**REDEFINING THE LANDSCAPE:** 

# MOMEN INSTEM

A PSD & PME EXHIBIT + SPEAKER SERIES

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Event Opening

This exhibit highlights a number of women learning, teaching, and researching at the University of Chicago in the PSD and PME. The displayed profiles of female scientists span many generations and represent a diversity of programs and interests. They opted to recount pivotal moments, challenges surmounted, and proudest accomplishments. Embedded in their narratives are paths forged through persistence and determination.

There are many more voices and unique stories than displayed in this exhibit. It is our goal and hope to elicit conversations that carry beyond the duration of this event and spill into hallways, research labs, and personal spaces. It is our hope that we discover and learn more about the collective experiences of the incredible trailblazing women who are paving the way for others who aspire to push discovery further. It is our hope that we continue to devise and implement ways to support them as they redefine the STEM landscape.

"Don't let anyone rob you of your imagination, your creativity, or your curiosity. It's your place in the world; it's your life. Go on and do all you can with it, and make it the life you want to live."

### **Mae Jemison**

First African American woman astronaut in space





My parents were both scientists, so pursuing a career in STEM came rather naturally. I was good at math and science and grew up in the era of the space race and landing on the moon. Lying out in the backyard at night and seeing the stars, I thought it would be great fun to explore the unknown. Now I explore the unknown closer to earth and on ultrafast and ultrasmall time and length scales using powerful x-ray lasers.

# What challenges do women in STEM face generally? What hurdles have you faced?

There is a lack of critical mass, so that the few women (underrepresented among peers) are tapped to do many tasks unrelated to the central research mission. Sometimes there is a lack of institutional support for obvious needs like childcare.

# What personal traits have you relied on to advance in your career?

Persistence, resilience, fairness, and friendliness.

# How can others, regardless of gender identity, help support future scientists?

Remain curious about how the world works and request scientific rigor to support stands on pressing issues such as climate change.

### Who supported you and how?

The Physics Division Director at Argonne who initially hired me named me as "group leader" when I was the youngest in the group of about 8 PhDs by a fair margin. He could easily have named a more experienced white male (there were many) to that position.

# How are you leading the way and supporting the next generation of scientists?

Mentoring some early career scientists and students. Running the Conference for Undergraduate Women in Physics 2020 @ UChicago.

I can't recall what inspired me to pursue a career in STEM generally, but I remember what inspired me to pursue a career in CS. I took my first computer science class my first semester of undergraduate studies. At the time, I just wanted to get it over with, since it was a requirement for the engineering major. I had a poor impression of CS from a summer lab internship in high school where I was the only student who wasn't from the elite science magnet school in my state. Some of my peers in that program made me feel awful because I didn't know how to code. However, I was surprised to find that I really enjoyed that CS class so much that I took more CS classes and ended up majoring in it. At the same time, I was reflecting on why I hadn't discovered it earlier.

Later, when I took an internship at the National Science Foundation, I learned about all the systemic and structural issues keeping historically marginalized groups out of computing, and how CS could complement efforts to address issues faced in those communities. I saw the power CS had to amplify the scale at which these issues could be addressed. It was this internship that started me on my current career path.

# What challenges do women in STEM face generally? What hurdles have you faced?

Women in STEM face both explicit (e.g. sexual harassment and sexism) and implicit bias (e.g. microagressions), as well as systemic issues (e.g. a disproportionate burden of child care tends to be placed on the woman).

Throughout my STEM career, I've experienced those challenges. I've been told that I only got into certain universities/programs or awards because I'm a woman of color. I've had to question if some of my peers truly respect me and see me as their equal. When I told a professor I was applying for the NSF fellowship, they said that my record wasn't good enough to get into UChicago and that I only got admitted because my PI wanted me. I was mistaken for a secretary during one of my internships in undergrad. I think secretaries do important work and are often the backbone of most organizations, but it was the fact that someone assumed I wasn't a scientist like everyone else at the event.

# What personal traits have you relied on to advance in your career?

Two personal traits come to mind: resourcefulness and reflective tenacity. To me, being resourceful means being creative about finding what you need, not only with material resources but also with people. If someone slams the door in your face, climb in through the window.

As for tenacity, it's what has allowed me to push through even when things get rough. I add the word "reflective" there because there has to be boundaries. I try to make sure what I'm pushing for is worth it. I also don't want to put up with things I shouldn't have to put up with. Instead of trying to succeed in spite of particular obstacles, how about I try to get rid of those obstacles?

"Don't be all bark and no bite. Nothing is more insidious than performative allyship. Listen to what people from marginalized identities—not just women—need in your community and actually do something about it."

In the words of Hamilton creator Lin-Manuel Miranda, I'm young, scrappy, and hungry.

# How can others, regardless of gender identity, help support future scientists?

Don't be all bark and no bite. Nothing is more insidious than performative allyship. Listen to what people from marginalized identities—not just women—need in your community and actually do something about it. Oftentimes, the work is placed on people from these marginalized identities to improve their communities—frequently with no acknowledgment at best or to their detriment at worst.

