



SPIE.

WOMEN IN OPTICS

CALENDAR



Creative, committed and inspired.

Maria, Ultrafast & Laser Reference Production Physicist at TOPTICA

TOPTICA Photonics | info@toptica.com | www.toptica.com



I find SPIE's idea of highlighting talented and inspiring women in optics and photonics by making them "excellence eye-candy" in a calendar absolutely brilliant. There's such a long history of treating women as objects, of assessing us primarily on our looks and our ability to thrill men with our pout, pose, and bra size! It's refreshing and empowering (and whimsical) to be able to follow up "Dude, have you seen Miss April this year?" with "Dang! Her huge leadership in optics R&D is amazing!" Or "She's such an impressive mentor and

inspiration for so many men and women in engineering!" Or "Wow! I'd love to do some physics with her."

Since 2005, the SPIE Women in Optics planner has shown us what women can accomplish. As you read through this year's profiles, you will be impressed by the scope, scale, and diversity of those faces of success, from emerging researchers to "grand dames," women at the engineering bleeding edge, and those who lead from the boardroom or the sales floor, and from many different countries and cultures. Of course, we don't need a calendar to tell us that women are central to making the 21st century the Age of Optics and Photonics. It's great to be reminded each year, though, by another impressive collection of "calendar girls" whose powerful goals, achievements, and stories inspire and encourage us to reach higher ourselves.

CATHER SIMPSON

Engender Technologies and the University of Auckland
Board Member, SPIE



Support provided by:



JANUARY 2022

Sunday

Monday

Tuesday

Wednesday

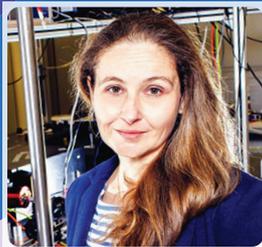
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<p>SPIE. PHOTONICS WEST 22-27 January 2022 San Francisco, California, USA</p> <p>SPIE. QUANTUM WEST part of Photonics West</p>	<p>SPIE.AR VR MR 23-25 January 2022 San Francisco, California, USA</p>	<p>1</p>
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A career in STEM is a beautiful journey that allows you to look at our world with the understanding and conviction that your decisions are based on knowledge. It gives you the power to construct new things and be useful.

-Barbara Pietka (pg. 43)

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spie.org/wio

FEBRUARY 2022

Sunday

Monday

Tuesday

Wednesday

	SPIE. MEDICAL IMAGING 20-24 February 2022 San Diego, California, USA SPIE. ADVANCED LITHOGRAPHY+ PATTERNING 27 February - 3 March 2022 San Jose, California, USA	1	2
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INTERNATIONAL DAY OF WOMEN AND GIRLS IN SCIENCE

INTRODUCE A GIRL TO ENGINEERING DAY



We need your creativity, fresh ideas, work ethics, and perspectives. But don't go it alone; there is strength in numbers, and speed through mentoring. Give back more than you take. Most importantly, leave the ladder down.

-Carolyn Cross (pg. 35)

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MARCH 2022

Sunday

Monday

Tuesday

Wednesday

	SPIE. ADVANCED LITHOGRAPHY+ PATTERNING 27 February–3 March 2022 San Jose, California, USA SPIE. SMART STRUCTURES+ NONDESTRUCTIVE EVALUATION 6–10 March 2022 Long Beach, California, USA	1	2
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INTERNATIONAL WOMEN'S DAY



MAR

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31	 <p>Ask questions at every opportunity and look for inspiration in the most unlikely places. You're a dreamer, you're an inventor, you're a scientist - these have no gender. -Alice Iles (pg. 40)</p>	

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APRIL 2022

Sunday

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Wednesday



Often, you may find opportunities that you think you can't pursue, but the truth is that you really can. It's okay to feel uncomfortable and try things you've never done before, because you never know, it might turn out that you actually like it.

—Caterin Salas-Redondo (pg. 37)

SPIE PHOTONICS EUROPE
3-7 April 2022
Strasbourg, France

SPIE DEFENSE+ COMMERCIAL SENSING
3-7 April 2022
Orlando, Florida, USA

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 18-22 April 2022 Yokohama, Japan  April 2022 Yokohama, Japan	1	2
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APR

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MAY 2022

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International Day of Light
16 May



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MAY



I would tell young women interested in pursuing a career in STEM to reach out to anyone and everyone for advice whenever you need it. Knowing what you don't know is the biggest, but most easily survivable battle.

—Cvic Innocent (pg. 42)

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JUNE 2022

Sunday

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Tuesday

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As a young researcher, I thought the success and failure of an endeavor was completely driven by the technical validity. Later on, I understood that this is not always the case. These experiences teach you that you should never give up: failures only make you stronger and more successful.

—Heidi Ottevaere (pg. 38)

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INTERNATIONAL WOMEN
IN ENGINEERING DAY

JUN

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JULY 2022

Sunday

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My advice to women interested in STEM is to exercise your creativity and stay curious... Creativity is like a muscle; it really does get stronger with use... Constantly learning new things and challenging your assumptions primes your mind for thinking in new ways, and that can really help technical thinking.

-Makenzie Lystrup (pg. 46)

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<p>SPIE. ASTRONOMICAL TELESCOPES + INSTRUMENTATION 17-22 July 2022 Montreal, Canada</p>	<p>1</p>	<p>2</p>
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JUL

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AUGUST 2022

Sunday

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SPIE OPTICS + PHOTONICS 21-25 August 2022 San Diego, California, USA	1	2	3
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AUG



My advice to all girls and women considering a career in STEM is to join the professional bodies, like SPIE, at early stages and participate in their programs. It brings inspiration and opens doors to new opportunities.

-Kiran Mujeeb (pg. 39)

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SEPTEMBER 2022

Sunday

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I would recommend young girls considering a career in STEM to find a community of people with common interests. Even if it is a small group of like-minded individuals, sharing a passion and ideas with others is extremely enriching and motivating, not to mention that it's never too early to start networking!

-Jessica Ramella-Roman (pg. 4)

SPIE REMOTE SENSING
5-8 September 2022
Berlin, Germany

SPIE SECURITY+ DEFENCE
5-8 September 2022
Berlin, Germany

SPIE PHOTOMASK TECHNOLOGY + EUV LITHOGRAPHY
September 2022
Monterey, California, USA

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SEP

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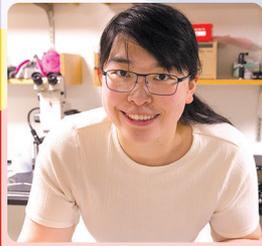
OCTOBER 2022

Sunday

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Don't be afraid to ask questions and make mistakes. Don't give up just because someone tells you STEM is difficult and demanding. Surround yourself with like-minded peers and supportive mentors and give back to your communities whenever you can.

-Linhui Yu (pg. 44)

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Thursday

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SPIE. LASER DAMAGE
October 2022
Livermore, California, USA

SPIE. PHOTONICS
OCTOBER
October 2022
Beijing, China

SPIE. SPACE SATELLITES
SUSTAINABILITY (SS)
October 2022 Edinburgh,
United Kingdom

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SPIE.
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NOVEMBER 2022

Sunday

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	SPIE. <small>FUTURE SENSING TECHNOLOGIES</small> November 2022 Tokyo, Japan SPIE. <small>PHOTONEX+ VACUUM TECHNOLOGIES</small> November 2022 Birmingham, England	1	2
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I would advise those considering a career in STEM to dig deep into the things that pique their curiosity. When you get into the weeds of any topic, you can always find questions that nobody has answered - and you could be the one to find those answers.

-Maryann C. Tung (pg. 26)

NOV

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DECEMBER 2022

Sunday

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In times that you find yourself discouraged or self-doubting, allow yourself to feel the way you do but don't let that prevent you from trying and doing it anyway. Mistakes and occasional setbacks don't define you; the way you recover and handle them does. A STEM career might seem challenging, but it will also show you how capable, strong, and smart you are.

