in-person courses in 2022

- *Optical Technologies and Architectures for Virtual Reality (VR), Augmented Reality (AR) and Mixed Reality (MR) Head-Mounted Displays (HMDs)*
- *Introduction to Optomechanical Design*
- *Optical Metrology for AR/VR/MR*
- *Practical Optical System Design*
- *Introduction to AR/VR/MR and Smart Eyewear: Market Expectations, Hardware Requirements and Investment Patterns*

Top three webinars in 2022

- *AR/VR/MR and Smart Glasses Display Architectures and Latest HMD Product on the Market*
- *A Concise Introduction to Quantum Computing*
- *Fundamentals of Optical Manufacturing*



« SPIE Fellow Daewook Kim teaching his *Introduction to Interferometric Optical Testing* course at Optics + Photonics.

YOUR SPIE SOCIETY MEMBERSHIP CONNECTS YOU TO THE WORLD

SPIE encourages our Members to increase their engagement with the Society and the greater optics and photonics community, supporting them to become changemakers. We provide network-building, mentorship, and legacy opportunities to everyone from our Student Members to Emeritus Members, making it easy for them to create Membership experiences that grow in tandem with their personal and professional development.

Selected highlights:

» We expanded networking opportunities for Members, including gatherings at conferences, the SPIE Students Slack Workspace, and higher Membership visibility at SPIE events.

» New and enhanced professional development offerings, both online and in-person, included connecting students with industry, a webinar series, and in-person workshops on key topics.

» To connect our Student Members more directly to industry, we launched the Career Connections Student Webinar series, showcasing best practices across industry and at key optics and photonics companies.

» We reached out to Members in Ukraine, providing financial support to Student Chapters and complimentary membership for one year to all current Members there.

» The inaugural SPIE Presidential Award for Outstanding Student Chapter was awarded to INAOE (National Institute of Astrophysics, Optics and Electronics) in Mexico.

AN IMPACTFUL COMMITMENT T

SPIE is inspired by the vision of a future in which the transformative power of photonics enhances life around the globe. Along with our inclusive approach and our commitment to our Society mission and values, we offer many and varied opportunities in terms of both outreach and outright support. In 2022, SPIE contributed **nearly $4 million** to the international optics community through our community support and development programs.

In 2022, SPIE celebrated the **18th year** of our Women in Optics planner, an original effort in our ongoing commitment to equity, diversity, and inclusion across all of our activities. We continue to create open and inclusive forums that maximize the potential for innovation and collaboration, working to increase diversity and inclusion across all SPIE events and programs. In addition to our LGBTQ+ and Black in Photonics social and networking events, we introduced informal community lounge spaces at SPIE events, for socializing, relaxation, and networking opportunities, as well as our **Lunch and Learn discussion series**. Our **Family Care Grants** continue to support attendance at SPIE conferences.

From scholarships, fellowships, and grants, to endowments, support of photonics-technician training, career resources, industry resources, and professional recognition, SPIE contributes to the global optics and photonics community in various impactful and transformative ways. Whether it's the **SPIE Career Center** providing a trusted platform that facilitates both hiring opportunities and job searches across the industry, or our optics-and-photonics-focused education scholarships, SPIE prides itself on supporting next-generation optical engineers, early-career scientists, and established

STUDENT CONFERENCE SUPPORT PROGRAM RECIPIENTS RESPOND

"Attending DCS was a great opportunity to connect with others working in similar fields and to learn more about my field. The conference was well-organized and well-attended, making the trip to Orlando worth it. I would highly recommend attending DCS for people interested in any photonics-based sensing approach."

–Chaz Cornwall,
MSc student, United States,
attended SPIE Defense + Commercial Sensing.

"During the poster session, I was able to discuss a machine-learning related problem that I had with a researcher who happened to be an expert in the topic in question. It was a fruitful discussion, and I will further look into the ideas he suggested. Also, the social events during the conference were greatly appreciated: many of us came by ourselves and those events really help us to make friends and meaningful connections. They certainly make the conference experience more joyful."

–Yuen San Lo, PhD student,
Malaysia (studying in UK),
attended SPIE Photonics Europe.

"A highlight for me was being in the same place as all of the experts in my field and being able to chat with them!"

–Jenna Montague,
PhD student, United States,
attended SPIE Photonics West.

TO COMMUNITY DEVELOPMENT

academic researchers alike. The coming pages showcase a selection of impact stories from the past year. A few additional highlights:

» Our **Student Conference Support Program** offers travel support to SPIE conferences to SPIE Student Members: you'll find a few recipient appreciations below. These impactful opportunities for professional engagement also provide a vital platform for sharing, presenting, and publishing their research in the SPIE Digital Library. In its first year the program funded **389** SPIE Student Members.

» Our optics and photonics education-focused support included **$336,200 awarded to 88 students** through SPIE scholarships.

» The 2022 International Day of Light's theme was "Our future is light. Play your part." In partnership with IEEE Photonics and Optica, the invitational video and accompanying website (dayoflight.org) focused on encouraging career opportunities in optics and photonics.

» We sponsored the 10th International Summer School on Biophotonics, welcoming **more than 60 PhD students from over 20 countries**. In addition, 2022 SPIE President Anita Mahadevan-Jansen participated as the keynote speaker and lecturer.

» SPIE's contribution toward the John E. Greivenkamp Endowed Scholarship in Optical Sciences at the University of Arizona's Wyant College of Optical Sciences, which supports third- and fourth-year undergraduates, matched the previous endowment, doubling the fund.

> One of my highlights from the conference was attending the Student and Early Career Networking Social. I met a professor at the event and was able to ask a lot of questions about doing a postdoc degree and pursuing a career in academia that I am not usually able to ask. It was a very insightful conversation for me and seeing how passionate the professor was about her work was a spark of motivation for me to keep working in this field.

–Melisa Gulseren, PhD student, Turkey (studying in United States), attended SPIE Optics + Photonics.

> One of my personal highlights at Photonics West was meeting with a very experienced researcher, who works at Google. We met for about one hour, together with my professor and two other PhD students. The discussion about his work from few years ago and our new results on the same topic was extremely interesting, inspiring, and helpful. Many new ideas arose on how to continue our work and what things we could try next.

–Lukas Uhlig,
PhD student, Germany,
attended SPIE Photonics West.

SPIE ENDOWMENTS, FELLOWSHIPS, AND SCHOLARSHIPS IN ACTION

SPIE AND THE UNIVERSITY OF ROCHESTER

As part of the SPIE Endowment Matching Program, SPIE and the University of Rochester established the $1 million SPIE Graduate Fellowship in Optical Sciences and Engineering, which will provide financial assistance to selected graduate students at the university's Institute of Optics who are working toward their PhDs. The first Fellowship recipient, Rushnan Islam — pictured here with SPIE Member Recognition Coordinator Brent Johnson, left, and Rochester's Institute of Optics Director Thomas Brown — has already been selected.

"The SPIE Graduate Fellowship in Optical Sciences and Engineering will create transformative opportunities for PhD candidates at Rochester's Institute of Optics," says SPIE President Anita Mahadevan-Jansen. "Rochester has a long history of successful optics education and many of today's leading optics researchers have emerged from its Institute of Optics. This endowed fund is a critical partnership between SPIE and the University of Rochester, one that will help ensure that pipeline of leaders continues for generations to come."

The SPIE Endowment Matching Program was established in 2019 to increase international capacity in the teaching and research of optics and photonics, and, with this latest gift, has provided nearly $4 million in matching gifts, resulting in more than $10 million in dedicated funds.

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 award to college, institute, and university programs with optics and photonics degrees, or with other disciplines allied to the SPIE mission.

SPIE currently has endowment partnerships with the following institutions:

The University of Arizona's Wyant College of Optical Sciences

The University of Rochester's Institute of Optics

The University of Birmingham

Vanderbilt School of Engineering

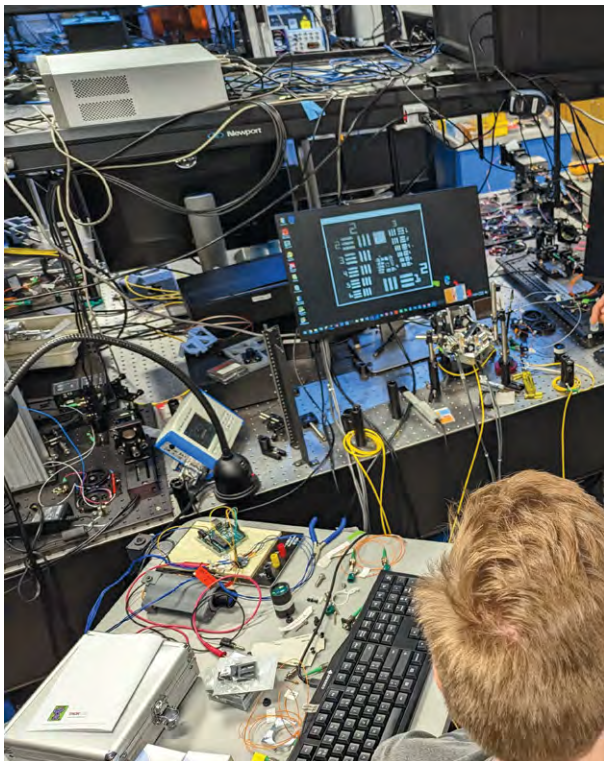
The University of Wisconsin-River Falls

The University of Glasgow

ICFO, the Barcelona-based Institute of Photonic Sciences

JILA, a joint institute of the University of Colorado Boulder and the National Institute of Standards and Technology

The University of Central Florida's CREOL, The College of Optics and Photonics



Yuankai “Kenny” Tao

THE INAUGURAL RECIPIENT OF THE SPIE FACULTY FELLOWSHIP IN OPTICS AND PHOTONICS AT VANDERBILT UNIVERSITY

Flexibility in terms of research, collaboration with campus colleagues, and more impactful mentorship of students: those are just a few of the elements that Vanderbilt University Assistant Professor of Biomedical Engineering Yuankai “Kenny” Tao says he’s been able to incorporate into his work as part of the SPIE Faculty Fellowship he received in 2022.