### Who supported you and how?

There are too many people to list them individually, but the best ones support me in the following ways. They believe in me, even when I have doubts and don't believe in myself. They listen and validate my experiences and my emotions. They are willing to go the extra mile to provide support.

# How are you leading the way and supporting the next generation of scientists?

Through my research, I hope to make computer science more diverse and equitable by improving the way programming is taught. I identify barriers that students face when learning to program and develop strategies to overcome them.

Outside of the lab, I founded the Graduate Women in CS to provide a community of peer mentorship for female-identifying students in my department. I have also been co-organizing the UChicago Women in STEM symposium for the past two years.







Looking back With my friend at our school science fair junior year; we later won second place at state

"It seems, in my experience, that women have to work twice as hard to get some people to listen to us."

### What first inspired you to pursue a career in STEM?

I pursued a career in STEM because I enjoy the applications of science and engineering and learning more about the mechanisms behind everyday devices and structures in our real world: computers, cell phones, buildings, etc.

My mentor encouraged me to simply keep pushing, and eventually people will start to notice. I work to encourage future generations of scientists in a similar way. I was involved in a program that tutored young kids in STEM subjects, trying to ensure that they don't feel defeated and become deterred from those topics.

# What challenges do women in STEM face generally? What hurdles have you faced?

It seems, in my experience, that women have to work twice as hard to get some people to listen to us.

# What personal traits have you relied on to advance in your career?

Drive, determination, and a hard-working mentality.

# How can others, regardless of gender identity, help support future scientists?

The biggest thing for me is to be inclusive and really engage with all people in a group/classroom or any setting.





Looking back
Presenting my science project
at the Massachusetts State Science
and Engineering Fair at 16

"We can help support our future scientists by providing them with opportunities to participate in science at a young age, giving them room to fail, encouraging their interests, and helping develop their passions.

We can show them just how great science really is."

#### What first inspired you to pursue a career in STEM?

I was first inspired to pursue a career in STEM when I was in seventh grade. We were tasked with coming up with a future technology. Select students would then get the chance to compete in an Explora Vision contest where the winners would work with a team to develop their invention. I came up with the idea for Carbon Nanotube Nutrition Sensors—a device that released nanorobots to check vitals and provide nutrients—as a plausible aid in treating eating disorders. This project piqued my interest in nanotechnology. Now, eleven years later, I am designing nanodevices to use to study biochemical pathways in plants.

# What challenges do women in STEM face generally? What hurdles have you faced?

Women in STEM face many challenges. There are hurdles for when they try to enter a male-dominated field. Depending upon where people growup, they may hear constantly that girls are not good at math or science. They experience misogyny that they then internalize, sexism from both male and female advisors, being talked over in a conversation, and not taken seriously.

# What personal traits have you relied on to advance in your career?

I have relied on drive, passion, and resilience.

# How can others, regardless of gender identity, help support future scientists?

We can help support our future scientists by providing them with opportunities to participate in science at a young age, giving them room to fail, encouraging their interests, and helping develop their passions. We can show them just how great science really is.

### Who supported you and how?

Mrs. Stephen, a physics teacher at Plymouth North High School, was my science fair mentor my high school career. She would help to teach me physics principles afterschool during my freshmen year of high school. Additionally, she helped me contact other scientists at Woods Hole Oceanographic Institutes. She recommended me for an internship at an optics company. She gave me room to fail and encourages all of my pursuits.

# How are you leading the way and supporting the next generation of scientists?

I have worked with a colleague in the Biophysical Sciences to start a peer-mentoring group to support first-year graduate students. I also mentor the undergraduates in the lab to help develop both their lab and presentation skills. Furthermore, I am an active member of the Graduate Recruitment Initiative Team; we work to recruit students from marginalized backgrounds to the BSD and PSD PhD programs and develop events that foster a more inclusive community.

Entering undergrad, I was really undecided about what I wanted to study, but then I took the first-year physics course. From there I just wanted to keep pursuing this subject because it was interesting and the physics department at Smith was great. The next year I got to do a summer REU and I determined that I liked working in a lab, so after undergrad I eventually decided to apply to graduate school. Growing up I was privileged to have the example of my older family members who had pursued advanced degrees, so going to graduate school always felt like an option for me. Also, I tried job hunting for anything related to my bachelor's degree, and my lack of success really cemented my decision to pursue my PhD. Now, I've discovered I really do enjoy lab work, both the day to day challenge of it and the potential to contribute to a larger effort, and I want to keep on doing this sort of work for as long as I can.

# What challenges do women in STEM face generally? What hurdles have you faced?

In general, I think women in STEM get less exposure to science early on and face discouraging stereotypes, the isolating experience of being outnumbered in all your classes, and the horror stories about how other women have been treated. Personally, I was lucky to have learned science from middle school through college in a majority-female environment, so I think I felt less negative pressure than many. Even with that support, coming to grad school was a huge change and the imposter syndrome hit me really hard; I attended a small college and had taken fewer advanced courses than many of my classmates, so I felt like everyone else knew more and was better at physics and that I was going to fail. I'm still struggling with the imposter syndrome, but the support of my classmates and lab-mates has been really great and has helped me to keep going.