—Shaimaa Azzam (pg. 36)

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DEC



MY LOVE of nanotechnology was sparked by an internship I had in high school at Portland State University. At the time, I was helping make solar cells from various nanomaterials, and I remember being completely blown away that this seemingly uninteresting yellow

goo sandwiched between two pieces of glass was actually an incredibly intricate network of nanowires, nanobelts, and nanoparticles. There was something inherently exciting to me about being privy to this invisible world at the nanoscale, and that curiosity continues to drive my work today.

These days, I am a graduate student working on new ways to print computer chips. Modern computer chips are made up of billions of tiny transistors, each one containing components thousands of times smaller than a human hair. As you can imagine, printing at such small sizes is challenging, and the process requires a high degree of precision. I study one such process that uses polymers that self-assemble into nanoscale cylinders with diameters of 20 nm or less. My PhD focuses on shrinking the size of computer memory with these self-assembling polymers.

Throughout my PhD, I have often struggled with Imposter's Syndrome. I have frequently doubted whether I am cut out for my field and have had periods of feeling very discouraged and alone because of it. I have benefitted a lot from finding a home with other women and LGBTQ+ scientists, and I encourage anyone feeling similarly to find a community in which they feel seen and uplifted.

When I was first starting out in my field, I wish that someone had told me that it's normal to feel as if you're struggling. If you're frustrated that your work isn't turning out like you wanted, it doesn't mean that you can't do it—it just means that you're inexperienced and have high standards for yourself. Be kind to yourself, give yourself permission to fail, and keep pushing past the doubts that you're feeling.

For me, STEM is about pushing the boundaries of human knowledge, so I would advise those considering a career in STEM to dig deep into the things that pique their curiosity. When you get into the weeds of any topic, you can always find questions that nobody has answered—and you could be the one to find those answers.

MARYANN C. TUNG SPIE Student Member

Graduate Research Assistant in Electrical Engineering, Stanford University, USA

Born in USA / Resides in USA

Educational Background: BS in Electrical Engineering, University of Illinois at Urbana-Champaign; MS in Electrical Engineering, PhD Candidate in Electrical Engineering, Stanford University

LOGICALLY ARRIVING

at solutions in maths fascinated me. Also Richard Feynman's lecture on nanotechnology, "There's Plenty of Room at the Bottom," inspired me to take up science. I started out in electronic and communication engineering, eventually realizing my true interest in nanostructures. The appreciation from my school teachers for my skills in optics remains key to shaping my future in photonics.

As a doctoral student, I am learning to conduct research independently. As a senior student, I mentor my juniors and aid them with advice and experiments. I carry out the work for my PhD thesis at the National Institute for Materials Science as a junior researcher, starting with rigorous literature review to find the fastest achievable research methods. I conduct my work with the help of other outstanding researchers. I present my work annually with these peers, with open questioning from professors from different fields, ensuring that complex concepts are accessible to a general audience.

One of the challenges I faced trying to pursue higher education, which hampered entrance interviews and winning scholarships, was a fear of teaching and going on stage despite preparation. I cultivated skills in anchoring, and scrutinized live stand-up comedy, learning how to think on my feet and overcome mistakes. In due course, I grabbed an opportunity to organize and introduce a full-day technical event in the annual cultural exchange Japan-Habba by IJCCI. I invited five companies for talks and job-interview sessions. Twice the number of people visited, and the event became a permanent program. It was a boost in self-confidence and now I enjoy being on stage and sharing my research.

Irrespective of the career you pursue, develop a habit of recording new things you do or learn every day, in your own handwriting. These are your actual achievements! After a year, you will see your growth, and nothing is more rewarding than to compare yourself to a year ago. Eventually, this forms a backbone to make achievable and ambitious plans for the coming years.

Find things that energize you and try to do them often. I try to plan experiments fabricating nanostructures in the Clean Room. Seeing the structures I can make is exhilarating, as well as being able to glimpse how far we progressed with science.

I found that through building a network in STEM, I can rely on and mentor juniors. This goes a long way when I need insights, either for a new research method or new position.

Don't get discouraged if you find someone interrupting or undermining you: prepare well and look for a way around. Plan well, do not hesitate to ask questions or to approach opportunities actively.

AFSHAN BEGUM SPIE Student Member

NIMS Junior Researcher, National Institute for Materials Science, and Graduate Student, University of Tsukuba, Japan
Born in India / Resides in Japan
Educational Background: BE in Electronics and Communications, MTech in Optoelectronics





WHEN I was in secondary school, I was fascinated by languages and traveling. I viewed maths as another language, with similar rules but without the exceptions that can make languages challenging. I was passionate about studying maths in university and some of the options given to us such as deciphering the symbolism in ancient sites around Ireland. But once I had access to university-level physics, I realized it offered far more career options for me with travel. As an undergraduate, I was given the chance to spend a summer in University College London working in a physics lab and this is what finally defined my direction in atomic physics.

Now I lead a research group of about 20 researchers (students, postdocs, staff scientists, technicians) and my main responsibilities lie in their education and training to conduct impactful research ethically. I give classes, organize lab sessions, coordinate research projects, source funding, and advertise our research through seminars and conference presentations. A lot of my time is spent editing student reports, research papers, and project reviews. I also mentor PhD students around the world, review research proposals for many international funding agencies, and promote OIST as a great place for PhD studies.

I would say that trying to choose a career direction that would ensure that I always had a steady income was probably the biggest challenge, especially after I finished my doctoral studies. I knew since I was a teenager that I wanted to leave Ireland, so I needed to find a way to do this with security. I was funded all through my university education by external or university grants and this made it all possible. I've always sought change, and this can also be challenging. On the day of my PhD exam, I was offered a research position in a fantastic lab in Austria that I couldn't say no to. There's so much to explore in the world (both inside and outside the lab) that we need to be adventurous in making decisions.

I think the most important thing is to ask for help if you need it, particularly financial. There are sources of funds out there that many don't know about that can make the possibility of having a great education all that easier. Most universities can provide some support where really needed.

So go for it—the independence you get from being a scientist is wonderful. You get to explore so many things. My driving force was my love of languages (including maths) and my desire to travel the world. Being a scientist enabled this more than any other job I can imagine, even working for an airline.

SILE NIC CHORMAIC SPIE Member

Professor, Light-Matter Interactions for Quantum Technologies, Okinawa Institute of Science and Technology Graduate University, Japan
Born in Ireland / Resides in Japan
Educational Background: BSc, MSc, Docteur en Physique

WHEN I was young, my mom bought me a sticker book. Inside that book there were stories of astronomical objects and spacecrafts. I fell in love in that moment with that content and knew I needed to find out how to become a physicist. And that was the beginning of my passion for sciences. Many years later, I got a scholarship to study physics. It was a great moment in my life.

Becoming a researcher at the National Research Center is very different from what I expected. Knowledge in sciences is definitely required but not enough. This is because my primary responsibility is to make a prototype from what I know in the sciences and deliver it to users. Therefore, some other skills such as team management, customer understanding, or even business networking are necessary to learn. In the meantime, my job is also focusing on publishing the data for the greater scientific community as well.

In the beginning of my career, many frustrating things happened because I had to work with many people from different departments. Of course, I preferred talking with scientists or engineers in my field because we quickly understood each other. But things were different when I had a conversation with people outside of my fields. Therefore, I tried very hard to make sure that every stakeholder saw and understood the same thing. It was tough but challenging. Every day, even now, I am still trying to understand and communicate better with the people I talk to.

Starting out I was so lucky to have good mentors. My boss and colleagues told me what organizations expected from me and gave me opportunities to prove myself.

Careers in STEM are full of fun because technology is changing very fast. If you are a person who loves to learn new things, you will not regret it. However, another important thing I should mention is trying to unite people who have same passion. Scientific experiments are not easy and many times it means failure. Passion will be the only thing that makes you carry on. If you are a person who loves taking risks to find the next new thing, make sure that your team loves it too.

ATCHA KOPWITTHAYA SPIE Member

Researcher/Team Leader, Photonics Technology Research Team, National Electronics and Computer Technology Center, Thailand

Born in Thailand / Resides in Thailand

Educational Background: BSc and PhD in Physics





MY FATHER told me to pursue a degree in science because he wanted to ensure that I was an independent person with a strong career that would draw on my skills in math. I now manage a research lab that develops laser systems that interface with optical atomic clocks to extract precision time and frequency signals to support redefinition of the second (as defined by the International System of Units) and to test the fundamental laws of physics.