The expanded opportunities available to Tao in terms of recruiting, training, and mentoring students across the university are supporting undergraduates and graduates alike: “We have a biophotonics center on campus, and a ton of users of optics technologies,” says Tao. “This fellowship, it’s helped us think more collectively about how to train our students, from encouraging them to study optics to preparing them with the expertise they need for optics-focused jobs.”

As for his own research, “we are very focused on clinical problems,” says Tao of his Diagnostic Imaging & Image-Guided Interventions Laboratory. “We started with translational work, focusing on diagnostics and therapeutic guidance in ophthalmology, working to integrate existing technologies — such as OCT — into surgical microscopy. There are lots dynamics during surgery: how do we feed relevant data to the surgeons in real time, so that they can make the proper adjustments for the best post-operative outcome? That’s one of the projects that is core to our group.” Other projects include creating optical-imaging systems for clinical diagnostics and therapeutic monitoring in gastroenterology and oncology, but, notes Tao, the SPIE fellowship has already opened new channels of research for his team. One such opportunity consists of building an optical-imaging instrument that will map the anatomy of the upper airway.

“They need a feedback mechanism,” says Tao, “But how do you map an entire upper airway in three-dimensions within a single respiratory cycle? We started thinking about creative optical ways to do this rapidly, in such a limited space. I was talking to another faculty member who does diffractive optics work, so I asked if diffractive surfaces would be a good way to make a small, fiber-tipped optical device that would allow us to spread light in a specific configuration, that would allow us to measure the circumference all at once. His grad students did some modelling, and we are going to use some of the SPIE funds to produce a prototype.” And all this work is being done right on campus, he points out, because they have a fabrication facility. “It’s kind of a stretch for us,” says Tao. “We’re good on the imaging end, we certainly know what these probes should look like, but this is a novel combination of diffractive surfaces, photonics work, plus the imaging side to solve a clinical problem in a collaborative way. It’s really exciting to be able to add things like this to our wheelhouse.”

« Tao in front of a handheld ophthalmic imaging probe, discussing system resolution and mechanical design with two of his students Rachel Hecht, right, and Jacob Watson. “They are both second year PhD students who just presented this work at Photonics West,” says Tao. “They both received MKS/SPIE Travel Awards to present their work at the conference.”

Matt Eichenfield

INAUGURAL RECIPIENT OF THE SPIE ENDOWED CHAIR IN OPTICAL SCIENCES AT THE UNIVERSITY OF ARIZONA'S WYANT COLLEGE

In 2022, Matt Eichenfield, a Distinguished Member of the Technical Staff at Sandia National Laboratories (SNL), joined the University of Arizona's Wyant College of Optical Sciences as its inaugural SPIE Endowed Chair in Optical Sciences. The $2 million endowed position was established with a $500,000 gift from SPIE that was matched by a factor of three with funds donated by Wyant College founding dean James C. Wyant and his family. The University of Arizona endowed chair was also the inaugural gift of the SPIE Endowment Matching Program.

Eichenfield joins the college as a tenured associate professor from his position as a Distinguished Member of the Technical Staff at SNL, leading programs in multiple instantiations of experimental quantum computing architectures, quantum and classical sensors, photonic microsystems, and microwave communications, among others. He will also be the first faculty member in a new Master Agreement established by University of Arizona Provost Liesl Folks and SNL's Chief Research Officer Susan Seestrom: in that role, Eichenfield will engage in research across both enterprises.

"I am honored to be joining the Wyant College of Optical Sciences as the SPIE Endowed Chair in Optical Sciences," said Eichenfield. "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."

RECIPIENTS OF THE EICHENHOLZ-SPIE PHOTONICS TECHNICIAN SCHOLARSHIP

Chris DiPardo • Alexandria Hajec
Ishita Paragkumar Soni • Samantha Turmel

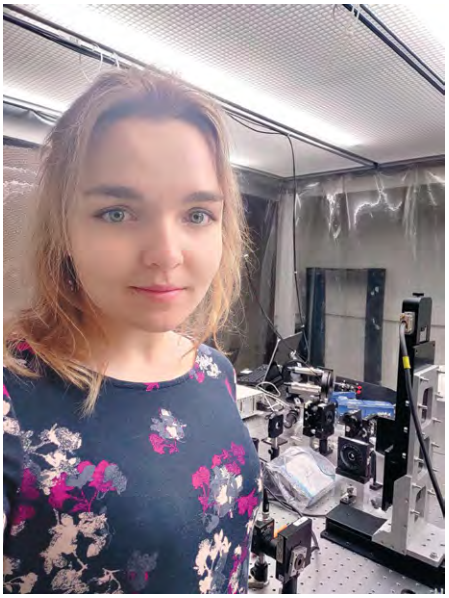
The Eichenholz-SPIE Photonics Technician Scholarship supports students enrolled or planning to enroll in a laser, optics, or photonics technician associate or certificate program.

The Eichenholz-SPIE Photonics Technician Scholarship helped me spend more time in the classroom learning the latest optical technology. I'm grateful that SPIE is helping students like me achieve their educational aspirations!

–Alexandria Hajec

Anna Kosar

SPIE OPTICS AND PHOTONICS EDUCATION SCHOLARSHIP RECIPIENT



For Anna Kosar, a third-year optics and optical engineering student at Taras Shevchenko National University of Kyiv, trying to complete her studies during wartime has held definite challenges. "Sometimes it's possible to work," she says via Skype, "but in April the university building with my laboratory was hit, windows were broken and some of the equipment was damaged." At the moment, things have improved: she works partly from home, partly in her lab, under the supervision of Professor Serhiy Kondratenko. "Right now, I'm working with a semiconductor material, placing CIGS material — copper indium gallium selenide — into solar panels. We are also experimenting with photoconductivity, X-ray diffraction, and photoluminescence. Plenty of optical stuff!"

Kosar is enrolled in a short-term university course, so this is the final year of her bachelor's degree. Then she plans on applying for a master's degree in optics and laser techniques: "It's the same specialty and, probably, the same department I'm working in now." If possible, she'd like to apply for a double-degree program, one year in Kyiv, one year in France perhaps. Either way, she's looking forward to a career in optics, one that ideally combines academics with industry work. "Recently I thought about this a lot," says Kosar. "And for me, I want to combine both: I want to become a professor at a university and also work for a company. If I become a professor, this is something that I do for myself and I find this pleasurable. But if I work for a company, it's more of a position where I can take my research and implement it in real-life situations."

So what impact did her SPIE Education Scholarship have on her work in the past year? "Right now, I'm talking to you on my new PC," she says, her face beaming into her computer's camera. "It's so powerful — I love it! It's hard to work on an old computer because so much of the required software doesn't work on those. So I bought a new computer and new software programs, and articles relevant to my work, and a scientific book of abstracts — all stuff I need for my research. It's made a very big difference."

Kosar first fell for optics in 2015 when a teacher conducted a kind of tech Olympiad, giving his students tasks to solve. "He asked me just practical questions," she says. "He took a pen and a glass of water and put the pen in the glass of water and asked, 'Why do we see this pen like it's broken in half?' And, of course, it's refraction!" Her interest, curiosity, and desire to try to explain what she was seeing impressed her teacher. "He told me, 'Oh, you have potential here.' After that, I enrolled in the university's Optical and Mechanical College, and I learned a lot of practical and technical stuff and trained as an optical technician so now I know how that works." Subsequently, she chose to deepen her theoretical knowledge, combining her hands-on experience with core physics and math, and striking a promising practical and academic balance that she's pursuing into her optics career.

Ivan Kosik

RECIPIENT OF THE SPIE-FRANZ HILLENKAMP POSTDOCTORAL FELLOWSHIP IN PROBLEM-DRIVEN BIOMEDICAL OPTICS AND ANALYTICS

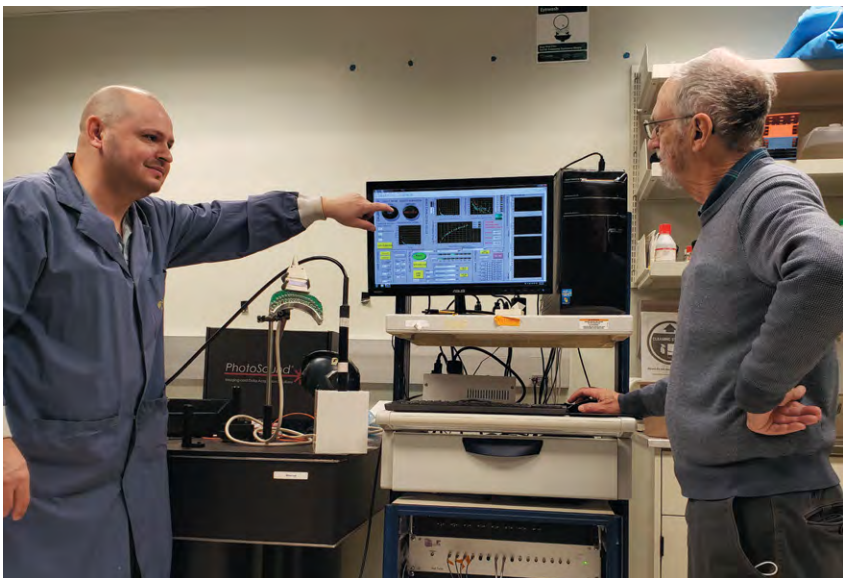
The $75,000 SPIE-Franz Hillenkamp Postdoctoral Fellowship in Problem-Driven Biomedical Optics and Analytics supports interdisciplinary problem-driven research and provides opportunities for translating new technologies into clinical practice for improving human health.

Kosik's project, conducted in conjunction with Professor Brian Wilson at the University of Toronto/Princess Margaret Cancer Centre's Lab for Applied Biophotonics, is focused on creating a minimally invasive treatment and guidance system for focal tumors.

