OPTICA FOUNDATION



2023 ANNUAL REPORT

We fundamentally believe in cultivating the next optics and photonics workforce to improve our world.



optica.org/Foundation

Learn more about us and our commitment to fostering the next generation.

optica.org/Foundation



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Optica Foundation Annual Report 02

An introduction to our 2023 annual report:

Central to the mission of the Optica Foundation is the fundamental belief in actively cultivating the next generation of optics and photonics leaders. For over two decades, we've expanded our support, transforming innovative pilot programs into enduring initiatives that build a dynamic workforce of scientists, engineers, and business professionals.

This report celebrates the achievements of our community – donors, beneficiaries, and those who serve as mentors and leaders. We hope you enjoy reading a few stories highlighting the transformative power of a community in action focused on turning individual success into global achievements. Optics and photonics stand at the forefront of technological progress, driving solutions to global challenges, sparking discovery, and connecting people worldwide. Our collective effort propels those in our field and lays the groundwork for incredible advances in light-based technology.

Thank you for being a crucial part of the foundation and empowering us to impact the next generation positively.

- Optica Foundation Board of Directors



US\$2.9M

invested in training and support.

1,000+

engaged as reviewers, committee members, speakers, mentors and donors.

US\$0

spent on overhead and operating costs.*

10,900+

people in the community impacted by our programs.

*Labor and overhead are covered by Optica to ensure all donations go directly to programs and beneficiaries.

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Eric Van Stryland CREOL, USA

NEXT GENERATION STORIES

Creating a professional home for the next generation.

Optica has always been my professional home. When I was a graduate student at the University of Arizona in the 1970s, I joined the society, gave a talk at the Annual Meeting in Tucson, and it made such an impact on me that I have attended each one thereafter.

Engaging with Optica as a student enhanced my professional journey. For instance, student education has always been a priority for me. So, in 1987, when Optica President Bob Greenler nominated me to join what was then the Education Council, I jumped at the chance. Our work in that group helped to launch the first optics kits, which have evolved today into a key outreach component for student chapters at universities worldwide.

Fast forward to 2004, and I had the honor of being elected as vice president of the society and was part of the leadership team who supported the launch of the Optica Foundation. At the time, the board was focused on creating an organization to enhance and build upon the student experience and draw in the next generation of optics and photonics scientists and engineers.

That work has yielded results. Looking back on my tenure as part of Optica's leadership, I realized that when I started on the presidential chain, Optica had around 25 student chapters, and by the time I cycled off, we had grown to upwards of 70. Today, student chapters number more than 400 worldwide.

Launching the Siegman International School on Lasers As the foundation gained its foothold, its programs expanded to offer greater opportunity for impact, including hosting forums that brought students from around the world together to enhance their skills and network. For instance, the Siegman International School on Lasers—a program close to my heart and one I am proud to say I helped to build—assembles 100 emerging leaders each year for an indepth education on lasers and their applications.

The Siegman School arose from the desire to facilitate simpler global connections. In 2009, I joined Optica CEO Liz Rogan, then-President Tom Baer, and a few others on a trip to China to expand our relationship with the Chinese optics and photonics community. We met with Chineset officials to discuss

"At the time, the board was focused on creating an organization to enhance and build upon the student experience and draw in the next generation of optics and photonics scientists and engineers."



Student poster prize winners and Eric Van Stryland at the first Siegman School in 2014.

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holding a school of optics in China. We were able to act on this vision, and Optica Past Presidents Tony Siegman, Chris Dainty and I helped to organize the inaugural event in Changchun in 2010 to much success.

Unfortunately, the next year Tony Siegman passed away. At that point, the Optica Foundation decided to honor his legacy by establishing an annual event like the one in Changchun, naming it the Siegman International School on Lasers. I was humbled to become the program chair, for the first few years, and we held the first event under its new name at Tony's academic home, Stanford University, in 2014. 2024 is the 10th anniversary of this prestigious school, and it's apropos that it will take place back at Stanford.