# What personal traits have you relied on to advance in your career?

What I usually put in a cover letter is that I'm conscientious, hard-working, and get along well with others. It sounds exaggerated but these are the qualities that I've relied on to keep going in science: building good relationships with my coworkers, keeping my word when I promise to do something, giving my best effort to the task assigned to me, and persevering through difficulties. I think a lot of work in science is being able to persevere when facing a tricky problem, and another large part is collaborating with other scientists to help each other out and come up with new ideas to try. I learned this approach in my physics classes; I wouldn't have gotten through them without a lot of persistence and collaboration with my classmates. Turns out the same skills are useful in a research lab.

# How can others, regardless of gender identity, help support future scientists?

I think we can all educate ourselves about unconscious bias and learn to recognize our own biases, whatever they are. This helps us recognize when we or others are behaving in ways that could be discouraging or hurtful. Uncovering bias in your thoughts and actions requires effort and reflection and can be difficult to acknowledge, but it's necessary because we can't address problems if we don't see them when they happen. Future scientists evaluate the community they may someday join and ask, "Will I be welcome here? Can I be happy here?" We lose them when we say things that indicate that we haven't done the work of confronting our own biases, because then we

"Future scientists evaluate the community they may someday join and ask, 'Will I be welcome here? Can I be happy here?'
We lose them when we say things that indicate that we haven't done the work of confronting our own biases, because then we represent a risk—not an asset—to their future happiness and success in science."

represent a risk—not an asset—to their future happiness and success in science.

### Who supported you and how?

My undergraduate major adviser has supported me since undergrad and she's really wonderful. I worked in her classroom as a tutor and TA. She always made us feel included and acknowledged our contributions to the department's efforts at implementing new models of physics education. She always has time to listen and gives good advice. When I needed a place to stay one winter break while recovering from an injury and finishing up my coursework, she offered to let me stay with her and her family. Whenever I talk to her it's clear that she believes in me and trusts my judgment, and that helps me believe in myself.

# How are you leading the way and supporting the next generation of scientists?

Since arriving at UChicago I've become involved with a few organizations that support young scientists. I'm involved with the Women and Gender Minorities in Physics (WaG-MiP) group, which provides a community within the physics department for graduate students to meet and support each other. I have been a mentor to undergrads and younger graduate students through the Physics Mentorship Program, the physics department 'Grad Influences' program, and in my lab. I've also participated twice in Expand Your Horizons (EYH), an annual event where I helped to lead a science workshop with groups of middle school girls.







### **Looking back**

At the interdisciplinary research outreach program ExploreU, teaching mathematics and computer science with artificial-intelligence

### What first inspired you to pursue a career in STEM?

I was always interested in science and, especially, math. I grew up building with Legos and solving puzzles. Math, chemistry, physics, and computer science were among my favorite subjects in school. The choice to pursue math for my career felt natural.

# What challenges do women in STEM face generally? What hurdles have you faced?

There is a definite lack of women in STEM. It was difficult at first to build a good female network.

# What personal traits have you relied on to advance in your career?

I have relied on resilience, drive and passion.

# How can others, regardless of gender identity, help support future scientists?

Unfortunately, in my role as an advisor I've experienced parents turning a child away from a scientific career because it is not considered high-earning. There needs to be a better understanding of how critical it is to preserve and enlarge the scientific community for future generations.

#### Who supported you and how?

My parents always encouraged me to follow my dreams. My PhD thesis advisor, David Manderscheid, introduced me to the mathematics community and set me on my path. When I was an Assistant Professor of Mathematics, I was most influenced and supported by Rick Spellerberg, who, at the time, was full professor and chair of the Mathematics Department at Simpson College. Rick is now a CEO of ICIT Institute (Iowa Center for Interdisciplinary Teaching), which he founded in 2016.

# How are you leading the way and supporting the next generation of scientists?

As one of the Co-Directors of Undergraduate Studies in Mathematics and departmental counselors, I get to support and influence the next generation via teaching, outreach, and my work as an adviser to all mathematics majors.

"As one of the Co-Directors of Undergraduate Studies in Mathematics and departmental counselors, I get to support and influence the next generation via teaching, outreach, and my work as an adviser to all mathematics majors."



**Looking back** Surrounded by papers in the Lindquist lab in 1999

"There are too few women in STEM so there is an absence of role models and the women who are in STEM fields are stretched very thin."

### What first inspired you to pursue a career in STEM?

My brother, who is twelve years older than I am, recognized that I was a curious kid and gently encouraged me to study biology in college. I knew I had found my calling. Later, while I was teaching at a liberal arts college, a former UChicago faculty member, Susan Lindquist, welcomed me into her lab for a summer. When that summer experience was over, we stayed in touch and I eventually joined her lab—first as a postdoc and, eventually, taking on the duties of a lab manager. I was lucky to have someone as gracious and smart as Sue as a role model, mentor, and friend. Now, I take every opportunity to help trainees at the University.