"I'm focusing on prostate cancer because it's probably the most impactful tumor site because of how debilitating the surgery is," says Kosik. "But this is a technology that could apply to almost any localized tumor that hasn't metastasized." Their treatment combines photothermal therapy and a very thin optical fiber: "It's similar to the kind of fiber optics that you hear about in popular culture for communications and stuff like that, but these are fibers that are able to bring near infrareds — safe light, essentially — at a high enough dose that the thermal effects destroy the cancer tissue."

He's also utilizing the fellowship to build awareness across the medical community that these treatments are possible by presenting at conferences, collaborating with other teams, and applying for grants to push the technology further. "We are refining the technique: though the technology to optically destroy tumors has existed for decades, the way to guide it has not."

As to what Kosik finds compelling about translational medicine, that's easy: "Why would we be spending all of these resources and time to develop these technologies if we're not going to be able to bring it to the bedside, actually show improved healthcare and outcomes for patients? For me," he says, "that's always been the main thing."



« Kosik, left, and Wilson optimizing the data flow in a prototype hand-held photoacoustic thermometry imaging system which uses multimodal bio-photonic inputs to rapidly produce (~10 frames/sec) accurate bulk tissue temperature maps deep inside living tissue structures.

« Sims, at work in his Morehouse College lab.

Wesley Sims

RECIPIENT OF THE IBM-SPIE HBCU FACULTY ACCELERATOR AWARD

Wesley Sims, an assistant professor of physics at Morehouse College and director of its Micro/Nano Optics Research and Engineering Laboratory, is the second recipient of the $100,000 IBM-SPIE HBCU Faculty Accelerator Award which supports research and education in quantum optics and photonics at historically Black colleges and universities.

The award's multi-faceted impact has a broad reach, supporting Sims' research as well as a postdoc and several students in his lab, and enhancing Sims' ability to provide transformative mentorship for his students as they build their own careers. Sims is leveraging an established collaboration with SPIE Member Sergio Carbajo, who holds faculty and leadership roles at UCLA and Stanford University's SLAC National Accelerator Laboratory; Sims is also a member of the IBM-HBCU Quantum Center. Together, these relationships plug Sims' students directly into an extensive network of colleagues and peers. "The students are involved in our weekly research meetings with Sergio and his postdoc," says Sims, "so they get real experience on how labs operate. And the IBM HBCU Quantum Center holds meetings for all the students supported by the involved schools: they get a chance to collaborate and see what their peers are working on at other HBCUs across the country."

Sims' research is focused on quantum sensing, detecting and measuring physical phenomena with high precision. "We're investigating a type of electronic optical dynamics — high harmonic generation — and we're taking a new approach, trying to capture it in real-time," Sims says. "To do this, we're developing a new technology capable of detecting and cross-correlating two different wave packets, or two different photons. We initially we called it the hyperspectral attosecond quantum cross-correlator, but as we're getting further and further into the research, we think we might change the name to a time-correlation transducer."

The award provides Sims with the flexibility to modify his research to a gratifying extent, but being able to create career-enhancing opportunities for students remains a major benefit in his mind. Having his own funding at a small liberal arts institution means being able to mentor students into their graduate degrees and providing them with the kind of hands-on experience that will bridge a gap between quantum-workforce needs and available talent. That, he says, "is probably the most rewarding part for me."

"What I really like about this process," Sims adds, "and where I am in my career trajectory, is that I inherited lab space, I received funding, I leveraged collaborative relationships, and my students see that process from the beginning – they didn't come into my lab where I'm 10 or 20 years in and where everything is already in place. They see that I wrote grant proposals last year, received funding, and now we're putting together the actual equipment and the materials that we talked about last year. Last year they were modelling; now we're procuring equipment for the experimental stage. To see them receive that experience is pretty big."

Oleksandra Ivashchenko

RECIPIENT OF THE JOE AND AGNETE YAVER MEMORIAL SCHOLARSHIP

The Joe and Agnete Yaver Memorial Scholarship honors the Yavers' long-term leadership at SPIE which was instrumental in the technical and financial success of the Society. It is available to SPIE Members and staff seeking an advanced degree or certification from an accredited program covering areas such as business administration, non-profit program management, technology management, and data science and visualization.

Oleksandra Ivashchenko, a medical physics resident in radiology and nuclear medicine at the Leiden University Medical Center and researcher in surgical oncology at the Netherlands Cancer Institute, is using the scholarship to complete an MBA program in healthcare management at the University of Amsterdam's Business School, while taking on a post-residency role as a senior medical physicist in the department of Nuclear Medicine and Molecular Imaging at the University Medical Center of Groningen.

"I received my notification about the Yaver award late at night, on the eve of the last day of my residency," said Ivashchenko. "It was such a big surprise that I even wondered if it wasn't a mistake. The award will be used to help finance a part-time MBA study, which will help me become a better clinical medical physicist, particularly in terms of cost-effectiveness optimization in healthcare. My long-term goal is to improve the affordability of personalized therapies — including radionuclide therapy and radio-embolization — which are often only accessible in high-income countries. As a researcher, I know how to develop or optimize an imaging technique, but the MBA will help put this knowledge in the perspective of wider health costs. I really hope this is the start of a great career journey in affordable healthcare."

Yonghwi Kwon

NICK COBB MEMORIAL SCHOLARSHIP RECIPIENT

The $10,000 Nick Cobb Memorial Scholarship recognizes an exemplary graduate student working in the field of lithography for semiconductor manufacturing. The award honors the memory of Nick Cobb, who was an SPIE Senior Member and chief engineer at Mentor Graphics. His groundbreaking contributions enabled optical and process proximity correction for IC manufacturing.

Yonghwi Kwon is pursuing an MS-PhD integrated course at the School of Electrical Engineering at the Korea Advanced Institute of Science and Technology. Working with Professor Youngsoo Shin, Kwon's primary research areas are machine learning guided physical design, computational lithography, and low power design, with a particular interest in integrating the manufacturing process of lithography with the design process. Kwon will pursue his research in computational lithography while utilizing and applying adaptive machine-learning techniques. His goal during that time is to make a reinforcement-based standard cell layout generator that takes into consideration manufacturability, power, and area, with future plans to create a company after graduation.

"I am truly honored to receive the Nick Cobb Memorial Scholarship," said Kwon, when he was announced as the recipient. "Since Nick's work on OPC is a fundamental basis of my work on computational lithography, this scholarship is especially meaningful to me. While the sub-nanometer era is coming up, the integration of lithography technology and design technology will be important to keep advancing the process development. This scholarship motivates me to connect the dots between the lithography and design fields. I am excited with the strong support to continue my research. Also, I am looking forward to presenting my research, as well as attending talks and presentations at upcoming SPIE conferences."

SPIE SCHOLARSHIP RECIPIENTS

David Lippman

David Lippman, of the University of Rochester (USA), was awarded the **2022 Michael Kidger Memorial Scholarship in Optical Design.** The Michael Kidger Memorial Scholarship is awarded to a student engaged in optical design including lens design, illumination design, and computational optical design.

Yao Fan

Yao Fan, of the Nanjing University of Science and Technology (China), was awarded the **Teddi Laurin Scholarship.** Photonics Media partners with SPIE to fund the Teddi Laurin Scholarship to raise awareness of optics and photonics and to foster growth and success in the photonics industry by supporting students involved in photonics. This scholarship is in memory of Laurin Publishing and Photonics Media founder Teddi Laurin.

> I am passionate about advancing technology for a sustainable and carbon-neutral future. Beyond research, I am also actively involved in advocacy activities to promote renewables to combat climate change. I am honored to receive this prestigious and competitive award.
>
> **–Anishkumar Soman,** USA
> John Kiel Scholarship recipient.

Photo credit: AMAR HABEEB
Our Promise to the Future
2022 International Day of Light photo contest

Kamal Rudra

The **Laser Technology, Engineering and Applications Scholarship** was awarded to **Kamal Rudra,** of University of Michigan (USA). This scholarship is awarded in recognition of a student's scholarly achievement in laser technology, engineering, or applications. Funds are provided in part by SPIE.

Anishkumar Soman

Anishkumar Soman, of University of Delaware (USA), was awarded the **John Kiel Scholarship** which was established to honor SPIE founding member John Kiel, in recognition of his long-standing and significant contributions to the Society. This scholarship is sponsored by SPIE and is awarded for the student's potential for long-term contribution to the field of optics and optical engineering.

> **I am humbled by this scholarship and hope to highlight how fun and interesting optics and photonics can be.**
>
> **–Matthew Cooper,** USA.
> SPIE D.J. Lovell Scholarship recipient.

Matthew Cooper

The **SPIE D.J. Lovell Scholarship** was awarded to **Matthew Cooper,** CREOL, University of Central Florida (USA). This is the Society's largest and most prestigious scholarship and is sponsored by SPIE.

Bin Wang

Bin Wang, of the University of Colorado Boulder (USA), was awarded the **BACUS Scholarship.** The SPIE-BACUS Scholarship is for students who wish to work in the fields of photomask and microlithography manufacturing for the semiconductor industry. This scholarship is sponsored by BACUS, SPIE's Photomask International Technical Group.