"It's a privilege to have given and to continue to give back to my professional home through the Optica Foundation."

Continuing the Impact in 2023 We've had many successes with the foundation, but the work is far from done. As optics and photonics grow in prevalence as part of today's advanced technologies, the need for students to pursue this field continues to rise, and the foundation remains a primary vehicle for connecting emerging leaders with the broader optics and photonics community.

I have been fortunate to witness its impact firsthand over the past year. In fact, over the U.S. celebration of Thanksgiving, I spent a week in Recife, Brazil, to celebrate the twentieth anniversary of the start of the Recife chapter. There were at least three student chapters represented at the meeting-one of which I had initially helped to start up-and the enthusiasm was contagious. I spent a fair amount of time emphasizing the benefits of optics and photonics as a field of study and demonstrating its impact in some of the most profound consumer and scientific advances of the past decade.

Building for the Future

Today, the Optica Foundation has its eyes set on the future. Building on these key programs to provide not only student support and global connections, it also now boasts numerous opportunities for scholarships, prizes, in-depth training and skill-building programs to nurture the future of optics and photonics. When I think back to our vision for what the foundation could be, I can honestly say that it has exceeded all expectations, emerging



Eric and the Optica Student Chapter in Recife, Brazil.

as a vital contributor to advancing the science of light worldwide. I have always believed that current students are next-generation leaders and the lynchpin for future lightbased innovations. It's a privilege to have given and to continue to give back to my professional home through the Optica Foundation. Through its programs and initiatives, we are growing the global optics and photonics community and expanding our collective impact, and that's a cause that will stand the test of time.

Eric Van Stryland was the 2006 Optica President and is a donor and active participant in the Optica Foundation today. He is an emeritus professor and founding dean of CREOL, The College of Optics and Photonics at the University of Central Florida (UCF).



Faezeh Gholami 2022 Optica Ambassador *IBM, USA*

NEXT GENERATION STORIES

Supporting and mentoring future generations.

The struggles women in the sciences go through are well known, and for immigrants, there's another layer of challenge tied to adapting to a new culture. I was fortunate to have had dedicated mentors to guide me, empowering me with their wisdom and support in navigating the nuances of professional life. Reflecting on my career journey, I recognize that my accelerated advancement to a leadership position at IBM wouldn't have been possible without the invaluable support of those who came before me. It was this recognition and the

deep-seated desire to give back to others that compelled me to become an Optica Ambassador.

Inspiring confidence (and connection)

As a student, I was shy and hesitant to reach out to people for help, and I wish back then I had a program like the ambassadors—mentors close to my age with diverse experiences it would have meant a world of difference. Now, as an ambassador myself, I realize simply sharing my story and offering up my experiences enables students and early-career professionals to feel seen and understood.

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For instance, during COVID, my ambassador cohort set up virtual "office hours" for students and earlycareer professionals. We set specific times to be available to connect with those from the community around the globe. Many were in the middle of deciding whether to remain in academia or pursue industry, and with ambassadors in both areas, we were able to offer first-hand perspectives and provide counsel on the benefits and challenges of both. These office hours helped build connections during a very remote time in our lives, and those with whom I spoke gained new insights into the possibilities of careers in industry.

Making an impact

Then, in 2023, I participated as a speaker and mentor at a conference initiated by my fellow ambassador, Jhonattan Cordoba, Universidade Federal de Minas Gerais (UFMG), Brazil. Our goal was to provide sessions on optics and photonics, coupled with discussions about career paths. What they lacked in resources, the audience more than made up for in enthusiasm and interest. After the event, some of the students shared that I was the first woman engineer they had ever met and the first person from abroad who had visited them, and I hope that my talk planted a seed of possibility.

I also helped Tatevik Chalyan, Vrije Universiteit Brussel, Belgium, another amazing Optica Ambassador,



Faezeh and Jhonattan (center) at the Optica meeting for the Pacific in Quibdo, Colombia.