# What challenges do women in STEM face generally? What hurdles have you faced?

There are too few women in STEM so there is an absence of role models and the women who are in STEM fields are stretched very thin.

# What personal traits have you relied on to advance in your career?

I have relied on treating everyone like I'd like to be treated.

How can others, regardless of gender identity, help support future scientists?

Stay curious.







# **Looking back**With my parents and my brother at my college graduation

### What first inspired you to pursue a career in STEM?

When I was a kid, I loved solving math problems and doing math puzzles. In fourth grade, I was the only girl in the advanced math class at my school. Another girl had been assigned to be in my class, but chose to stay in the on-level class. With the support of my teacher, I chose to stay in the advanced class. This was pivotal for me because it was one of the first times I actively chose math over fitting in. I succeeded in the class, enjoyed the challenge, and made many friends. After that, there was no stopping me from studying math.

# What challenges do women in STEM face generally? What hurdles have you faced?

Women in STEM face many challenges, including lack of access to mentorship and female role models, implicit bias, stereotype threat, imposter syndrome, and overarching cultural ideas about what women should be good at. I have dealt with imposter syndrome, mental health struggles, lack of access to mentorship, and lack of self-confidence, among other things.

# What personal traits have you relied on to advance in your career?

I have relied on passion and persistence.

# How can others, regardless of gender identity, help support future scientists?

I think a big problem is the way we, as a field, talk about scientific/mathematical ability, and our expectations for how science/math should be learned. I think we can help support future scientists by being more accepting and accommodating of all learning styles, by emphasizing that scientific/mathematical ability can be learned, and by making the field as inclusive as possible.

### Who supported you and how?

My undergraduate advisor, Professor Todd Quinto, was integral in getting me to graduate school. I had the good fortune of being connected with him by an admissions officer before I even started college. He advised me on what courses to take as a freshman in an unofficial capacity and was a natural choice to be my official advisor later on. I worked on a research project with him one summer. He advised me on research experiences to apply to and, ultimately, which grad schools to apply to. He encouraged me to take the most challenging courseload available to prepare myself for grad school.

"I think a big problem is the way we, as a field, talk about scientific. and mathematical ability, and our expectations for how science and math should be learned. I think we can help support future scientists by being more accepting and accommodating of all learning styles, by emphasizing that scientific and mathematical ability can be learned, and by making the field as inclusive as possible."

# How are you leading the way and supporting the next generation of scientists?

Now, I am supporting the next generation of scientists with my involvement in GRIT. I am a co-leader of the disabilities team and the math department representative, and I work to retain and recruit diverse grad students to our university in these capacities. I also mentor undergraduates for the math department's directed reading program and summer REU. I serve as vice president for the Association for Women in Math. Additionally, I am on the organizing committee for the UChicago Women in STEM Symposium, which is open to women in STEM at all levels.





Looking back
During an undergraduate
internship at SLAC, I received
the Earnest Coleman Award
for exemplary citizenship as
well as research ability

### What first inspired you to pursue a career in STEM?

My interest and drive to pursue physics started when my high school physics teacher taught us about the Large Hadron Collider at CERN. I was instantly skeptical that such a machine could exist and work in the way he described. It was that skepticism and desire to understand the physics and engineering involved in particle accelerators that launched me into STEM. I began studying particle accelerators during my undergraduate degree, and as I learned more about them, I had more and more unanswered questions. Now, after many years of studying the physics and math behind building, improving, and using particle accelerators, my drive to help others ask difficult questions and pursue the answers is strong.

# What challenges do women in STEM face generally? What hurdles have you faced?

One of the major hurdles that many women face, and which I face often, is doubt. Being talked down to about subjects that I have studied for years is frustrating in the short term but can also lead to doubt of my own abilities and qualifications in the long term. One experience from very early in my career still haunts me: instead of asking me a question at the end of my presentation, a male audience member turned to my male advisor and asked him the question. This audience member assumed that I would not know the answer, and he did not give me a chance to respond. My advisor also acknowledged that he should have asked the audience member to direct his questions to me, but he responded to the question on instinct. It is important to note that this kind of behavior was instinctual for both parties; and the root cause must be addressed in order to change this behavior in the future.

This story is all too common, but situations like these can be avoided by making the community aware that it is inappropriate to assume that the speaker, regardless of identity, is not an expert within their specialty.

# What personal traits have you relied on to advance in your career?

The primary personality traits that I have relied on are resilience, proactivity, and resourcefulness. Resilience is a common, but I believe necessary, trait: without the ability to bounce back when presented with obstacles or difficult situations, it is impossible to regain focus and continue to progress towards one's goals.

Proactivity requires trusting yourself to make decisions, not out of desperation at the last minute, but out of foresight. This is a skill that is built over time, but as I have learned to trust my ability to assess negative potentialities, I have also learned how to make the best decision to preempt negative outcomes.