My biggest challenges to my career have occurred when I have taken negative experiences and interactions personally. I have learned that to best support myself and others, I need to develop awareness about my own biases, to ensure that I do not use them unconsciously. It requires being observant, compassionate, and present.

When I was just getting started, I wish I had known how important networking and assertive communication skills would be for finding good sponsors, mentors, and peers to help navigate my science career.

Don't be afraid of having a sense of entitlement about what you can accomplish, and what pay and recognition you deserve for a job well done. But at the same time, demonstrate knowledge and appreciation for all the opportunities and resources you have, and for the people you work with. This way you can have a career that you are in control of, but with openness and gratitude for the systems and people who supported you on your journey.

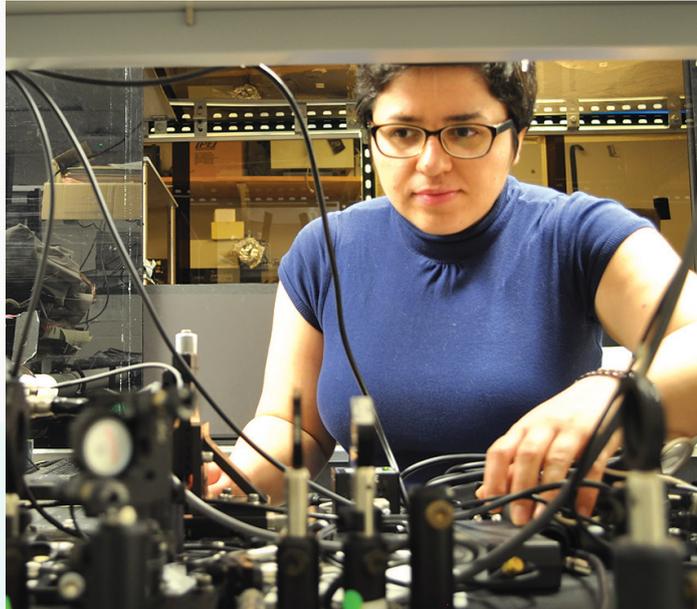
TARA FORTIER

Project Leader, Time and Frequency Division, National Institute of Standards and Technology, USA

Born in Canada / Resides in USA

Educational Background: PhD in Physics, University of Colorado, Boulder

I BECAME deeply passionate about science through many stimulating discussions that I had with my sister growing up. We used to spend hours trying to solve tough math and physics problems together. The discussions were sometimes heated but the results were always rewarding. In middle school, when I was 11 years old, I learned about experimental physics and optics where we got a chance to do experiments with lenses, mirrors, and prisms, and I was fascinated by it. All these early experiences had so much influence on me and inspired me to invest my life in exploring the mysteries of these scientific realms and choose a career in optics.



Currently I am a PhD candidate where I conduct research on classical and quantum light scattering from disordered configurations as well as designer artificial geometries. In these studies, I use either experimental techniques which involve implementation of optical setups, data acquisition, data analysis, and post-processing, or theoretical schemes which involve mathematical modeling, coding, data analysis, and post-processing, or both methods. These efforts compose the extent of my thesis. Throughout my PhD, I have worked as a graduate instructor for a couple of graduate-level courses and undergraduate laboratories. Moreover, I have the responsibility of mentoring a number of undergraduate and high-school students in our optics experimental facilities.

Like other young girls and women, the biggest obstacle that I have faced in my career was the lack of a professional support network. I have been fortunate to have had excellent mentors throughout my career. But with respect to access to valuable mentorship and a professional network, there exists a definite distinction between female and male scholars and scientists. I see this as an undeniable hurdle to overcome for women in most steps of their professional journey. To beat this bias, I persistently try to reach out more and expand my network one step at a time.

As I was starting out, I wish someone had advised me that failing is part of gaining experience and success. And that it is more common in cutting-edge research than you might expect at the outset.

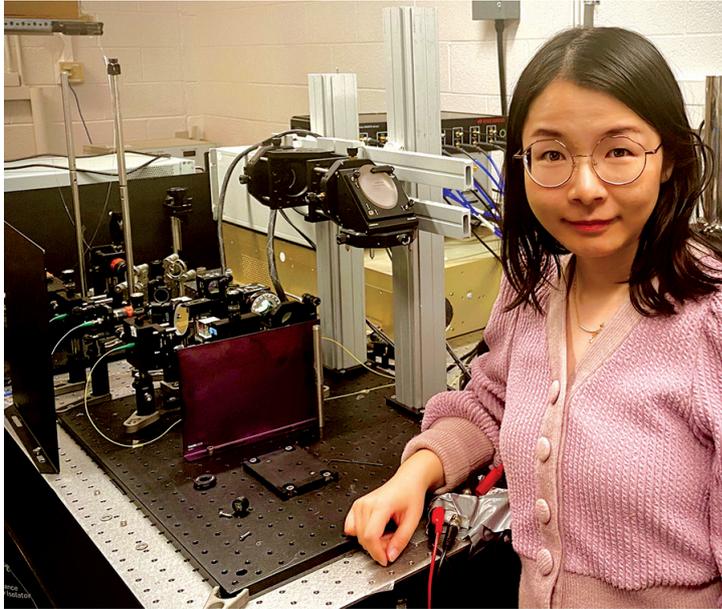
My advice to young women who are considering a career in STEM is to be adventurous, to be bold, and to always cherish their curiosity. STEM careers have their own challenges. Be mindful of their presence and make sure to seek help when you are in need of it.

NOOSHIN M. ESTAKHRI SPIE Student Member

Graduate Student and Research Assistant, Electrical Engineering and Computer Science, University of Michigan, USA

Born in Iran / Resides in USA

Educational Background: BSc, MSc in Electrical Engineering, University of Tehran; PhD Candidate in Electrical Engineering and Optics and Photonics, University of Michigan



MY INITIAL inspiration to pursue STEM was from my father. I became very interested in math under his influence and attended several math competitions. Growing up in a city known as the Optics Valley of China, I had heard a lot of exciting news on advances in optoelectronics. So I naturally chose a major in photonics in my undergraduate study to fulfill my curiosity. My background makes my research interest two-fold: I am interested in

theoretical aspects and applications of optics and imaging. During my PhD, I worked on tool development for deep brain imaging. I also spent quite some time thinking about their potential applications in medicine and biology. During my postdoc, I will be more focused on combining computational tools with the hardware to further open doors to more exciting capabilities of imaging.

My primary responsibilities are to help mentor students and to conduct research in combining computational tools with optical imaging to overcome current limits in imaging. I have always been amazed at how imaging helps uncover unknown phenomena and have never been bored. I also enjoy the interdisciplinary aspect of my research. I see how my work can impact real-world applications and advance science in various fields, which brings me great satisfaction.

The biggest challenges I have faced are learning how to handle stress properly during research, and how to build a professional environment with male colleagues in a male-dominant field. When I am stressed out I have learned to give myself a break. Sometimes mental stress requires physical rest. Having a hobby outside work also helps. Creating a professional environment meant learning how to communicate more effectively. I read a lot about management skills and a growth mindset.

Follow your intuition and curiosity when you do science. I found I enjoyed my research the most when my curiosity drove me. And enjoy the freedom of doing science. It's also helpful to have a growth mindset and be open-minded, which helps you think out of the box and gradually change your stereotype of yourself, your work, your colleagues, etc. Be grateful for the people you feel comfortable working with and learn to work with different people professionally. There is always something to learn from others. Finally, I hope everyone enjoys science and working in STEM.

And to young women interested in STEM I say, always have faith in yourself. I genuinely think a strong self-belief and following your heart will eventually take you to wherever you want to go.