Faezeh and Tatevik Chalyan with the **participants** of the student conference in Armenia.

organize a conference in Armenia, neighbor to my home country of Iran. We offered travel grants for students, which enabled participation from geo-politically challenged regions of the world, drawing in those who may not otherwise have been able to attend. I served as a traveling lecturer and spent four days with students who held similar backgrounds and faced similar challenges, offering insights into potential career paths.

To give is to receive

This experience has not been a oneway street. The Optica Foundation has given me as much, if not more, than I have given. I have had many first-time opportunities with the foundation: the first time on a panel, first time as a speaker, first interview, and so much more. One of my biggest pieces of advice for my mentees is: Volunteer your time. It has been such a privilege to be part of something that contributes so much to this evergrowing community. Through programs like the ambassadors, we are building a stronger, more diverse and global community, one emerging leader at a time.

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Optica Ambassadors provide career advice, technical knowledge and mentorship with students and earlycareer professionals, supporting professional development. The program is made possible by generous donations to the Optica Foundation Annual Fund. More information can be found at optica.org/Ambassadors.



OPTICA STUDENT CHAPTERS

The Optica Foundation offers grants to the community of 400+ Optica Student Chapters offers unique programs focused on professional development, education outreach, and diversity and inclusion. In 2023, the foundation allocated US\$100,000 to support chapter programs.



"Participating in a chapter has connected me to new friends, mentors and opportunities well-beyond my university. My favorite activities with my chapter are connecting with kids in our local community and getting them excited about physics through the beauty of optical phenomena."

Giovana Bonano Carlos, Universidade Federal do ABC, Brazil

optica.org/StudentChapters

OPTICA AMBASSADORS

The Optica Ambassador program empowers emerging leaders in our community with a unique distinction and resources. Ambassadors provide career advice, technical knowledge, and mentorship to students and earlycareer professionals by supporting professional development events at meetings, universities and corporations worldwide.



"As an Optica Ambassador, connecting with students and early career professionals from around the world has taught me a lot about myself and the optics community. These experiences have helped me evolve as a leader and mentor so that I can continue to inspire and support current and future generations of scientists and engineers."

Atrouli Chatterjee, 2023 Optica Ambassador, Yale University, USA

optica.org/Ambassadors





SCHOLARSHIPS & STUDENT PRIZES

Careers in photonics begin with rigorous study and research. We offer scholarships, student prizes and travel grants to recognize early excellence, and remove need-based barriers. These programs include the Amplify Scholarship for Black Scientists, Optica Women Scholars, Photonics Workforce Scholarship (piloted in 2023), Corning Women Scholarship, Stoicheff Memorial Scholarship, Pollicove Memorial Scholarship, the Hilbert, Bennett and Incubic Travel Grants, Maiman Student Paper Competition and Corning Student Paper Competition.



"When I was recognized as an Amplify Scholar this year, I discovered there is a community and network there to support me throughout my career, and I'm thrilled to be a part of it."

Adeyinka Yusuf, 2023 Amplify Scholar, Friedrich Schiller University Jena, Germany

optica.org/StudentOpportunities

EARLY-CAREER PRIZES & COMPETITIONS

As early-career professionals embark on their careers, they possess immense potential to excel, enriching the field as they advance in their careers. The foundation offers a suite of prizes and fellowships recognizing this potential while providing financial resources to follow their interests. These programs include the Tingye Li Innovation Prize, Thomas F. Deutsch Memorial Fellowship, Theodor W. Hänsch Prize in Quantum Optics and Bernard J. Couillaud Prize in Ultrafast Lasers.



"Receiving the Couillaud Prize has opened many doors. It has helped to put a spotlight on my research on ultrafast frequency combs, and the recognition from the community will go even further than the US\$20,000 prize in advancing my career."

Edoardo Vicentini, 2023 Couillaud Prize in Ultrafast Lasers, Spain

optica.org/ECPOpportunities



Victoria Xu 2023 Winner, Theodor W. Hänsch Prize in Quantum Optics *MIT Kavli Institute - LIGO Laboratory, USA*

NEXT GENERATION STORIES

Enabling a new research paradigm.