And lastly, by learning that it is ok to ask for help early, I have been able to leverage a broader array of resources. This includes mental health resources, medical health resources, as well as reaching out to colleagues and mentors who can advise me.

### How can others, regardless of gender identity, help support future scientists? I have benefited greatly from working with mentors, advisors, and colleagues who respect me. Learning from someone who is not judgmental or arrogant about their own experiences or abilities creates a safe environment for working together. The scientists that I have worked with who have shown respect for my abilities professionally and personally and are genuine when they ask if I have experience in a field before explaining it to me, are the easiest to work with, and our efforts are more fruitful. Many minority students suffer when male, non-minority identifying advisors assume either that the student is incapable, or that they do not have the ability to succeed. I believe that one of the best ways to combat the continuing negative impacts of this kind of behavior is for each individual in an academic community to consider how to appropriately gauge the experience of a new student or colleague without being judgmental or making assumptions. This is critical for supporting any young scientist, regardless of background or identity, but is particularly important for minority identifying students who may feel out of place or doubt themselves due to a history of such interactions. Who supported you and how? Dr. Christopher Mayes has been my mentor, advisor, and collaborator for seven years, and he has supported me professionally and personally since we first began working together. I first worked with him when I was an undergraduate researcher at Cornell. Dr. Mayes was a postdoctoral researcher at the time and was very approachable and supportive while I was a new student learning basic research skills. Through the years, he has maintained his support in numerous ways. He is respectful of my abilities and nonjudgmental when I tell him I have yet to learn a certain topic or skill. He does, however, push me to learn more and work harder each day. Due to his continued support since my undergraduate research, I sought to work with him during my graduate studies as well. Dr. Mayes continues to support me as I work towards my PhD, and he even supports, without judgement, my decision to pursue opportunities outside of academia in the future. Dr. Mayes' support has helped me overcome the doubt I often experience as a woman studying physics, and his ability to advise me and push me to succeed sets him apart as a mentor. His behavior as a mentor is therefore an example of how to properly support minorities in STEM.

"My interest and drive to pursue physics started when my high school physics teacher taught us about the Large Hadron Collider at CERN. I was instantly skeptical that such a machine could exist and work in the way he described. It was that skepticism and desire to understand the physics and engineering involved in particle accelerators that launched me into STFM"

# How are you leading the way and supporting the next generation of scientists?

During my time at University of Chicago, I have spent countless hours building community among the women and gender minority identifying (GMI) members of the physics department. In 2018, the informal group of women and gender minority identifying graduate students in the department formalized our group as the Women and Gender Minorities in Physics (WaGMiP), which allowed us to secure funding from the department. As a leader of this organization, I founded a Peer Mentoring Program which paired undergraduate and graduate women and GMI students together to foster mentoring relationships. I also organized an Imposter Syndrome workshop for our group, as well as women-in-science movie nights and community dinners. It was important for me to ensure the survival of this group, so as a 5th year graduate student I made sure to include younger students in leadership roles, and to act as a member and advisor to the new leaders. Securing the survival of this group ensures that our experienced community and leaders will be able to continue to support new minority students as they learn to navigate a STEM graduate degree.





Looking back
In front of the instrument
that I used as a postdoc

I always wanted to know not only how something in our natural world worked but also why it worked. In middle and high school, I liked the seemingly neat answers of science. Once I got to college and graduate school, I better understood that science is messy and complex, but, in the end, this only made STEM more appealing.

# What challenges do women in STEM face generally? What hurdles have you faced?

It sometimes feels like as a woman in STEM you don't have permission to fail—if you screw up, then maybe this isn't the job for you. Even when you are successful, people will say things like "oh you only got that award/fellowship/job because you're a woman." This can make it hard to maintain the levels of confidence and resilience needed daily for a career in science. As a PI, I feel like it's a tough line between being assertive so you don't get taken advantage of, and being perceived as a bitch. A strong network of other women can be a good way to vent frustration and get needed support. I've been lucky enough to find that among other female faculty in the PSD.

# What personal traits have you relied on to advance in your career?

I have relied on perseverance, passion, and optimism.

# How can others, regardless of gender identity, help support future scientists?

Encouragement! Particularly if a certain profession is male-dominated, women may not see themselves in that role. Don't just encourage once but many times!

### Who supported you and how?

I had a mentor when I was an undergraduate who went out of their way to give me advice on applying to graduate school and their honest opinion about different programs. They read many drafts of my personal statement and helped me decide between different options. This mentor has continued to be incredibly supportive of me moving forward.

"I always wanted to know not only how something in our natural world worked but also why it worked. In middle and high school, I liked the seemingly neat answers of science. Once I got to college and graduate school, I better understood that science is messy and complex, but, in the end, this only made STEM more appealing."

When I was a postdoc applying to faculty positions another mentor gave me some important tough love around being confident in myself and showing the world that I knew what I was doing and was going to be great!

# How are you leading the way and supporting the next generation of scientists?

Formally, I actively participate in both community and university outreach for students interested in STEM. Informally, I mentor many graduate students and postdocs and provide my perspective on how we all can be better allies for underrepresented groups in the sciences.