FEI XIA SPIE Early Career Professional Member

Postdoctoral Researcher, The Kastler-Brossel Laboratory (ENS, Sorbonne University, PSL, CNRS), France

Born in China / Resides in France

Educational Background: BS, Huazhong University of Science and Technology; PhD, Cornell University

I'VE ALWAYS had a love of asking questions, and throughout my childhood I was lucky enough to have parents who helped me find the ways to answer them. My dad would spend hours showing me how to take something apart and fix it; my mom would point out a plant or bird and tell me all about it. So, when I told them I wanted to be an astronaut they never questioned it or the countless hours I'd stare up at the moon through my telescope trying to find the Apollo 11 landing spot. That curiosity and dream drove me in my favorite classes and through those I found a home in science and eventually optics. While I may never be an astronaut (you never know!), I love knowing that the work we do in optics is enabling future technologies and even missions to put people on Mars!



As an optical/opto-mechanical design engineer, I design optical components and systems using optical and mechanical design software, then work with the other team members to get those designs out to manufacturing and into the world. I've worked on a variety of systems, from industrial camera lenses to laser system components and more. It's a rewarding experience to have something that you designed be built and then put into use.

Actively working on my confidence in both myself and my abilities has been one of the biggest challenges I've taken on, but it's also been one that has immensely improved my work, my professional relationships, and even my sense of who I am and what I can do. I had to learn not only how to trust in what I knew or felt, but also be okay to say it aloud and stand up for what I think and believe in. For me, it has meant leaning on supporters in my network and having hard conversations with myself at times, but it has been and continues to be worth the effort.

When I started out, and even now, I sometimes think I must be great at something right away. It's not true! I couldn't have gotten to where I am or be going where I'm trying to without help and support along the way. Don't be afraid to ask for help when you need it and put in effort along that way to build yourself a network that lifts you up and inspires.

If something excites you, even if it's tangential to what you think you want to do or completely unrelated, lean into that. There is so much more to STEM fields than we can even imagine, so if it interests you, I say go for it—you never know what could come of any opportunity.

OLIVIA FEHLBERG SPIE Early Career Professional Member

Design Engineer, Edmund Optics, Inc., USA

Born in USA / Resides in USA

Educational Background: BS in Optical Sciences and Engineering, University of Arizona
College of Optical Sciences



I WAS inspired by a Ted Talk about optogenetics by Edward Boyden. It was the first time I found out there was a possibility that we could “read” all the information from a human brain and then “write” it into another brain. That seemed like a way to create eternal life. It was hard to not think that was cool.

Every Nest Smart Display device that Google sells is tested before shipping to the customer. I design and create end-to-end automated display test solutions for these devices. These test solutions test every single device to ensure it has a high-quality display before it is shipped to the customer.

Towards the end of the second year of my PhD, I was told that I needed to improve my output or leave the program. For the first three years of my PhD and the year prior to starting, I was going through some, let’s just say, pretty big stressors in my life which were causing me to do poorly in my PhD. The way I overcame this was by putting my head down and frankly doing a lot of damage to my mental health in the short term in order to survive. I had to be in my PhD program in order to stay in a country where I was at least somewhat safe. The lesson here is that survival is the most important thing in life, and even though mental health is a close second, you shouldn’t feel bad making whatever choices you need to make in order to survive. Sometimes we have to put everything else aside to focus on survival, even if it means working for a long time in the future to undo the damage we did to ourselves before in order to survive.

I wish someone had told me that if you know exactly what you want 10 years from now, with a little luck you can get it, even if it sounds completely implausible. But I also wish someone had told me that even when you reach the place that you think you want to reach or even when you surpass it twice over, you feel just as lost as you did when you started. Goal setting is a lifelong process.

So, I would tell young women and girls interested in STEM to think bigger than you think is possible. Because the possibilities are more than we can imagine.

SARA MADAAN

Test Engineer Level 4, Devices and Services Product Area, Google, USA

Born in India / Resides in USA

Educational Background: BE in Biotechnology; MS in Physics and Optics in Medicine; MS in Electrical Engineering; PhD in Biomedical Engineering



Pictured left to right: Julia Cross, Tayyaba Hasan, and Carolyn Cross at IPA World Congress, Boston.

I WAS inspired by the technology itself. The idea that a little blue liquid and a little red light could eradicate deadly pathogens was too alluring to pass up. I also knew that it was going to be difficult to undertake and that I had the right personality to get behind this important technology and see it through.

As CEO, I am responsible for running the company and making sure that it has the right resources and strategies to drive it to success. People are our greatest assets. My top responsibility is to ensure that we have the right people on board who have the right talents and share the right core values.

The biggest obstacle and challenge in my career is always finding the right resources to achieve the success that is needed. Having enough personal commitment, perseverance, and passion is the only way through this challenge. Starting out I wish I was told to network more. That and to think bigger sooner.

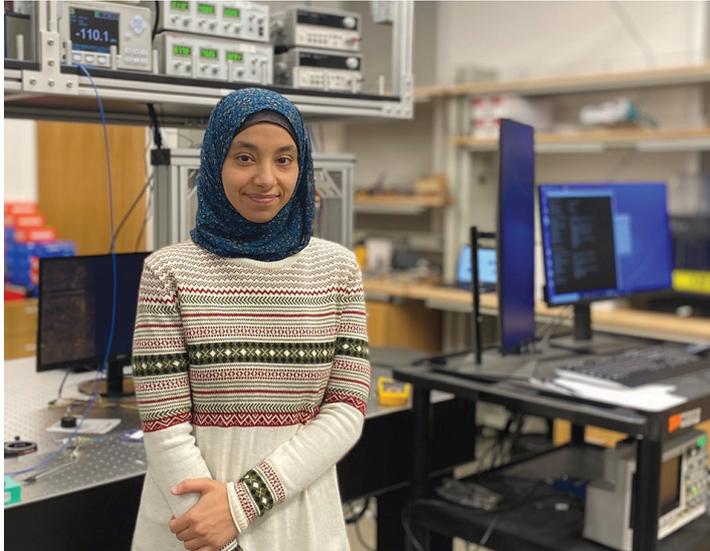
So the advice I would give to young girls and women interested in STEM is to go for it. Together we can make the world a much better place for everyone. We need your creativity, fresh ideas, work ethic, and perspectives. But don't go it alone: there is strength in numbers, and speed through mentoring. Give back more than you take. Most importantly, leave the ladder down.

CAROLYN CROSS SPIE Member

CEO, Ondine Biomedical Inc., Canada

Born in Canada / Resides in Canada

Educational Background: HBA, University of Western Ontario; MBA, York University; CFA



MATH HAS always been my favorite subject, especially since high school, and my teachers encouraged me to consider engineering. I always found ways to enjoy working on challenging problems, and studying electrical engineering was the right discipline for me.

I work as a postdoc in optics and photonics. My primary role is to design new and exciting devices and experiments where we can use light to study

new phenomena or realize new applications. I am currently working on integrating two-dimensional materials with nanophotonic devices to engineer better and more efficient single-photon sources. I also get to work with graduate and undergraduate students involved in similar research and to participate in, and sometimes initiate, collaborations with other research groups to combine expertise and techniques to do even more exciting science.

The biggest challenge I faced, and still sometimes do, is managing my time. There is so much to be done, and with every career move, my responsibilities increase. With experience and practice, I have learned to get organized, set priorities, say no sometimes, and ask for help.

I wish I were advised when I first started my academic journey on the value of setting priorities and distinguishing between urgency and importance. In an academic career, we tend to follow a long list of deadlines, which can marginalize essential tasks that don't seem very urgent. An example of that is self-care and stress management.

Another piece of advice I wish I had received early on is to search for role models who I can relate to. It is sometimes easy to feel like you don't belong due to the lack of successful figures with similar experiences, backgrounds, and/or identities who have achieved the same goals you aspire to reach. For example, I genuinely believe that female mentors and role models play a crucial role in guiding and retaining junior female scientists in STEM.

For young girls and women considering a career in STEM, I would say don't be afraid to take risks and make mistakes. In times that you find yourself discouraged or self-doubting, allow yourself to feel the way you do but don't let that prevent you from trying and doing it anyway. Mistakes and occasional setbacks don't define you; the way you recover and handle them does. A STEM career might seem challenging, but it will also show you how capable, strong, and smart you are.