ADDITIONAL SPIE SCHOLARSHIP RECIPIENTS

Trevon Badloe
Pohang Univ. of Science and Technology (Republic of Korea)

Ji Eun Bae
KAIST (Republic of Korea)

M. Saad Bin-Alam
Univ. of Ottawa (Canada)

Carlos Andrés Buitrago-Duque
Univ. Nacional de Colombia Sede Medellín (Colombia)

Derek Burrell
Wyant College of Optical Sciences (USA)

Maximilian Büttner
Karlsruher Institut für Technologie (Germany)

Gor Chalyan
Yerevan State Univ. (Armenia)

Wesley Chiang
Univ. of Rochester (USA)

Neel Choksi
Univ. of Toronto (Canada)

Lauren Cooper
Univ. of Michigan (USA)

Stijn Cuyvers
Univ. Gent (Belgium)

Maria Júlia de Arruda Mazzotti Marques
Instituto de Física de São Carlos (Brazil)

Camilla dos Santos Costa
Univ. de São Paulo (Brazil)

Flanish D'Souza
Manipal Academy of Higher Education Chapter (India)

Margherita Firenze
Columbia Univ. (USA)

Michael Garner
Texas A&M Univ. (USA)

Neha Goswami
Univ. of Illinois (USA)

William Green
Vrije Univ. Brussel (Belgium)

Jose Cesar Guerra Vazquez
Centro de Investigaciones en Óptica A.C. (Mexico)

Adriana Guevara
Univ. of Central Florida (USA)

Melisa Ekin Gulseren
Univ. of California Davis (USA)

Arthur Harrison
Univ. of the Witwatersrand Johannesburg (South Africa)

Omid Hemmatyar
Univ. of Southern California (USA)

En-Lin Hsiang
CREOL College of Optics and Photonics Univ. of Central Florida (USA)

Aislinn Hurley
Univ. of Texas at Austin (USA)

Timothy Oshiobughie Imogore
Friedrich-Schiller-Univ. Jena (Germany)

Ibrahim Issah
Tampere Univ. (Finland)

Takeki Itoh
Univ. of California Santa Barbara (USA)

Alexandra Ivakhno-Tsehelnyk
Taras Shevchenko National Univ. of Kyiv (Ukraine)

Jaehyuck Jang
Pohang Univ. of Science and Technology (Republic of Korea)

Wei Jia
Univ. of Utah (USA)

Vlada Kyrisha
Taras Shevchenko National Univ. of Kyiv (Ukraine)

Rujia Li
Tsinghua Univ. (China)

Yuanwei Li
Northwestern Univ. (USA)

Ishaan Lohia
Univ. of Cambridge (United Kingdom)

Chao Ma
Yale Univ. (USA)

Shridhar Manjunath
Australian National Univ. (Australia)

Grigor Mantashyan
Russian-Armenian Univ. (Armenia)

Maxim Masyukov
Aalto Univ. (Finland)

Sara Meir
Bar-Ilan Univ. (Israel)

Niladri Modak
Indian Institute of Science Education and Research Kolkata (India)

2022 Nick Cobb Memorial Scholarship recipient Yonghwi Kwon at SPIE Advanced Lithography + Patterning, with Siemens' Steffen Schulze, left, and Symposium Chair Kafai Lai.

"I am very grateful to receive this scholarship: I was able to acquire two electronic devices that help me a lot in my courses and in my research. Thank you, SPIE!"

–**Yohan Szuszko Soares,** Brazil.

> Being a woman in optics, SPIE accompanies me along the way, from presenting in conferences and networking, to taking part in the SPIE Student Chapter in Bar Ilan University, and especially by receiving support from the SPIE optics and photonics education scholarship.
>
> –**Sara Meir,** Israel.

Shubho Mohajan
Univ. of Alberta (Canada)

Juniyali Nauriyal
The Institute of Optics
Univ. of Rochester (USA)

Jack Naylor
The Univ. of Sydney (Australia)

Victor Ochoa-Gutierrez
Univ. of Glasgow (United Kingdom)

Solomon Ojo
Univ. of Arkansas (USA)

Arsenii Prymak
Taras Shevchenko National Univ. of Kyiv (Ukraine)

Victoria Quiros-Cordero
Georgia Institute of Technology (USA)

Ana Hiza Ramirez Andrade
Univ. of North Carolina at Charlotte (USA)

Venugopal Raskatla
National Institute of Technology Warangal (India)

Armand Rathgeb
Univ. of Texas at Dallas (USA)

Mykyta Redkin
Taras Shevchenko National Univ. of Kyiv (Ukraine)

Farnaz Sahragard
Univ. of British Columbia (Canada)

Yuki Sano
Univ. of Tokyo (Japan)

Anjum Shahzad
Quaid-i-Azam Univ. (Pakistan)

Hardit Singh
Cameron Heights Collegiate Institute (Canada)

Edyta Środa
Wroclaw Univ. of Science and Technology (Poland)

Yohan Szuszko Soares
Universidade Federal do Paraná (Brazil)

Mahsa Torfeh
Univ. of Southern California (USA)

Ashish Tummuri
Manipal Univ. Jaipur (India)

Erica Venkatesulu
Montana State Univ. (USA)

Gabriela Isabel Vera Garfias
Univ. Autónoma Metropolitana (Mexico)

Simon Ward
Vanderbilt Univ. (USA)

Alicia Wei
Univ. of Notre Dame (USA)

Zixian Wei
McGill Univ. (Canada)

Benjamin Wilson
Univ. of Dayton (USA)

Ivy Hei Man Wong
Hong Kong Univ. of Science and Technology (Hong Kong China)

Xiaohui Xu
Purdue Univ. (USA)

Haiqiu Yang
Columbia Univ. (USA)

Hajun Yoo
Yonsei Univ. (Republic of Korea)

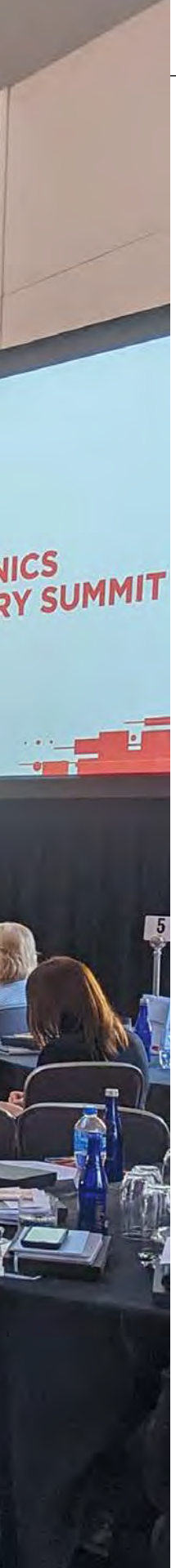
Mohammadreza Zandehshahvar
Georgia Institute of Technology (USA)

Teresa Zhang
Emma Willard School (USA)

Kai Zou
Tianjin Univ. (China)

> This scholarship enabled me to continue my research project on evaluating the safety of an implantable optical sensor in a series of animal experiments, prior to moving this technology towards human clinical trials for patients with spinal cord injury.
>
> –**Farnaz Sahragard,** Canada.


Welcome to
SPIE.
PHOTONICS
INDUSTRY SUMMIT
SPIE.
10
17



INDUSTRY CONNECTIONS AND RESOURCES

SPIE provides the necessary bridge between people working in industry, government, and academia. Our events, exhibitions, and programs are designed to support companies as they grow and expand into new markets; identify emerging market segments; find new suppliers; and hire the optics and photonics talent required to innovate and build winning products.

In addition to our longstanding SPIE Industry Report, the exciting Startup Challenge, and the prestigious Prism Awards, we also offer industry-focused executive events at our major meetings for in-person engagement and networking purposes.

Selected highlights:

» The in-person launch of the SPIE Quantum West industry program at Photonics West in cooperation with the QED-C. This was in addition to our weeklong industry program that included sessions on 3D sensing, healthcare, government policy, a photonics market update, and an executive insights forum. The industry program at Photonics West is designed to support the 1,000+ companies that exhibit at the trade show — as well as buyers that come to the event — by showcasing timely and relevant content on emerging topics and markets.

» Our AR|VR|MR conference and exhibition has already established itself as a must-attend event in the community, featuring speakers from leading companies and highlighting the most advanced products and technologies.

» An insightful keynote session at SPIE Defense + Commercial Sensing (DCS) on successful business-government relations. The program featured Anthony Di Stasio, director of the Defense Production Act, Title III, and speakers from major government labs. We also partnered with the Florida Photonics Cluster to showcase regional photonics companies at the exhibition. The overall DCS program included sessions on AI/ML for security and defense, hyperspectral imaging, lidar, government policy, and a photonics market update.

» Photonex featured a robust two-day industry program in the UK with sessions on topics of technical interest such as quantum, fusion energy, and compound semiconductors, complemented by sessions on topics of social interest such as energy, the environment, and net zero. Sessions also included updates on recent trends in government policy.

« SPIE CEO Kent Rochford speaking at the inaugural — and highly successful — SPIE Photonics Industry Summit in Washington, DC. (See page 32 for more information).

PUBLIC POLICY, GLOBAL ADVOCACY

SPIE advocates on behalf our global community, representing the interests of students, researchers, engineers, and optics and photonics companies. We work with the US Department of Commerce Sensors and Instrumentation Technical Advisory Committee (SITAC) — which SPIE staff in Washington, DC, currently chair — hosting committee meetings where policy recommendations are created, increasing access for our industry constituents as well as advocating key priorities for laser and sensor companies.

Selected highlights:

- We hosted the inaugural SPIE Photonics Industry Summit in Washington, DC. The one-day event brought together high-level US Government representatives and C-level executives for discussion, Q&As, and networking. It drew wide attendance from across the optics and photonics community, as well as high-profile industry sponsorship.
- Through our work as chair of the Sensor and Instrumentation Technical Advisory Committee within the Department of Commerce, we advocated for a proposal to make changes to US regulations regarding uncooled infrared technology.
- We worked with the international community, and partner organization SPECTARIS, to submit two export control proposals to make changes to international Wassenaar Agreements in areas governing laser technology.
- We advocated for passage of the NIST for the Future Act, which successfully passed into law as part of the CHIPS and Science Act.
- We organized and hosted a multi-agency stakeholder meeting through the National Photonics Initiative to discuss National Quantum Initiative reauthorization as well as needed improvements to the initiative.

> **SPIE did an amazing job getting together key industry and government leaders to share thoughts and ideas. The day equipped us with a much better understanding of the opportunities available and how to help drive the optics and photonics industry forward.**
>
> **–Debbie Gustafson**
> Energetiq CEO.

SPIE Photonics Industry Summit 2022

SPIE PRISM AWARDS FOR BEST NEW PRODUCTS

Since 2009, we have been recognizing the companies and teams who have launched the best new products of the previous year. Today, the Prism Awards for Photonics Innovation are recognized as the top new product awards in our industry. The annual awards banquet at SPIE Photonics West has become the largest get-together for industry executives, investors, and entrepreneurs. Companies from around the world benefit from recognition and differentiation earned by their association with Prism Award finalists and winners.