"It's important to increase exposure to science by doing outreach and serving as a mentor for undergraduate research experiences."

#### What first inspired you to pursue a career in STEM?

What first inspired me was growing up among pilots and training to become a recreational pilot.

# What personal traits have you relied on to advance in your career?

I have relied on drive.

# How can others, regardless of gender identity, help support future scientists?

It's important to increase exposure to science by doing outreach and serving as a mentor for undergraduate research experiences.

Everyone should educate themselves about bias. When you see or experience bias, do something (point it out, report it, etc.). We are making some progress on these issues but we have a long way to go.

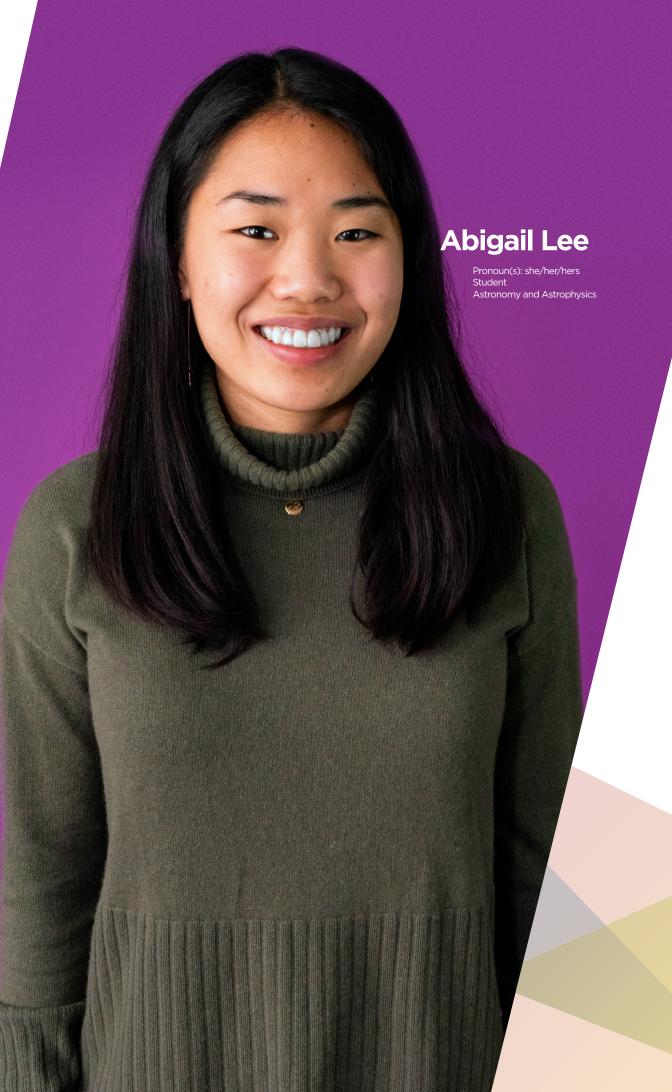
#### Who supported you and how?

My mentors were instrumental in my success.

# How are you leading the way and supporting the next generation of scientists?

Mentoring early career scientists.







Looking back Running my first observing night for the public at Penn

The older I got and the more I learned about STEM, the more I felt lost and small compared to the vast size of the universe. However, in my first semester of college, I took a non-major introductory astronomy course and realized that I could empirically learn about the fate of the universe. I loved learning about and researching cosmology because it allows me to better understand two of humankind's deepest questions: How did the universe come to be, and what does the future hold? Every single person has grappled with these types of philosophical questions, and I feel like I am making an impact by helping to answer them for other people and for myself.

# What challenges do women in STEM face generally? What hurdles have you faced?

Women in STEM generally face being ignored by their peers and feeling imposter syndrome because of this or as a consequence of it, so there can be a 'snowball effect.' My sophomore year of college, I was the only woman in my partial differentials class, and for our final project we had to present on a topic. I ended up doing most of the work, yet one of the men in my group was more confident than me so he presented and made it seem like his own work. He ended up getting a good grade and I got a subpar grade, and he gaslit me when I complained, telling me I was overreacting. I was so discouraged because I felt like there was nothing I could have done to prevent something like that happening. However, I went to one of my female physics professors and told her I was thinking of dropping the physics major. She encouraged me to stick with it and said that, while there will always be challenges, it would be worthwhile in the end. She ended up becoming one of my strongest mentors and is the reason I believe mentorship relationships are so important for minorities in STEM.

# What personal traits have you relied on to advance in your career?

I have relied on grit, dedication, and endurance.

# How can others, regardless of gender identity, help support future scientists?

Support future scientists by hiring or advocating for more women faculty. Don't just stand by when seeing discrimination. Educate yourself and become more well-versed and empathetic towards how to advance minorities in STEM. One way of doing this is by following women in science on Twitter! It's a great way of learning from people but not taking time from them.