SHAIMAA AZZAM SPIE Early Career Professional Member

Postdoctoral Fellow, California NanoSystems Institute, University of California Santa Barbara, USA

Born in Egypt / Resides in USA

Educational Background: BS, MS, and PhD in Electrical Engineering

I FOUND my passion for STEM when I discovered what creating new knowledge, being able to understand how things around us work, and solve large scale issues in society by technology means (that I would design and develop myself). That discovery hyped me up. Plus, you get to live and work on the cutting edge and that is fascinating!

I help to shape the sustainable industrial deployment of photovoltaic (PV) technologies in the zero-carbon transition. Because I understand the physics of photovoltaics and their life-cycle environmental impacts, I serve as subject matter expert and provide recommendations to design PV systems that are easily recyclable, use less critical materials, and avoid harmful chemicals. I also identify pathways to reach environmentally friendly targets. Finally, I write strategic recommendations for stakeholders and European policymakers.

I have faced two big challenges. The first one was at the very beginning of my career, when I had to convince my parents to support me in pursuing postgraduate studies abroad (out of reach of a family member or anybody they would know), when I was barely 21 years old. I got up the courage and prepared arguments to explain (and make them realize) the amazing work they have done raising me. So, they did not have a reason to worry and could trust in my capabilities to excel and take care of myself.

The second challenge was my career development as a new mom. I had the most-important role of being a mom with the arrival of my little one while still working. I managed it through open communication with my spouse. And I would advise others to have clear terms with your partner so both get equal chance for career growth, while embracing and enjoying the family life.

I wish I had known this earlier: Be comfortable with trying new things, and don't be afraid to reach out to others. Often, you may find opportunities that you think you can't pursue, but the truth is that you really can. It's okay to feel uncomfortable and try things you've never done before, because you never know, it might turn out that you actually like it.

And to girls and women interested in STEM careers I would say: Don't be discouraged. Believe in yourself, dream big, and work hard. Don't hesitate to express your passion for STEM, as that will drive you to excel in whatever you wish to pursue. As Einstein said, "I have no special talent, I am only passionately curious."

CATERIN SALAS REDONDO SPIE Early Career Professional Member

Senior Research Engineer, L'Institut Photovoltaïque d'Île-de-France, France

Born in Colombia / Resides in France

Educational Background: Electronic and Electrical Engineering double degree, Universidad

Tecnologica de Bolívar; Master in Nanotechnology for Integrated Circuits, Politecnico di

Torino, Grenoble INP, EPFL; PhD in Physics, IAPP, Technische Universität Dresden





AS A child I never played with dolls, but loved to play with Legos and Playmobil. My elementary-school teachers sparked my interest in math and science with various simple but really cool experiments. From that moment on, I knew I wanted to become a scientist.

I am currently chairing the Applied Physics and Photonics Department of the Faculty of Engineering at the Vrije Universiteit Brussel (VUB) that is responsible for the photonics education curriculum. I am also responsible for the instrumentation and metrology platform at our VUB Photonics Campus and the research unit

“biophotonics” of the Brussels Photonics Team B-PHOT. I coordinate and work on multiple research and industrial projects focusing on the design, fabrication, and characterization of different types of photonic components and systems in the field of biophotonics, interferometry, holography, and imaging.

The biggest challenge I have faced is learning when a concept or project is flawed for reasons that are not technical. As a young researcher, I thought the success and failure of an endeavor was completely driven by the technical validity. Later on, I understood that this is not always the case. These experiences teach you that you should never give up: failures only make you stronger and more successful.

Studying engineering as a woman never seemed special to me. Later I had to learn that some people saw me as a woman who was part of a quota. I wish I had had a better understanding of this perception when I started.

Being successful in any career requires hard work, but most of all it requires that you enjoy what you are doing. In my opinion, having successful female scientists as role models is the best way to attract young women into science and engineering. My advice towards young girls and women is: believe in yourself and your own capabilities! Be aware of your own unique set of skills and keep on looking for your niche. STEM is the ultimate playground!

HEIDI OTTEVAERE

SPIE Member

Professor in Photonics and Programme Director, Master of Science in Photonics Engineering, Department of Applied Physics and Photonics, Brussels Photonics (B-PHOT), Vrije Universiteit Brussels

Born in Belgium / Resides in Belgium

Educational Background: MSc in Electrotechnical Engineering, Photonics major; PhD in Engineering Sciences, Vrije Universiteit Brussel

I WAS born in a small town near the “line of control,” the effective border between Indian Administered Kashmir and Azad Jammu and Kashmir. I grew up in fear of bombs and to the noise of shelling across the border. My mother left the comfort of a big city in Lahore to teach in that remote area. She was the first female teacher deployed to this area with no physical school yet. She wanted to educate every child in the community. However, poor infrastructure was a big hurdle in her mission. She founded three schools in Nakyal Fatehpur Thakyal, one of which has been promoted to a girls’ degree college now. In those days, carrying water pots on my head, travelling on uneven hilly tracks, I heard that “technology can bring comfort in our lives.” Those words stuck in my mind. My mother dedicated her life to the betterment of her community and died of brain cancer. As a young girl I decided to go into science and engineering to bring comfort to others, like she did.



Now I am pursuing a PhD in nano-optics. I design efficient plasmon sensors in collaboration with Lahore University of Management Sciences and Pennsylvania State University. I volunteer my time to outreach activities in optics and STEM. I also work as an affiliate expert on a project titled “Development of low-cost classroom demonstrations in optics” at Harmony Technologies.

The only college offering a BSc in my town was a “men’s college” and female students were not allowed to attend. Due to financial constraints, I was unable to go to school in another city. I started a campaign to get permission to study in at the local college. My father supported me, and we met with local authorities. Fortunately, they were convinced, and special, legal permission was granted. But the next challenge was social permission, because in a very conservative society, a girl cannot be allowed to study with boys at BSc level. Even though my family supported me, my prospective teachers did not. After so many “ifs” and “buts,” I was given the opportunity with a condition to convince more girls to join the class. I took on that challenge and worked in the community to convince their families.

I am grateful to all those girls and their families and others who supported me in this cause. In the end, it was not just my chance for higher education, but people found a new way to treat girls in our community.

I do I wish someone had advised me to pursue my education in the USA. Now I am lucky to work under the supervision of SPIE Fellow Dr. Akhlesh Lakhtakia at Penn State.

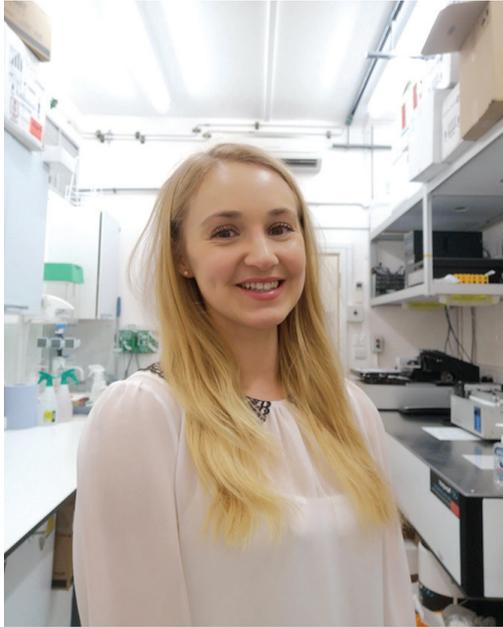
My advice to all girls and women considering a career in STEM is to join the professional bodies, like SPIE, at early stages and participate in their programs. It brings inspiration and opens doors to new opportunities.

KIRAN MUJEEB SPIE Student Member

PhD Candidate, Department of Electronics, Quaid-i-Azam University, Pakistan

Born in Pakistan / Resides in Pakistan

Educational Background: M.Phil in Electronics with major in Electromagnetics, Quaid-i-Azam University



I KNEW from a young age that I wanted to do something to make a difference in medical science. I have always been fascinated by how things work and desperate to feed my curious mind, ever since my parents bought me my first microscope. At school my favorite subject was biology and I knew I needed to pursue further education in something that would give me a foundation for a career in science. I was lucky enough to get some work experience in a hospital laboratory and was fascinated by the inner workings of the human body and how they were affected by disease. This led to my choice of biomedical science as my undergraduate degree.

I am currently working towards my doctorate where I am developing point-of-care tests

for rapid diagnosis and disease monitoring. I am involved in both the laboratory development process and the validation of such tests with human samples.