As a new award in 2023, the Hänsch Prize spoke to me because it provided visibility for work that takes research in very complex technical directions—few prizes celebrate that level of fundamental exploration. The prize was even more attractive because Dr. Hänsch's work in laserbased precision measurements paved the way for the work I do today, which focuses on quantum measurement science.

Team effort

Needless to say, winning the prize

was a huge honor, not just for me but for the entire Laser Interferometer Gravitational-Wave Observatory (LIGO) team. There are hundreds of us collaborating, with decades of theory and experimental proposals coming together to advance quantum science. It's a significant step forward to explore the limits of a quantum interferometer, which has increased the volume of the gravitational waves we can detect by 65% and reduced noise by upwards of 40%.

There are hundreds of us collaborating, with decades of theory and experimental proposals coming together to advance quantum science.

I'm proud to be one piece of a puzzle that has enabled much in a brief time. In fact, we're starting to detect black holes about 10 to 11 billion years in the past. The universe is 13.8 billion years old, so we're beginning to see gravitational waves pushing into cosmic times. As we increase the sensitivity of our detectors, we will be probing earlier and earlier in the universe to places we can't see electromagnetically, and that's exciting; we are going to make fascinating discoveries unimaginable 20 years ago.

Pursuing long-term impact

Despite these milestones, when working on fundamental science, it can be challenging to see the daily impact. It's just been nine years since the start of gravitational wave astronomy, and where we are now in using lasers for precision measurements is like the difference between making the first lens and developing the James Webb space telescope. We've advanced technically at a rapid pace, yet sometimes, we need a reminder of just how far we've come. The Hänsch Prize recognition has given a boost to all of us, to the project, reminding us that what we do matters and that our work will have long-standing outcomes.

I had that same encouragement when I attended Optica's Quantum 2.0 meeting to receive the prize. I met members of the prize selection committee and other conference leadership. In addition to feeling flattered our work was so widely acknowledged, I also made meaningful career connections. For



Victoria Xu, Paul Blackborow, Hamamatsu Photonics; Sterling Backus, Thorlabs Inc., and Ronald Holzwarth, Menlo Systems GmbH (left to right) at Optica Quantum 2.0 in 2023.

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instance, Garrett Cole, technology manager at Thorlabs, invited me to do a seminar on our developments. Seeing others excited about these advancements and what they mean for science was pretty profound.

Future efforts

LIGO research is making an essential impact in quantum optics, but for a researcher, it's not always an easy decision to jump into a large-scale project. I firmly believe if you find something that interests you, you will also find collaborators and likeminded people who see the value in what you do and support your potential—no matter the project's size. That's certainly true for me, and the Hänsch Prize not only helped to expand the project's visibility, but it also enabled me to demonstrate that there's a career in doing this type of

I firmly believe if you find something that interests you, you will also find collaborators and like-minded people who see the value in what you do and support your potential no matter the project's size. work, one where individual success is celebrated.

Of course, engaging with the Optica Foundation helps as well. Through this prize, I've discovered a world of collaborators, mentors and quantum enthusiasts, not to mention an expanded awareness of my role in this ecosystem. None of this would be possible without the support of the Hänsch Prize donors Menlo Systems, Thorlabs and Hamamatsu Photonics, and for that, I am deeply grateful.

The Hänsch Prize was launched in 2023, It is funded by a US\$250,000 contribution from Menlo Systems, Thorlabs and Hamamatsu Photonics to be offered for ten years. You can learn more at optica.org/HaenschPrize



Victoria at work.



SCHOOLS & TRAINING PROGRAMS

We offer a suite of training programs for students and early-career professionals seeking guidance on career paths and skills for the photonics workforce. These programs include Amplify Optics Immersion, the Siegman School, Career Accelerators, the Innovation School and Level Up Leadership.