2022 WINNING COMPANIES		
AUGMENTED & VIRTUAL REALITY	**Luxescel**	VisionPlatform™
AUTONOMOUS VEHICLES	**Lumotive**	Meta-Lidar™ Platform
BETTER SENSING	**SWIR Vision Systems**	Acuros® eSWIR Camera
BIOMEDICAL DEVICES	**PlenOptika**	QuickSee
DISPLAYS	**BRELYON**	Ultra Reality Display
INDUSTRIAL LASERS	**Civan Lasers**	OPA 6 Weld
MANUFACTURING & TEST	**LightPath Technologies**	Freeform Optics
QUANTUM	**ColdQuanta**	Albert: The Quantum Emulator Machine
SCIENTIFIC LASERS	**Stuttgart Instruments**	Alpha
SOFTWARE	**Zemax**	OpticStudio STAR Module

ColdQuanta accepting their 2022 SPIE Prism Award.

SPIE.

AWARDS

2022 SOCIETY AWARDS

The SPIE Awards Program is the most prestigious way the Society recognizes professional and personal excellence, and one of the longest-running Society programs. Since 1959, SPIE has honored the best in optics and photonics for their significant achievements and contributions in advancing the science of light.

Michael Berns
Gold Medal of the Society

Thomas Ebbesen
Mozi Award

Jürgen Czarske
Chandra S. Vikram Award In Optical Metrology

Tuan Vo-Dinh
President's Award

Ge Wang
Aden and Marjorie Meinel Technology Achievement Award

Gabriel Popescu
Dennis Gabor Award in Diffractive Optics

Julie Bentley
Directors' Award

Bert Müller
Biophotonics Technology Innovator Award Award

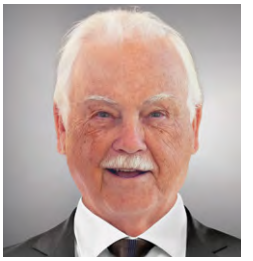
Qaisar Abbas Naqvi
Diversity Outreach Award

Bruce Tromberg
Britton Chance Biomedical Optics Award

2022 SOCIETY AWARDS

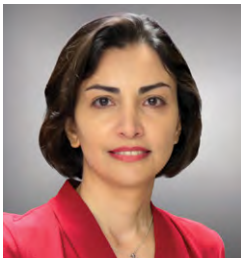
Bhavin Shastri
Early Career Achievement Award—Academic Focus

Michelle Stephens
George W. Goddard Award in Space and Airborne Optics



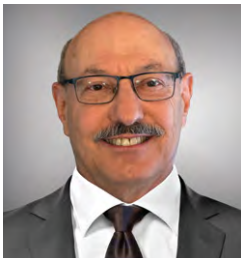
Bill Krupke
Maiman Laser Award

Lionel Clermont
Early Career Achievement Award—Industry/Government Focus



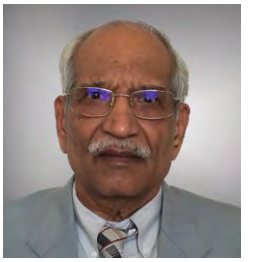
Mona Jarrahi
Harold E. Edgerton Award in High-Speed Optics

Shin-Tson Wu
Maria Goeppert Mayer Award in Photonics

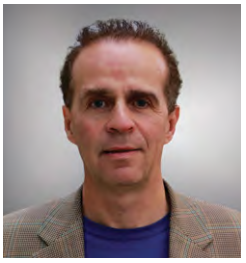


Harry Levinson
Frits Zernike Award for Microlithography

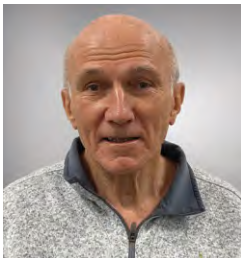
Maryellen Giger
Harrison H. Barrett Award for Medical Imaging



Rajpal Sirohi
María J. Yzuel Educator Award

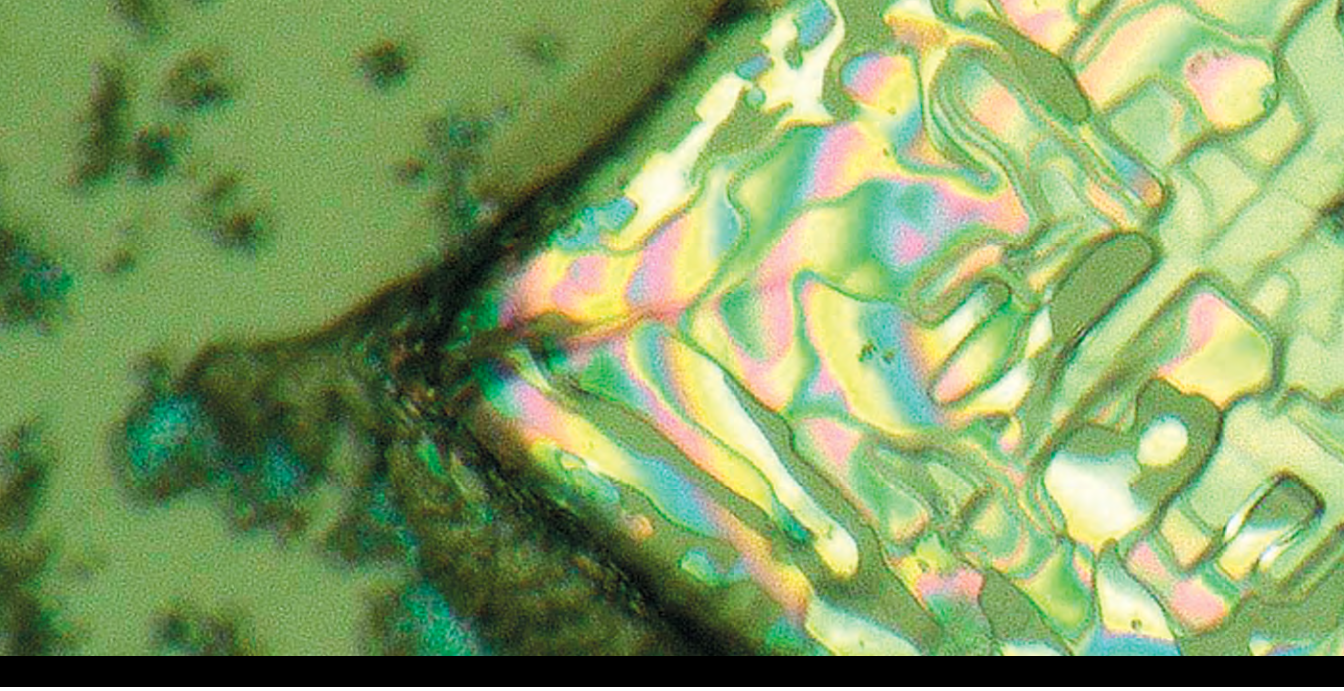


Alex Vitkin
G.G. Stokes Award in Optical Polarization



Paul McManamon
Joseph W. Goodman Book Writing Award

Masato Shibuya
Rudolf and Hilda Kingslake Award in Optical Design



FELLOWS AND SENIOR MEMBERS

SPIE Fellows have made significant contributions in the multidisciplinary fields of optics, photonics, and imaging. They are honored for their technical achievement, for their service to the general optics community, and to SPIE.

Senior Members are recognized for their professional experience, active involvement with the optics community and SPIE, and achievements that set them apart from their peers.

SPIE congratulates all those listed below.

2022 FELLOWS: 58 NEW SPIE FELLOWS ELECTED

Prof. Wengang Bi
Prof. Steve Blair
Prof. Shean-Jen Chen
Dr. Weijie Chen
Prof. Pankaj K. Choudhury
Dr. Vincent M. Cowan
Prof. Mini Das
Prof. Charles A. DiMarzio
Dr. James T. Dobbins
Dr. Jean J. Dolne
Prof. Kevin W. Eliceiri
Dr. Nelson M. Felix
Prof. Ling Fu
Prof. Yu Fu
Prof. Michael E. Gehm
Dr. Manuel Guizar-Sicairos
Prof. Christoph Hoeschen
Dr. Hyun Wook Kang
Prof. Anupama B. Kaul
Ms. Tina E. Kidger
Dr. Chiman Kwan
Prof. Bennett A. Landman
Prof. Jiun-Haw Lee
Prof. Yi-Hsin Lin
Dr. Dariusz Litwin
Prof. Tien-Chang Lu
Dr. Kevin Lucas
Prof. Yuan Luo
Dr. Wayne R. McKinney
Dr. Mike J. McShane
Dr. Gualtiero Nunzi Conti
Prof. Salah Sabry A. Obayya
Prof. Lidia Ogiela
Prof. Uzodinma Okoroanyanwu
Dr. Elisabet Pérez Cabré
Prof. Malin Premaratne
Dr. M. Yasin Akhtar Raja
Dr. Haisheng Rong
Prof. Yasuhiko Shimotsuma
Prof. Shy Shoham
Dr. Tatyana Sizyuk
Prof. Henry A. Sodano
Prof. Volker J. Sorger
Dr. Mark F. Spencer
Mr. Christopher J. Stolz
Dr. Jinghua Teng
Prof. Sergio N. Torres
Prof. Jian Wang
Prof. Lizhe Wang
Prof. Xueding Wang
Prof. Douglas H. Werner
Prof. Kenneth K. Y. Wong
Prof. Fei Xu
Dr. Sumio Yano
Prof. Ta-Jen Yen
Prof. Xiaobo Yin
Prof. Baohong Yuan
Prof. Xihua Zou