Finishing my undergraduate degree, I was offered a position on a prestigious graduate scheme at a multinational medical equipment manufacturing company. I was reluctant to accept it as I realized this would not fulfil my passion for scientific research and so began applying for PhD positions. I didn't realize how competitive the PhD market was and how much experience other people had. Despite being shortlisted for many interviews I was always 'pipped to the post.' After all my hard work I was knocked back by the rejection. More determined than ever, I kept pushing forward and with the help of my friends and family I didn't give up. I was introduced to a researcher at the University of Southampton who was doing some interesting work developing point-of-care tests for tuberculosis. As tuberculosis had been the focus of my final year project, I had a keen interest in this area. They saw the benefit of bringing my knowledge in bacteriology to the team in physics and engineering and so we proposed a PhD project.

It will not be easy, and it will not always go to plan but if you want it badly enough then it is worth fighting for. As Henry Ford said: "Whether you think you can or you can't, you're right."

Never be afraid to step outside of your comfort zone, don't worry about what everyone else is doing, focus on what brings you joy. Ask questions at every opportunity and look for inspiration in the most unlikely places. You're a dreamer, you're an inventor, you're a scientist—these have no gender.

ALICE ILES SPIE Student Member

Graduate Student, Zepler Institute for Photonics and Nanoelectronics, University of Southampton, UK

Born in UK / Resides in UK

Educational Background: BSc in Biomedical Science, University of Surrey; PhD candidate, University of Southampton

I GREW up in Italy and when I was in my late teens the first computers became available to the general public. It was the beginning of a technological revolution and an incredibly exciting time. I had a Commodore 64 and I remember having a great time creating very rudimentary video games. My love for technology and engineering started then. I have always loved reading



and writing and for the longest time I considered a career in the humanities, but ultimately, I found the pursuit of scientific knowledge and problem solving at the core of this field to be addictive and worth spending my life doing.

I am the director of a research group and a professor in the biomedical engineering department at FIU. My time is split between research, teaching, service to the university, such as serving in committees, and outreach activities. As a research group, we have different projects and interests all focusing on photonics. We are studying the way polarized light interacts with biological media as a way to establish new diagnostic modalities. For example, we use contrast that polarized light offers to collagen to determine the risk of a preterm labor in women. We are also interested in the use of light for the design of more inclusive wearables for underserved populations, and we are particularly focusing on the obese population whose access to medical care is often limited.

I grew up in a very patriarchal society where I found little support for my budding interest in science. Being one of the few women in my class felt very isolating and brought up a feeling of being an outsider and that I did not belong in that community. It has taken me many years to feel completely at home within the research community of STEM and I give much credit to my graduate advisors and some of my colleagues, now friends, for welcoming and supporting me.

I wish somebody had told me that setbacks are common and that everybody must deal with them in one way or another. Dealing with rejection may, at times, feel overwhelming and it is all too frequent in the academic environment. Be it a new position, a promotion, or a research proposal rejection, know that you are not alone, and that grit and persistence are indispensable to succeed.

I would recommend young girls considering a career in STEM to find a community of people with common interests. Even if it is a small group of like-minded individuals, sharing a passion and ideas with others is extremely enriching and motivating, not to mention that it's never too early to start networking!

JESSICA RAMELLA-ROMAN SPIE Fellow

Associate Professor, Department of Biomedical Engineering and Herbert Wertheim College of Medicine, Florida International University, USA

Born in Italy / Resides in USA

Educational Background: BS, University of Pavia; MS and PhD, Oregon Health & Science University; Postdoc, Johns Hopkins University Applied Physics Lab.



I WOULD tell young women interested in pursuing a career in STEM to reach out to anyone and everyone for advice whenever you need it. Knowing what you don't know is the biggest but most easily survivable battle.

Early in my career I worked for NASA, and seeing scientists apply their skills to climate issues under the NOAA-CREST initiative opened my eyes to the social aspect of science... that scientists have a civic duty to better the world. Working for the government was an honor and a blast. And the inspiration to work there came from knowing my talents could serve my country in a way that affects not just the one or two percent of scientists in any ivory tower, but in a lasting way, globally—hence the social aspect of science!

I have piloted academic-industrial partnerships, managed two large research facilities during their transition to scientific innovation hubs, and initiated institutional changes to engage and sustain external relationships and strategic alliances. In my current role, I apply that experience as a subject matter expert in efforts to find and disseminate emerging technologies created by underfunded scientists, engineers, and technologists.

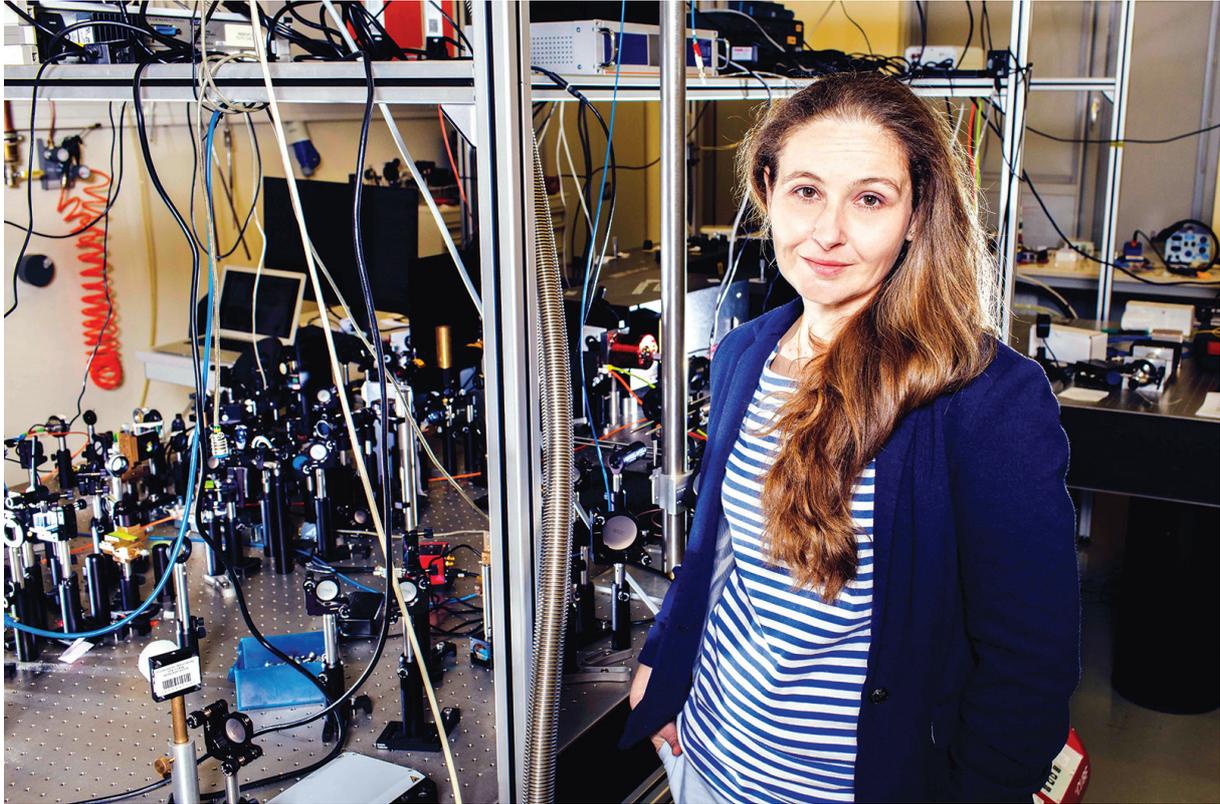
My biggest challenge in my career remains actively making sure that the science I support has a positive and direct effect on society, not just now, but also for the future. As my career developed, I wish I had been told to take a step back and remember that—that science and innovation are always in the context of humans doing good things for other humans.