"I was thrilled to have my application to the Siegman School accepted and be able to attend the 2023 program in Ireland. I met so many people from all over the world—including so many speakers who I had only known from scientific papers before. It was an amazing experience. "

Maisarah Mansor, Universiti Putra, Malaysia

optica.org/Schools



OPTICA

The 2023 Siegman School on Lasers, Dublin City University, Ireland

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Maimuna Nagey 2022 Optica Women Scholar & Amplify Optics Immersion Attendee *Creighton University, USA*

NEXT GENERATION STORIES

Advancing a career with community support.

My interest in optics was born in high school when a neighbor underwent laser surgery to remove a tumor. I was astonished by the possibilities of optical technologies, but as a Black Muslim woman interested in science in Kenya, I wasn't supported or encouraged to pursue this path.

Enabling education

Receiving the US\$10,000 Optica Foundation Women Scholar award changed what I thought was possible. First, I was able to fund my undergraduate education in Kenya, relieving so much financial stress, as in my home country, it is nearly impossible to work and study simultaneously because classes occupy up to 14 hours per day. The scholarship also covered the costs of the equipment I needed—something that would not have been possible without the grant.

Building community

Then, that same year, the Optica Foundation invited me to attend the Amplify Optics Immersion Program—a unique program made possible by Edmund Optics—in Rochester, N.Y., which would mark my first time coming to the U.S. I was very nervous, concerned that people wouldn't understand me or I them, but I needn't have worried. Professors and peers were immediately invested

It was also an honor to be in a room filled with 50 other young Black scientists and engineers and to begin building relationships that will last a lifetime.

in my knowledge, success, and what I wanted to do in the future. I had never seen such support in my life! It was also an honor to be in a room filled with 50 other young Black scientists and engineers and to begin building relationships that will last a lifetime. I connected with leaders in the field, with whom I shared my story. The kindness I received was so much more than academic: It was love and acceptance.

Forging a career

At the program, I was fortunate to meet Turan Erdogan, president, Plymouth Grating Laboratory, Inc. During our conversation, he asked

me what I wanted to do. I shared my passion for medical physics, but I wasn't sure I would be able to afford a master's program at Creighton University, where I wanted to go. Mr. Erdogan immediately introduced me to Professor Timothy Baran, University of Rochester, U.S., who, in turn, connected me with the program director of Medical Physics at Creighton. Everyone encouraged me to finish the application, and a few days after I submitted it, I received my acceptance letter, along with a fellowship and research assistantship to cover the costs.



Amplify Optics Immersion at Frontiers in Optics + Laser Science (FiOLS) 2022

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Maimuna Nagey meeting 2002 Optica President Anthony Johnson

It was a dream come true! This year, I anticipate graduating with a master's in medical physics and applying for residency in radiation oncology.

I truly believe the Optica Foundation helps to make dreams a reality. Donors should know that the impact they enable is immeasurable and forever lasting. I am so thankful that people like Janet Fender & L. John Otten III, Elizabeth Rogan and industry members including Coherent, Corning, and SourcePhotonics, among countless others, provided me with this lifetransforming opportunity. Without the foundation, I wouldn't be where I am today—a woman from East Africa who's been given confidence and the chance to pursue life-long career goals—and for that, I couldn't be more grateful.

The Optica Women Scholars program annually honors 20 women who receive a merit and need-based grant, and the Amplify Optics Immersion Program brings together Black physics and engineering undergraduate or graduate students to explore the research and career opportunities within optics and photonics. Learn more at optica. org/WomenScholars and optica.org/ AmplifyImmersion





Use photonics. Find a solution. Change the world.

optica.org/Challenge

OPTICA FOUNDATION CHALLENGE

Launched in celebration of our 20th anniversary, the Optica Foundation Challenge supports early-career members with the opportunity to leverage optics and photonics in driving new scientific discoveries and breakthroughs to transform our world. We received 105 proposals from individuals worldwide outlining how they would solve global challenges in three categories: environment, health and information. Ten winners received US\$100,000 prizes to use as seed money and mentoring and speaking opportunities.