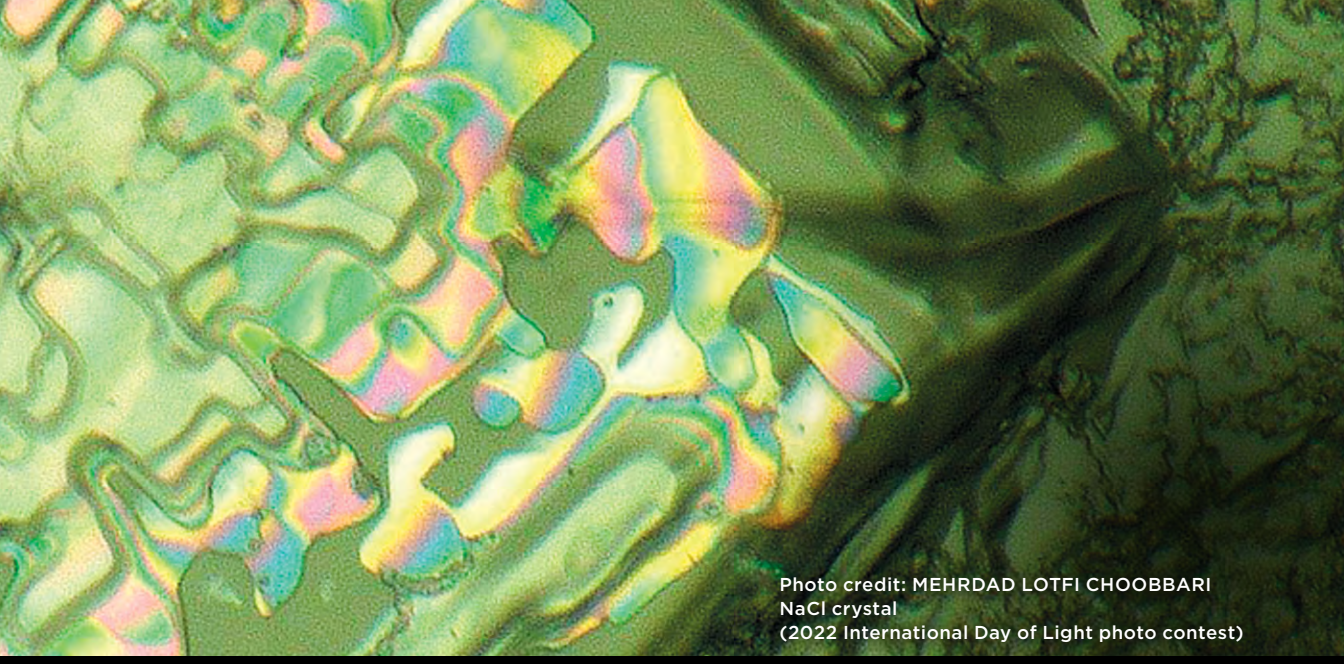


Photo credit: MEHRDAD LOTFI CHOOBBARI
NaCl crystal
(2022 International Day of Light photo contest)

2022 SENIOR MEMBERS: 77 NEW SENIOR MEMBERS ELECTED

Prof. Shiva Abbaszadeh
Prof. Igor Aharonovich
Prof. Hatice Altug
Dr. Gilles R. Amblard
Prof. George Barbastathis
Prof. David J. Bergman
Dr. Brett C. Byram
Prof. Wenshan Cai
Dr. Sawyer D. Campbell
Prof. Artur Carnicer
Dr. James T. A. Carriere
Dr. Devendra Chack
Prof. Heang-Ping Chan
Dr. Chih-Wei Chu
Dr. Anuja De Silva
Mr. John W. Devitt
Dr. Karen Drukker
Prof. Andrey Valerevich Dunaev
Dr. Stanislav Y. Emelianov
Ms. Olivia R. Fehlberg
Dr. Allen H. Gabor
Prof. Enrique J. Galvez
Prof. Sylvain Gioux
Dr. Frank U. Grupp
Dr. Vitaly E. Gruzdev
Dr. Abbas Haddadi
Prof. Xiaolong Hu
Prof. Guoliang Huang
Ms. Agnes Hübscher
Dr. Brajesh Kumar Kaushik
Prof. Edward C. Kinzel
Prof. Michael C. Kolios
Prof. Ioannis Kymissis
Prof. Irina V. Larina
Prof. Howard Lee
Dr. Myungjun Lee
Prof. Thierry Lépine
Prof. Jinyang Liang
Prof. Natalia M. Litchinitser
Prof. Yongmin Liu
Dr. Andrés G. Marrugo
Dr. Amalia Martínez-García
Dr. Jack E. McCrae
Dr. Asif Mehmood
Dr. Luciana Meli
Dr. Paul C. Montgomery
Dr. Mircea Mujat
Dr. Aulia Muhammad Taufiq Nasution
Prof. Heinz-Christoph Neitzert
Dr. Tatiana Novikova
Dr. Linyong Pang
Prof. Cheng-Wei Qiu
Prof. Ribal Georges Sabat
Dr. Takashi Sato
Mr. William M. Shensky
Prof. Cather M. Simpson
Prof. Maksim Skorobogatiy
Prof. Tsu-Te Judith Su
Prof. Jun Tanida
Prof. Chao Tian
Prof. Fatima Toor
Dr. Carlos M. Torres
Prof. Kevin K. Tsia
Dr. Christopher R. Valenta
Dr. Miranda van Iersel
Dr. Satish E. Viswanath
Dr. Edwin P. Walker
Dr. Alex J. Walsh
Dr. Lynn T. N. Wang
Prof. Timothy J. White
Prof. Yun-Feng Xiao
Prof. Yang Yue
Prof. Hao F. Zhang
Prof. Zhihong Zhang
Prof. Feifan Zhou
Dr. Weimin Zhou
Prof. Yiming Zhu

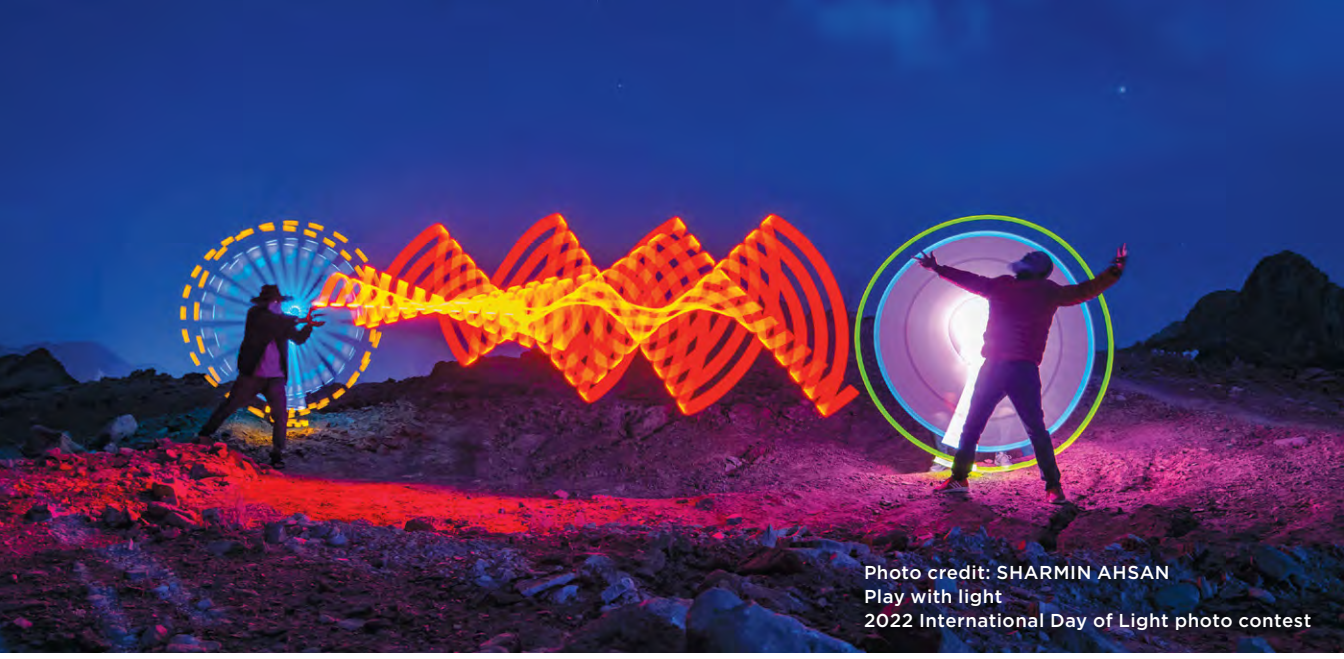
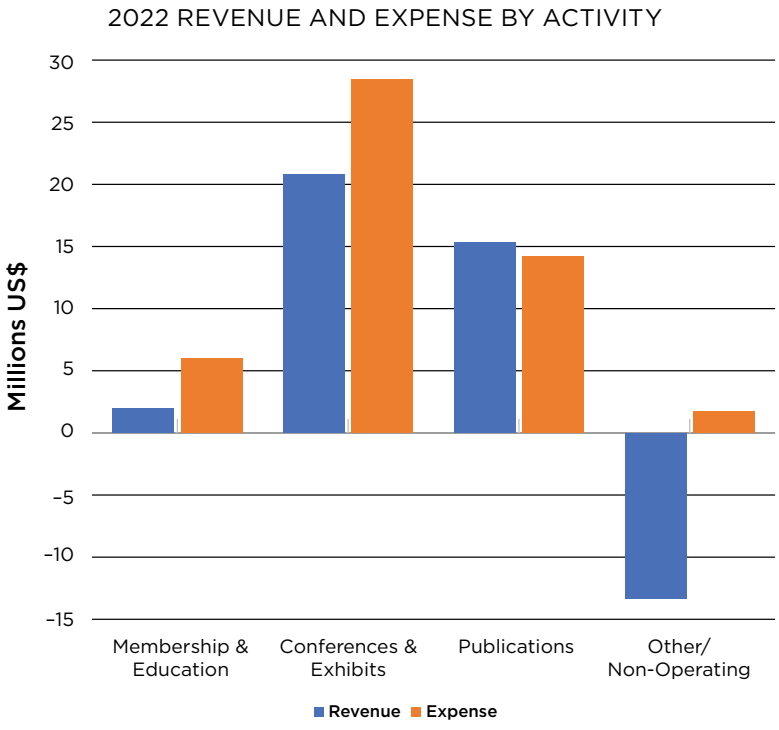


Photo credit: SHARMIN AHSAN
Play with light
2022 International Day of Light photo contest

FINANCIAL SUMMARY

SPIE generates revenue through publications, exhibitions, conferences, educational programs, and individual and organizational memberships. In addition, the Society holds investment assets in the financial markets, with a Board goal of maintaining investment levels that contribute to SPIE community-development programs and provide SPIE with the ability to continue to support our community during challenging economic times.