CVIC INNOCENT SPIE Early Career Professional Member

Scientific Innovation Lead, PARITII, LLC, USA

Born in USA / Resides in USA

Educational Background: Post doc, Oxford University; PhD, Cornell University



I HAVE always been attracted to the freedom of thought, to discover new things, and to reflect on the richness of phenomena in nature. This is how I imagined scientists. Later, I discovered the peace of the laboratory and the ability to test by myself how things work. Finally, I discovered the pleasure of talking to people who think similarly, and it has remained that way to this day, which is why I enjoy working in the scientific community.

Now I lead a research team that investigates optical properties of materials in photonic structures. I feel responsible for keeping our research at a high level, interesting to scientists, but also to young students. To join teaching and science, I always try to compare the classical understanding of physical phenomena with recent discoveries.

Time constraints have always been the biggest obstacle for me. The moment when I have to choose between different projects, teaching responsibilities and people are always the hardest. Now I know that you need a good plan and schedule, as well as a long-term vision of the development of a given project and career.

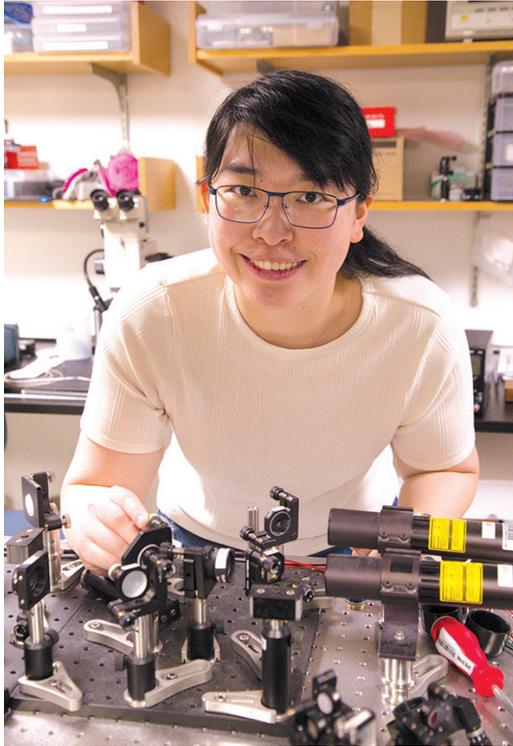
The most valuable advice for me at the beginning would be: don't be afraid of not knowing, ask as many questions as possible. Contact professionals and get answers. Find a mentor. A career in STEM is a beautiful journey that allows you to look at our world with the understanding and conviction that your decisions are based on knowledge. It gives you the power to construct new things and be useful.

BARBARA PIETKA

Lead Physicist, Institute of Experimental Physics, University of Warsaw, Poland

Born in Poland / Resides in Poland

Educational Background: Doctor of Physics, University of Warsaw and Université Joseph Fourier; Habilitation, University of Warsaw



I GREW up on the campus of a research institute in China. When I was a kid, I was surrounded by a lot of professors and researchers as neighbors. Both my parents are researchers in agriculture, and they always talked about science in life. For example, when we went on a field trip, they would spend a decent amount of time discussing the plants we saw and which species/classes they may belong to. When we came across a farm, they would discuss the impact of weather on different crops. Since an early age, I have always wanted to learn more, so that I could join those mini discussions.

As a research fellow in the Wellman Center, my work focuses on the development and optimization of optical techniques for measuring the structural and functional information of biological tissue. These systems can be utilized for both basic scientific research and clinical applications. My responsibilities range from

hardware development and instrumentation, to system validations in experiments with excised tissue, cell cultures, and sometimes in animals and humans. I also develop numerical models to extract the parameters of interests, for example, the stiffness of biological samples, the velocity of flow, and small-particle motions.

The biggest challenge I face is overcoming Imposter Syndrome. The voice of my inner critic always tells me that I am not good enough, and that I must try to be better. It used to prevent me from accepting challenges or exploring opportunities. A mentor once told me: "Don't compare to your perfect self. Accept who you are now, set up a workable plan to get closer to your goal, and keep moving." Now I realize that my inner criticism may not always be correct. I say yes to challenges and try my best. I accept Imposter Syndrome as a life-long challenge and an opportunity for active learning and self-improvement.

I wish someone had advised me of the importance of self-care when I was first starting out. I was always told to work hard, explore different fields, and seize all opportunities. I learned the importance of self-care the hard way, through burnout in graduate school and almost quitting my PhD. I hope everyone can balance the demands of work and life and take care of their own needs and well-being first.

I recommend that anyone who finds happiness and passion in discovering new things, expanding understanding, or solving real-life problems should follow their heart and explore STEM career choices. Don't be afraid to ask questions and make mistakes. Don't give up just because someone tells you STEM is difficult and demanding. Surround yourself with like-minded peers and supportive mentors and give back to your communities whenever you can.

LINHUI YU SPIE Early Career Professional Member

Research Fellow, Wellman Center for Photomedicine, Massachusetts General Hospital, Harvard Medical School, USA

Born in China / Resides in USA

Educational Background: BEng in Instrumentation and Metrology, Tianjin University; MSc in Electrical Engineering, University of Calgary; PhD in Electrical and Computer Engineering, University of Calgary

AS LONG as I can remember, I have been intrigued by science. My parents (both mathematicians) have always encouraged me and my brothers to be curious. In high school, I gained more fascination for biology and the human body, which led me to study biomedical engineering. When I was a student, it was Ton van Leeuwen who introduced me to biomedical optics, and optical coherence tomography in particular. I was sold! It is so much fun to look inside the human body without opening it up.

I am the principal investigator of two research lines, in which I supervise fellow researchers and students. The first research line aims to reduce the amount of invasive blood draws for ill and premature newborns with noninvasive optical methods. The second research line focuses on developing new technologies for breastfeeding research. There are so many mothers who experience difficulties in breastfeeding, and there is simply a lack of techniques to investigate the origin of these problems. I am very excited to explore how we can apply our biomedical optics toolkit for this purpose.

My biggest career obstacle was combining work and the birth of my first child. Both my partner and I had long commuting distances and we realized that for us, this was not a sustainable situation when raising a family. We had to find a new work-life balance. At that time, I had just received a prestigious personal research grant. That grant allowed me to move to my current institute and enter into a tenure track. For my partner, there were sufficient job opportunities in the same area, so we solved the puzzle and moved. Both of us now have the privilege of riding our bikes to work. In hindsight, taking this step has catalyzed my career and I am very happy that the birth of our son forced us into it.

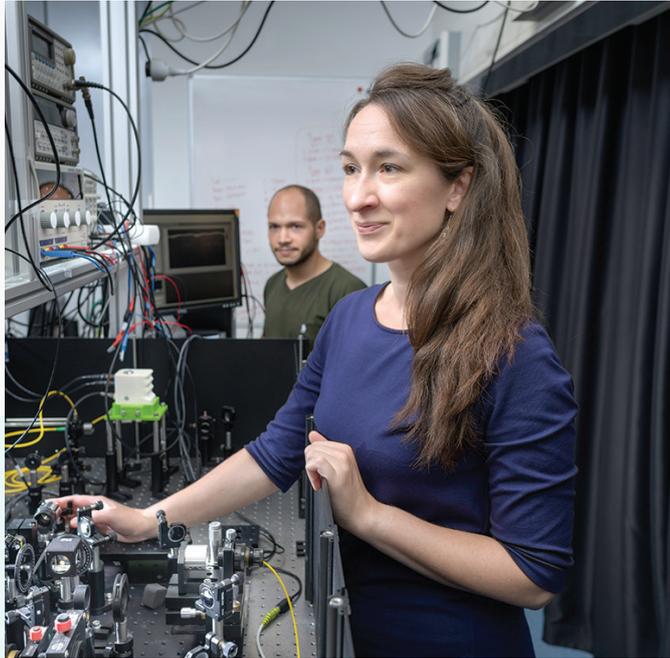
As a piece of advice to my younger self: science requires patience. I think many young researchers (including me) feel frustrated at some point about the time it takes to reach the overarching end goal of their project. Treasure the small steps that you have made towards that end goal, because these are just as important.

To young women considering a career in STEM, I would say: find out what makes you happy and go for it! Don't take your critical inner voice too seriously. And also: think about what you need to make yourself thrive. Be clear about your needs to your loved ones, your supervisors at work, and anyone else who can help you meet them.