"I loved learning about and researching cosmology because it allows me to better understand two of humankind's deepest questions: How did the universe come to be. and what does the future hold? Every single person has grappled with these types of philosophical questions, and I feel like I am making an impact by helping to answer them for other people and for myself."

### Who supported you and how?

My undergraduate advisor supported me by encouraging me to apply to graduate school and putting his personal time into helping me edit my essays and picking schools.

# How are you leading the way and supporting the next generation of scientists?

I am currently an instructor for Space Explorers, a KICP program that offers inner-city youth from neighborhoods around the University a two-day intensive and immersive science retreat where they learn about a topic in STEM and develop their own project. I am currently in the midst of designing the curriculum for this year's Winter Institute, and am excited to teach and learn from these students.



I've always had a love of the natural world. As a child, I kept "treasure boxes" full of interesting twigs, flowers, seashells, stones, and anything else that caught my eye in the outdoors, but it wasn't until college that I realized studying Earth sciences was an option. I was also inspired by my mother, a trained chemist, who helped to recognize and nurture my scientific interests.

# What challenges do women in STEM face generally? What hurdles have you faced?

Women in STEM are not the dominant practitioners and therefore struggle to influence the general culture of the discipline. This can lead to a sense of isolation or lack of belonging, which can amplify and make us overly susceptible to negative feelings arising from the myriad of disappointments, failures, and frustrations that go along with scientific work. I nearly chose a different career path because I thought that being a scientist would require constant arguing and aggressive posturing, which made me uncomfortable. I have since been happy to discover my own, different ways of interacting with my professional world that better match my personality.

# What personal traits have you relied on to advance in your career?

I have relied on curiosity and my motivation to see a job done well.

# How can others, regardless of gender identity, help support future scientists?

I think that we should all remember that we can challenge scientific ideas without putting down the scientist. Everyone should be given the opportunity to grow as scientists, to learn new things and correct mistakes.

### Who supported you and how?

I am grateful for the support of so many! Among them, I thank my postdoctoral adviser, who was always careful in how he attributed scientific ideas. I never heard him speak about my work without crediting me for my original ideas.

"I've always had a love of the natural world."
As a child, I kept 'treasure boxes' full of interesting twigs, flowers, seashells, stones, and anything else that caught my eye in the outdoors, but it wasn't until college that I realized studying Earth sciences was an option."

In a world where reputation and recommendations are an important way of judging merit, I am sure that his careful attributions helped me get to where I am today.

# How are you leading the way and supporting the next generation of scientists?

I am explicit with new members of my research group that I expect them to create a welcoming environment, to support each other, and to provide feedback to me about how successful I am in doing the same. I hope that these open channels of communication set the right kind of tone for supporting all types of scientists according to their individual and evolving needs.

**Looking back** 

The night I won the University of Illinois
College of Education Young Alumni Award
with two women who inspire me and supported
me in my research and development work:
Michelle Perry, my graduate advisor, and
Linda Sims, my dear colleague and mentor



"The biggest challenge with STEM I faced growing up was a sense that STEM wasn't for 'cool girls.' Although I excelled at math and computers, I felt I had to hide that part of myself to fit in."

#### What first inspired you to pursue a career in STEM?

I had a lot of questions about teaching and learning that I wanted to answer, so I pursued a career answering them through research and development.

# What challenges do women in STEM face generally? What hurdles have you faced?

There are too many to list, but I'll go back to childhood. The biggest challenge with STEM I faced growing up was a sense that STEM wasn't for "cool girls." Although I excelled at math and computers, I felt I had to hide that part of myself to fit in. I remember being teased by boys for being a "mathlete" and actually quitting quiz bowl and math team because of it. As I became older and more self-possessed, I stopped caring about these trivial issues, but it definitely influenced my choices as a child.

# What personal traits have you relied on to advance in your career?

Strong values and self-belief. Although I'd be lying if I said I don't care what others think, I have learned not to let what others think sway me from what I believe in. I also truly always try to do the right and ethical thing, no matter the cost.

# How can others, regardless of gender identity, help support future scientists?

Engage young people in different scientific tasks so they learn all the options. And be a gate-opener rather than a

gate-keeper. I feel like UChicago prides itself on this identity of being rigorous and hard on people, but there's a time and place for that. People also need to feel they belong, and some gate-keeping rituals can exacerbate the feeling of not belonging in STEM for women and others.

### Who supported you and how?

My PhD advisor, Michelle Perry, is the single biggest reason I am where I am. She provided an example of a strong, brilliant, productive, kind female faculty member in a research field. She had high expectations and pushed me to be the best, but she coupled that with empathy, support, and an unwavering message that I did belong. She still pushes and supports me today. When I work with others, I try to do for them what she did for me. (She's also a UChicago alum, by the way.)