In 2022 SPIE generated **$24,570,654** in revenue with **$50,273,260** in expenses, resulting in an overall loss of **$25,702,606**.



During 2022, SPIE provided nearly $4 million in community support that includes scholarships and awards, outreach and advocacy programs, travel grants, public policy, and educational resources. Aligned with our focus on community support and education, the SPIE Board of Directors approved an endowment at the University of Rochester, as part of the SPIE Endowment Matching Program, an educational-funding initiative that supports the establishment of endowed chairs and scholarships that directly expand education and research in optics and photonics.

SPIE FINANCIALS BY KEY ACTIVITY

SPIE remains positioned to continue our mission of supporting the optics and photonics community, even during challenging times. With a long history of prudent volunteer leadership, cautious financial management, and the involvement of thousands of scientists and engineers globally, SPIE is using our resources for the good of our community while continuing to manage the organization in an economically responsible and sustainable way.

	2021	2022
	Total $	Total $
Revenue by Product Line		
Membership & Education	1,338,743	1,990,806
Conferences & Exhibits	6,487,708	20,838,588
Publications	13,274,281	15,066,328
Other/Non-Operating	17,270,618	(13,325,068)
TOTAL REVENUE	**38,371,349**	**24,570,654**
Expense by Product Line		
Membership & Education	3,416,603	5,964,220
Conferences & Exhibits	14,939,299	28,407,685
Publications	10,755,398	14,184,033
Other/Non-Operating	8,186,887	1,717,322
TOTAL EXPENSE	**37,298,186**	**50,273,260**
Net Surplus/(Deficit)	**1,073,163**	**(25,702,606)**

2022 ANNUAL MEETING MINUTES

MINUTES OF THE ANNUAL MEETING of the SOCIETY OF PHOTO-OPTICAL INSTRUMENTATION ENGINEERS (SPIE)

Monday, 22 August 2022
10:00 AM–11:00 AM PT
San Diego Marriott Marquis: Marina Ballroom D
San Diego, CA 92101

AGENDA

1. Meeting called to order by the President (Anita Mahadevan-Jansen)
2. Certification of quorum (Allison Romanyshyn)
3. Approval of Agenda
4. Approval of the Minutes from the Annual Meeting 2 August 2021
5. Report of the President (Anita Mahadevan-Jansen)
6. Report of the Treasurer (Jason Mulliner)
7. Report of the CEO (Kent Rochford)
8. Election Results from the President (Anita Mahadevan-Jansen)
9. Q & A with SPIE Officers
10. Other Matters Appropriate for Discussion
11. Time and Location of Next Meeting
12. Adjournment

1. **Meeting called to order by the President:** SPIE President, Anita Mahadevan-Jansen, called the Annual General Meeting to order at 10:01 am.
2. **Certification of quorum:** Allison Romanyshyn, SPIE staff, explained that while business as stated on the agenda could be conducted, a quorum was not reached, and therefore no new business could be conducted.
3. **Approval of the Agenda: Bob Lieberman moved to approve the agenda** and **Jim Oschmann seconded.** There was no objection to approve the agenda as written. The agenda was approved.
4. **Approval of the Minutes from the Annual Meeting 2 August 2021: Allison Barto moved** to approve the minutes, and **David Andrews seconded. All were in favor. Motion passed. The minutes were approved.**
5. **Report of the President:** Mahadevan-Jansen began her presentation with a remembrance of SPIE Past President John Greivenkamp who passed away in 2022. Mahadevan-Jansen then highlighted SPIE programs and activities in 2021. This included providing more than $4 million in community support in the form of scholarships, student development, public education and awareness, career development, awards, industry advocacy, sponsorships and university programs, equity, diversity, and inclusion activities, and the endowment matching program. She provided details about these programs and featured some of the recipients of these funds in 2021. In closing, Mahadevan-Jansen urged members to nominate their colleagues for the SPIE awards program and for elevation to Senior and Fellow member categories.
6. **Report of the Treasurer:** SPIE COFO, Brad Ferguson, reported the financial status of the Society on behalf of 2022 SPIE Secretary/Treasurer, Jason Mulliner. SPIE spent just under $4 million on community and support activities in 2021, accounting for over 14% of operating revenue. SPIE's total revenue and surplus for 2021 (inclusive of investments) were $38.4 million and $1.1 million respectively. Operating revenue and surplus were $27.1 million and -$8 million, respectively. The Society withdrew $7 million in 2021 from its investment portfolio to sustain operations and community support programs; a conservative and diversified portfolio keeps SPIE well positioned for the future. Ferguson explained that by the end of 2021, SPIE was in a great position concerning investments, and on a trajectory to improve operational financials in 2022. Ferguson thanked the SPIE staff for continuing the excellent financial stewardship that allows SPIE to support its members and the greater photonics community.
7. **Report of the CEO:** SPIE CEO, Kent Rochford, began his presentation by reviewing the mission of SPIE. He explained that the Society stuck to this mission throughout the pandemic by continuing to provide world-class events that served applied scientists, researchers, engineers, and photonics companies. 2021 was a year of transitioning from online-only meetings conducted via the SPIE Digital Forum, to a hybrid meeting model, and finally to in-person only meetings. Rochford highlighted the volume and popularity of ma-

2022 ANNUAL MEETING MINUTES

terials in the SPIE Digital Library, noting 2021 was another record year for usage. In response to the challenges of the pandemic, SPIE extended its discounted institutional subscription pricing for a second year. Rochford concluded by thanking all the staff and volunteers who worked hard in 2021 so that the Society is able to continue serving the optics and photonics community during a very challenging year.

8. **Election Report from the President:** Mahadevan-Jansen announced the following individuals were selected as Officers and Directors of the Society for the periods indicated and will begin service on 1 January 2023.

Officers for 2023:

President: Bernard Kress, Google

President Elect: Jennifer Barton, University of Arizona

Vice President: Peter de Groot, Zygo Corporation

Secretary/Treasurer: Jim McNally, StratTHNK Associates

Directors for the 2023-2025 Term:

Jessica DeGroote Nelson, Edmund Optics

David Hagan, CREOL, University of Central Florida

Miles Padgett, University of Glasgow

Laura Waller, University of California, Berkeley

9. **Q & A with SPIE Officers:** SPIE Member Matt Posner asked if SPIE has data on which demographics aren't returning to in-person meetings. Rochford replied that it varies by meeting, but there is not a clear demographic shift, except for the decline in attendance by people from Asia and Australia, where travel has been most restricted.

   SPIE Member Jeremy Bos requested the Annual meeting time switch from 10:00am on the Monday of Optics+Photonics, back to 6:00 pm on the Tuesday of Optics+Photonics, occurring directly before the Member Reception. Mahadevan-Jansen replied that staff will revisit the schedule to see if this is possible in the future.

   SPIE Member Barbara Darnell agreed with moving the Annual Meeting back to 6:00pm on the Tuesday of Optics+Photonics, and also requested that SPIE not hold conferences in locations that are unsupportive of LGBTQ+ rights and reproductive rights.

   SPIE Member Nea Hamilton asked if there was another venue to ask questions of SPIE officers. Stacey Crocket provided the direct email for governance: governance@spie.org. Mahadevan-Jansen also encouraged all members to approach any staff, advisor, director, or officer at any SPIE event to ask them any questions they have.

10. **Other matters appropriate for discussion:** No other matters were discussed.

11. **Time and Location of next meeting:** The next Annual General Meeting will take place at the Marriott Marquis Hotel and Marina in San Diego California, USA in August 2023.

12. **Adjournment:** Jim Oschmann moved to adjourn the meeting and Maryellen Giger seconded. All were in favor. The meeting was adjourned at 10:33 am.

2023 ANNUAL GENERAL MEETING OF THE SPIE CORPORATION

22 August 2023 • 6:00 PM – 7:00 PM PT
San Diego Marriott Marquis:
Marina Ballroom D
San Diego, California

AGENDA

1. Meeting Called to Order by the President (Bernard Kress)
2. Certification of Quorum (Allison Romanyshyn)
3. Approval of Agenda
4. Approval of the Minutes from the Annual Meeting of 22 August 2022
5. Report of the President (Bernard Kress)
6. Report of the Treasurer (Jim McNally)
7. Report of the CEO (Kent Rochford)
8. Election Results from the President (Bernard Kress)
9. Q & A with SPIE Officers
10. Other Matters Appropriate for Discussion
11. Time and Location of Next Meeting
12. Adjournment

2022 SPIE COMMITTEES

AUDIT COMMITTEE

COMMITTEE CHAIR

Gary Spiegel
Strategic Consulting
United States

COMMITTEE MEMBERS

Allen Earman
Judy Fennelly
Joseph Howard
R. John Koshel
Makenzie Lystrup
Jessica DeGroote Nelson
Robert Sprague
David Wick

AWARDS COMMITTEE

COMMITTEE CHAIR

Kyle Myers
Puente Solutions LLC
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COMMITTEE MEMBERS

Samuel Achilefu
Nicholas Antipa
Sterling John Backus
Caroline Boudoux
Donis Flagello
Viktor Gruev
Maryah Elisa Morastoni Haertel
Sanjay Krishna
Elizabeth Krupinski
Charles LaCasse
Carmiña Londoño
Fernando Mendoza-Santoyo
Michal Pawlowski
Brian Primeau
Martin Richardson
Amrita Sahu
Joanna Schmit
Maciej Trusiak

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Jennifer Barton
John Greivenkamp
Bernard Kress
Anita Mahadevan-Jansen
Jim McNally

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Edmund Optics
United States

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Daniel Denison
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Marie-Christine Ferland
William Holtkamp
Alison Kohyama
Nishant Mohan
S. Craig Olson
Russell Spaulding
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Chris Toomey
Tori Uthe