NIENKE BOSSCHAART SPIE Member

Associate Professor, Biomedical Photonic Imaging, University of Twente, The Netherlands
Born in The Netherlands / Resides in The Netherlands

Educational Background: BSc and MSc in Biomedical Engineering, University of Twente;
PhD in Biomedical Optics, Amsterdam University Medical Centre





Credit: Ball Aerospace

I WAS always curious about the natural world, particularly space. I was also always interested in environmental issues. Once I learned the scientific process as a way of understanding the world, I was hooked. Examining the world through a scientific lens became my worldview, and then my career.

I lead our Civil Space division, which includes science missions in Earth observations, planetary exploration, astrophysics, and the physics of the sun, and also terrestrial weather and space weather satellites. Our work ranges from technology development in the lab to missions to the outer solar system, and everything in between. I have many talented scientists and engineers on my team, and we get to design and build missions that will help us understand everything from climate change to black holes.

I did not come from a family of scientists, engineers, or professionals. One of my challenges is that I sometimes felt out of place with people who grew up with more privilege and role models, and there was a lot about college and careers that I just didn't know. I had excellent mentors along the way who helped me bridge that gap.

I wish someone had told me earlier on in my career to always get enough sleep! Taking care of your physical and mental health is critical to success.

My advice to women interested in STEM is to exercise your creativity and stay curious. Engineering and science often require creativity, new ways of thinking, and innovative problem solving. Art, music, and fashion are some of the ways I exercise my creativity daily. Creativity is like a muscle; it really does get stronger with use. I enjoy reading literature, history, and philosophy—it challenges the way I think. Constantly learning new things and challenging your assumptions primes your mind for thinking in new ways, and that can really help technical thinking.

MAKENZIE LYSTRUP SPIE Senior Member

Vice President and General Manager, Civil Space, Ball Aerospace, USA

Born in USA / Resides in USA

Educational Background: BS in Physics; PhD in Astrophysics

I WAS drawn to science from an early age with all the classic “take everything apart” tendencies. In college, I majored in physics and decided to pursue further study in optics and laser development. Only years later did I realize that my interest in lasers was heavily influenced by a movie that had been my favorite since age 12: *Real Genius*. It’s about college students working on a high-power laser project, and that’s what I ended up studying in graduate school!

My current job is totally removed from my graduate studies and career in industry. I work as a legislative aide to a state senator who is also a PhD scientist! I transitioned from industry and laser development to public policy by applying and being selected for the Arthur H. Guenther Congressional Fellowship, cosponsored by SPIE and OSA. I served as staff on a US Senate subcommittee for a year. My role as a fellow was equivalent to a legislative assistant, and I learned a huge amount about how legislation is developed.

A major challenge I faced was finishing my dissertation project. It was complex and it was entirely mine. I love wearing many hats and getting to do everything, but it also left me largely alone when things went wrong. I had a long series of unfortunate events that caused months of delay and my research became an extreme exercise in determination and expectation management. I

was fortunate to have an amazing spouse, an excellent senior researcher to consult, and I took advantage of the free mental-health services offered on campus. With that support system and a lot of grit and persistence, I was able to push through, complete my project, and graduate. It is one of my proudest accomplishments.

I used to see self-care as a distraction from work. Now I believe that taking time to exercise, rest, or cook a healthy meal are essential investments in my ability to perform; these activities make me more productive and creative, improve my quality of life, and will enable me to live longer.

STEM can provide you with an incredibly satisfying career. It is about solving puzzles and understanding the nature of the Universe, and a STEM education gives you a broad array of amazing skills and career opportunities that go beyond STEM itself, including public policy! It can be super frustrating dealing with people who treat you like you don’t belong in STEM because you are a woman, but don’t let them get you down. Just keep going and prove them wrong! I also highly recommend finding mentors, colleagues, and friends (both female and male) who you can talk with, go to for support, and who can help you navigate career questions.

CHRISTINA C. C. WILLIS SPIE Member

Legislative Aide, Colorado Senate Democrats, Colorado General Assembly, USA

Born in USA / Resides in USA

Educational Background: BA in Physics, Wellesley College; MA and PhD in Optics, CREOL, College of Optics, University of Central Florida





I HAVE always been fascinated by the way everything works, from very little things in nature to technology that seems to come from a science-fiction book. However, if I had to think of who inspired me to get into science, I would say it was my parents. My dad nurtured my curiosity, introducing me to the electronic boards that roar like cities bursting alive

within our computers! While my mom showed me that with creativity and passion you can achieve whatever goal you set for yourself, in the same way she pursued a successful career as a chemical engineer. With their support and guidance, I was able to complete a degree in electronics that satisfied my curiosity of how things work and a PhD in photonics that allows me to play with light every single day.

Currently, I work as a research fellow in the field of silicon photonics. I am mostly involved in developing new materials and fabrication processes that will enable us to exploit the properties of light using electronic-like chips that have the potential to make our everyday devices more efficient, such as computers and phones. When I am not designing or fabricating new chips in the lab, I enjoy showing people how amazing light is and how they can play with it.

Looking back on my career there have been many challenges that I have had to face, from being the only women in some classes at university to having to move to another country to pursue my dreams. However, I think the biggest one has always been myself. I believe that on many occasions we take for granted our efforts because we think we are just doing the things that are expected of us, rather than realizing we are doing things that are worth being recognized for! This is something I am still working on every day by giving value to all my hard work and recognizing all the successes that have led me to where I am.

At the beginning of my career, I wish someone would have told me to be more confident in myself and my abilities. It is so easy to get lost in all the things that can go wrong and lose motivation. Instead, you should be confident of your potential and focus on the things you learn and all the opportunities that open in front of you to achieve amazing things.

To all the women interested in science, I would like to encourage you to be curious and never stop dreaming because you can realize anything you can dream of. In the end, science has always been made of dreams.

THALÍA DOMÍNGUEZ BUCIO SPIE Early Career Professional Member

Research Fellow, Zepler Institute for Photonics and Nanoelectronics University of Southampton, UK

Born in Mexico / Resides in UK

Educational Background: BS in Electronics and Computer Engineering; MSc in Photonic Technologies; PhD in Optoelectronics

AS A small child I was always curious and seeking to understand the why and how. Thanks to an inspiring professor of physics, I started to develop a deep love of physics as a teenager. Instead of Take That or Brad Pitt posters hanging in my room, there were two posters of Einstein. My friends did make fun of me, but 'Albert' was my inspiration.

Now I am responsible for the development and strategy of our products throughout their lifecycle as well as ensuring business growth. We develop innovative high-end technology products, so I always have the opportunity to learn something new as well as improve my management skills.

When I completed my master's, I wanted to pursue a PhD at the same university, but I wasn't accepted. At first, I was disappointed, angry, and doubted myself, thinking I wasn't good enough to get the PhD position. But I did not give up!

I continued to work in research and after few years I started my PhD in physics. Looking back, the fact that I was not admitted to a PhD Program immediately after my master's, was a positive. It gave me the chance to earn my PhD in a topic I loved in a really exciting scientific environment.

For years, I was not sure if should stay in academia or move to industry. It took time to find the right place for me. But looking back, it was clear that I am a better fit for industry than academia. It would have been useful if someone had guided me through this earlier in my career.

I give the same advice to every young person, despite gender: do in life what you love, and if, despite the passion you put into it, the results are not good enough, do not give up. Give yourself the chance and time to find what you are meant to do.

MARIA OLIVA

SPIE Member

Director Global Product Management, SBU Semiconductor and Advanced Manufacturing, Light and Optics, Jenoptik, Germany

Born in Italy / Resides in Germany

Educational Background: MBA, HHL Leipzig Graduate School of Management; MEng, Università degli Studi di Palermo; PhD in Diffractive Optics/Technology, University of Jena





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—**Deesha Shah**
Purdue University (USA)

*2020 recipient of the
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2023

January

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SPIE is excited to organize and provide this free monthly planner that recognizes impressive women in the fields of science and engineering. The planner is meant to not only encourage young students to pursue careers in science or engineering, but also to inspire those already in their careers by sharing an outstanding variety of role models.

If you would like to nominate a woman you find inspiring, please visit our website spie.org/wio.

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