Justus Ndukaife

Vanderbilt University, USA

Next-generation high throughput plasmonic nanotweezers for nanoplastics analysis. (Environment)



Alejandro Velez-Zea

Universidad de Antioquia, Colombia

Multilayer holographic augmented reality with digital micromirror devices: content pipeline and system implementation. (Information)



Zaijun Chen University of Southern California, USA Accelerating optical edge sensing with photonic deep learning. (Information)



Ahmed Dorrah

John A. Paulson School of Engineering and Applied Sciences, Harvard University, USA

Structured light generation and sensing with metasurfaces for THz communications. (Information)



Samantha Grist

The University of British Columbia, Canada Silicon photonic biosensors for low-cost, portable, data-

rich measurements of hormone biomarkers relevant to women's health and the menopausal transition. (Health)

Nirosha Murugan

Wilfrid Laurier University, Canada

Capturing Cancer in Its Early Glow: pioneering early detection strategies using light-based biomarkers. (Health)

Yicheng Wang

Ruhr-Universität-Bochum/Photonics and Ultrafast Laser Science (PULS), Germany

High-power 2-µm frequency combs for rapid greenhouse gas sensing. (Environment)

Fei Xia

National Center for Scientific Research (CNRS), France

Low-cost, stain-free computational spectral fluorescence imager for diagnosis of diseased tissue. (Health)

Ying Xue

Hong Kong University of Science and Technology, Hong Kong Monolithic III-V active devices in-plane coupled with Si for integrated Si-photonics. (Information)

Fernando Zvietcovich Pontifical Catholic University of Peru, Peru

Development of a clinical multi-excitation optical coherence elastography system to interrogate biomechanics for the detection and staging of normotensive glaucoma. (Health)

ANNUAL SUPPORT

Our annual contributors of all levels enable our ability to support the next generation of optics and photonics.

This listing (amounts in US dollars) indicates those who have contributed recently to foundation programs supporting students and early-career professionals. Recognizing total contributions over the past ten years: donors in GREEN have contributed US\$20,000 or more; those in BLUE have contributed US\$5,000 or more.

\$100,000+

Coherent Edmund Optics Inc. Go!Foton Huawei Technologies Co., Ltd. Innolight Technology

Lumentum Menlo Systems GmbH. Optica Source Photonics Anonymous (2)

\$50,000+

Ursula J. Gibson Daniel R. Grischkowsky Hamamatsu Photonics Marvell Semiconductor Thorlabs Walter de Gruyter Gmbh. Genthiner

Annual \$20,000+

Joseph W. and Hon Mai Goodman Alice Sinclair \$10,000+ George Bayz Gary C. and Carolyn M. Bjorklund John H. Bruning Robert L. Byer Stephen D. Fantone Kaminow Florence Marks-Forman Barbara Peter F. Moulton Optimax Elizabeth Rogan Sycomp

\$5,000+

Joseph Wai-Ting Ip Donald Ray Scifres Chad Stark Theodore N. Voss

\$1,000+

Richard L. Abrams Sean Bagshaw Magnus Bengtsson Gisele Bennett Andrea Blanco-Redondo Becky Bosco David J. Brady Philip H. Bucksbaum Simin Cai Federico Capasso Connie J. Chang-Hasnain Pierre H. Chavel James and Catrina Coleman Gene Davis Hans de Veer Turan Erdogan Amy Eskilson Yeshaiahu Fainman **Roger L. Farrow** James R. Fienup Eric R. Fossum Michal Lipson and Alex Gaeta Thomas K. Gaylord Google LLC. **Eve Griliches Ryan Hamerly** Lucian Hand Urs Hoelzle

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\$25+

LaCroix Precision Optics Raytheon Technologies Nanoplus Nanosystems and Technologies GmbH. AmazonSmile Holly Aaron Ishwar D. Aggarwal Govind P. Agrawal

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Herbert Walther Award Rainer Blatt, University of Innsbruck, Austria

James P. Gordon Memorial Speakership Tracy Northup, University of Innsbruck, Austria

Jane M. Simmons Memorial Speakership Hong Liu, Google LLC, USA

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