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Edmund Optics
United States

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Cory Boone
Yun-Chorng Chang
Katie Chong
Benjamin Cromey
Marla Dowell
Oliver Fähnle
Kate Medicus
Brian Monacelli
Cristina Elizabeth Solano
Alexis Vogt
Nicholas Heng Loong Wong
Linhui Yu

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United States

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Naamah Argaman
Kamran Avanaki
Walter Burgess
Olivia Fehlberg
Bo Gu
Hemang Jani
Nicole Naselaris
Madison Rilling
George Simion
Kirk Warden
Michael Williams

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Univ. of Queensland
Australia

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Srividya Jayaram
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Iva Laginja
Martin Leahy
Ying Lia Li
Latifah Maasarani
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Cather Simpson
Orlando Torres Perales
J. Scott Tyo
Frédérique Vanholsbeeck
Jessica Wade
Richard Youngworth

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Elder De la Rosa
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Rüdiger Grunwald
Mona Jarrahi
Edmund Lam
Gisele Maxwell
Hakaru Mizoguchi
Shouleh Nikzad
Jean-Christophe Olivo-Marin
Kara Peters
Jessica Ramella-Roman
Steffen Reichel
Eva Sevick
Perry Shum
Richard Silver
Georgia Tourassi
Norman Wereley
Rachel Won
George Zentai

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Yi Hua
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J. Scott Tyo
Christopher Wilcox
Christina Willis

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Rebecca Fahrig
Olivia Fehlberg
Goldie Goldstein
Nathan Hagen
Matthew Jungwirth
Saulius Juodkazis
Qian Kemao
Vasudevan Lakshminarayanan
Kyle Myers
Oliver Myers
Nicholas Petrick
Rosario Porras-Aguilar
Inga Saknīte
Michelle Lynn Stock
David Wick

2022 SPIE COMMITTEES

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COMMITTEE CHAIR

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Univ. of East Anglia
United Kingdom

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Kyle Myers
Jacobus Oschmann
Lorenzo Pavesi
Katie Schwertz
Prabhat Verma

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Qian Du
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Ifor Samuel
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Fatima Toor
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Ruda-Cardinal, Inc.
United States

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Claudio Castellan
Tatevik Chalyan
James Corsetti
Ronald Driggers
Angela Dudley
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Sergi Gallego Rico
Nea Hamilton
R. Luke Harris
Tomonori Hu
Daewook Kim
Maciej Kraszewski
Kenneth Loh
Anastacia Manuel
Moritz Merklein
Sonika Obheroi
Fenglin Peng
Brian Primeau
Carmelo Rosales-Guzmán
Sarmishtha Satpathy
Jami Shepherd
Zhimin Shi
Alex Sincore
Ghanshyam Singh
Elaine Maria Stewart
Nathália Tomazio
David Wayne
Brian Wheelwright
Heather Whitney
Chao Zuo

SENIOR MEMBER COMMITTEE

COMMITTEE CHAIR

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Clemson Univ.
United States

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Fow-Sen Choa
Jean Dolne
Marla Dowell
Kevin Eliceiri
Martin Forrer
Augustus Fountain
Frank Grochocki
Eunkyoung Kim
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P. Susthitha Menon
Stefan Nolte
Elisabet Pérez Cabré
Christopher Stolz
Shu-i Wang

2022 SPIE COMMITTEES

STRATEGIC PLANNING COMMITTEE

COMMITTEE CHAIR

Bernard Kress
Google
United States

COMMITTEE MEMBERS

Jennifer Barton
Scott Bass
Julien Blin
Dan Curticapean
Peter de Groot
Maryellen Giger
Marc Himel
Apurva Jain
Anita Mahadevan-Jansen (non-voting member)
Jason Mulliner
Jessica DeGroote Nelson
Kent Rochford
Halina Rubinsztein-Dunlop
David Sampson

SYMPOSIA COMMITTEE

COMMITTEE CHAIR

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Zygo Corporation
United States

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Mark Clampin
Emily Gallagher
Keisuke Goda
Agnes Hübscher
Jana Kainerstorfer
Kate Medicus
Karin Stein
Alexander van Eijk
Sharon Weiss
Christopher Wilcox

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2022 International Day of Light photo contest

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Alluxa
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BOARD ADVISOR
Kent Rochford
SPIE
United States

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Ball Aerospace
United States
(Term 2022-2024)

Audrey Bowden
Vanderbilt Univ.
United States
(Term 2022-2024)

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Board Advisor; Chair, Corporate and Exhibitor Committee
Edmund Optics
United States
(Term 2022)

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Chair, Symposia Committee
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United States
(Term 2022)

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Germany
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United States
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United Kingdom
(Term 2022)

Katie Schwertz
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United States
(Term 2020-2022)

Cristina Solano
Centro de Investigaciones en Optica AC
Mexico
(Term 2020-2022)

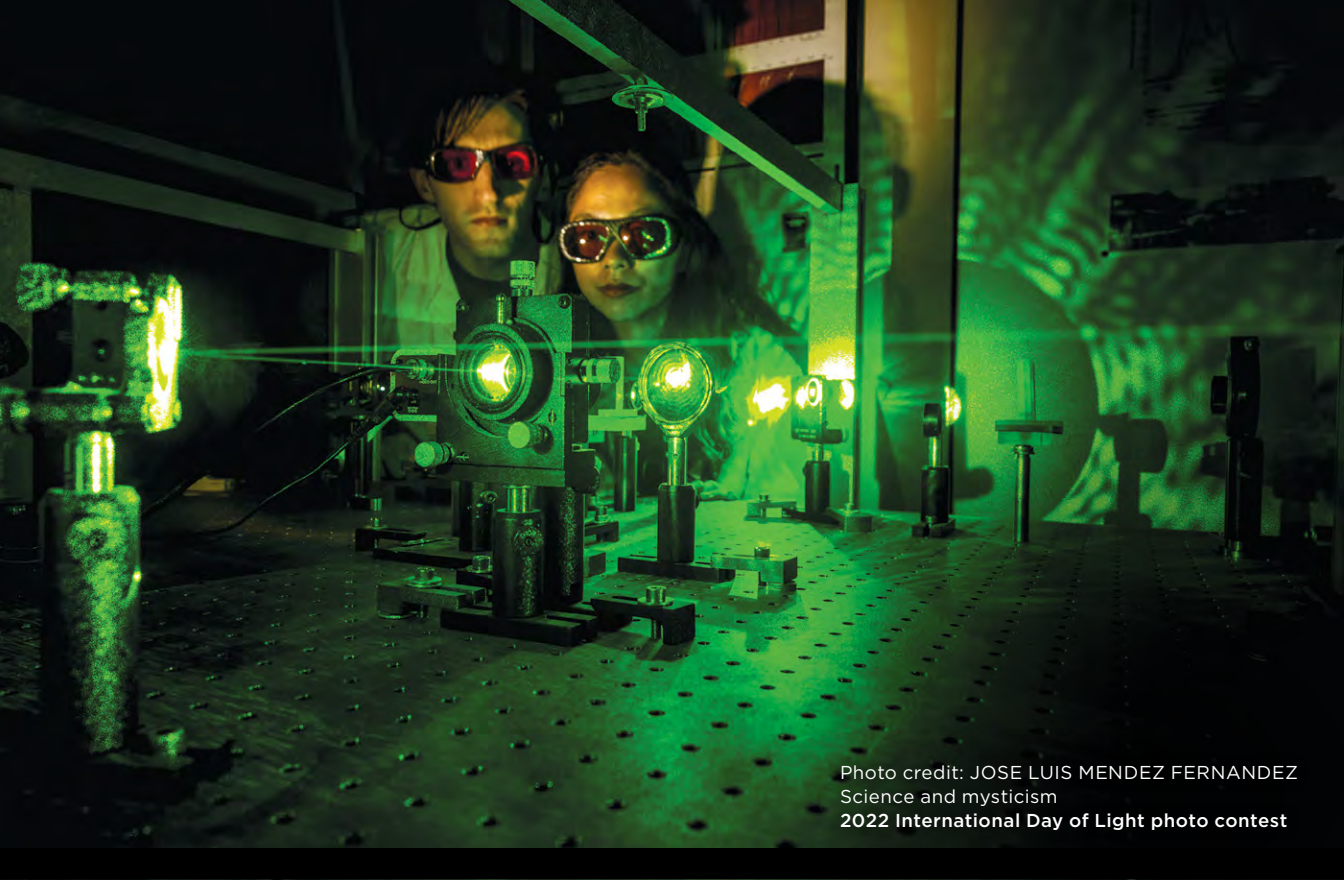

Photo credit: JOSE LUIS MENDEZ FERNANDEZ
Science and mysticism
2022 International Day of Light photo contest

SPIE MANAGEMENT

CHIEF EXECUTIVE OFFICER
Kent Rochford

CHIEF OPERATING AND FINANCIAL OFFICER
Brad Ferguson

SENIOR DIRECTOR, GLOBAL BUSINESS DEVELOPMENT
Andrew Brown

SENIOR DIRECTOR, TECHNICAL PROGRAMS
Marilyn Gorsuch

SENIOR DIRECTOR, INFORMATION TECHNOLOGY & CHIEF TECHNOLOGY OFFICER
Scott Ritchey

SENIOR DIRECTOR, COMMUNITY ENGAGEMENT & CHIEF INCLUSION OFFICER
Allison Romanyshyn

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I've been doing this trade show for 30 years now, and I have to say this year has been remarkable. Over the last two years with Covid, we missed the traffic and the new leads that come with that. This year, there was a nice synergy going on between the technical conference and the exhibit floor that has driven traffic to our booth. I've had so much fun, honestly. Whether the customers are from industry or are professors, it's been a great year.

–**Kelly Gregorak,** Vice President, Sales and Marketing, Meadowlark Optics.

It's been excellent! We've gotten a lot of leads, and I've been able to talk to a lot of the people, as well as making some additional contacts with my counterparts at other companies. I think that there's the fresh energy and excitement of being back doing trade shows and being amongst our peers.

–**LeeAnne E. Peters,** Customer Success Manager II-VI Aerospace & Defense.

SPIE Optics + Photonics 2022

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Light on the hair
2022 International Day of Light photo contest