# How are you leading the way and supporting the next generation of scientists?

I try to do several things to lead the way and support the next generation of scientists. First, I acknowledge and support excellent work, especially work that often goes unnoticed. Second, I call out inequity where I see it and try to help elevate voices of women of color (from my position of privilege as a white woman). There are a lot of times people do inequitable things because "that's how it's always been done," and I will always push back on that. Third, on research projects, I encourage younger scholars to take the lead on research inquiries and articles, supporting them as they have questions and issues, and affirming consistently that they belong. Fourth, I am openly and unabashedly a "STEMinist," meaning I support women in STEM and work to promote a collaborative rather than competitive ethic among my female colleagues. I could still get better at all these things. I know I am privileged in many ways and benefit from that privilege, so I'm still trying to become better at seeing that and raising others up.







Looking back
My first time on a boat collecting
in situ data with my mentor
David Murray during junior year
of college

My chemistry teacher in high school was a retired chemical engineer, and it was clear that she loved science. She went on to be my physics and AP chem teacher so I had her as a mentor for three years. Through her classes, I became very curious about the world around me, and I wanted to become a scientist to explore all the things that fascinated me.

# What challenges do women in STEM face generally? What hurdles have you faced?

My main challenge has been serious imposter syndrome and feeling like I did not deserve an opportunity that I was given. However, I have been very lucky to have had wonderful mentors throughout my academic career that have helped me navigate my journey.

### What personal traits have you relied on to advance in your career?

I have relied on positivity, curiosity, honesty, and gratefulness.

# How can others, regardless of gender identity, help support future scientists?

Others can listen to students when they ask for advice, give students an opportunity, and provide constructive feedback.

#### Who supported you and how?

My undergraduate advisor, Professor Jan Tullis, has been one of my strongest supporters and continues to be a mentor to this day. When I was having a hard time in college and thought that I would never be able to attend graduate school, she took time to share her story with me, gave me advice on how to improve, and helped me to not feel alone. As a first-generation student, I don't have anyone who can guide me through next steps, but she has always helped me and her support made me feel like I had what it took to be successful. She still does!

"My main challenge has been serious imposter syndrome and feeling like I did not deserve an opportunity that I was given. However, I have been very lucky to have had wonderful mentors throughout my academic career that have helped me navigate my journey."

## How are you leading the way and supporting the next generation of scientists?

I help my family and anyone around me whenever I can with anything related to academics or their professional success. I look for opportunities to mentor and interact with students interested in science. I create workshops and activities to share STEM with students from underrepresented groups and anyone who is interested. However, my main mission is to be healthy and do well in my research/academics so that I can continue to be a role model and resource to future students.





Looking back
With a toad I encountered in Thailand,
where I was working at a high school
to help science teachers incorporate
scientific inquiry in their curriculum

"I have always been interested in animals and how bodies work, so originally I wanted to be a doctor when I was young. My seventh and eighth grade science teachers expanded my view of possible careers in science beyond that, and my high school biology teacher got me thinking about even more options. I became a PhD biologist and STEM educator, rather than a medical doctor. because of them."

#### What first inspired you to pursue a career in STEM?

I have always been interested in animals and how bodies work, so originally I wanted to be a doctor when I was young. My seventh and eighth grade science teachers expanded my view of possible careers in science beyond that, and my high school biology teacher got me thinking about even more options. I became a PhD biologist and STEM educator, rather than a medical doctor, because of them.

# What challenges do women in STEM face generally? What hurdles have you faced?

I think the systemic and institutional biases faced by nonwhites and non-males are well established. I attended a lot of programs to encourage girls to become more interested in science—girls are not the problem. We need to work to confront existing biases and change the culture.

# What personal traits have you relied on to advance in your career?

I have relied on curiosity and bravery.

### How can others, regardless of gender identity, help support future scientists?

Everyone, regardless of gender identity, can advocate for adequate funding for public preK-12 education and equity in STEM learning. There are huge discrepancies in opportunities to learn STEM based on race and socioeconomic status that we can't ignore. That advocacy will benefit all children. For children you know personally: take time to learn about their interests and help them see how STEM connects to those interests, help them get connected to learning opportunities, and talk to them about STEM. Talk about all kinds of STEM jobs, not just doctors and professors.

#### Who supported you and how?

My mom and stepdad really supported me becoming a STEM professional, all through the circuitous path to where I am now, even though they didn't always understand it. They made sure I was able to participate in out-of-school STEM learning programs that I was interested in when I was in high school, finding time and money to get me there even though I know it was not easy. They embraced my love of amphibians. The first quilt my mom made for me was in honor of my PhD defense.

# How are you leading the way and supporting the next generation of scientists?

My work focuses on supporting preK-8 teachers to teach STEM in their classrooms, as well as expanding access to out-of-school STEM learning for youth in Chicago. By ensuring that more kids have quality STEM learning experiences, I am expanding the number of individuals who know that STEM is for them and consider it as a career path.



#### **Looking back**

My second birthday party was space-themed and included papier-mâché models of the planets that my parents and I made

#### What first inspired you to pursue a career in STEM?

I loved space from a young age. I was particularly mystified by the idea that there were vast expanses of little-explored nature that people could work to understand. I was always interested in exploration and creativity as a kid, whether through following fashion or making crafts or playing outside in the woods. I spent a few years as a preteen obsessively learning about plants, and the idea of engaging with plants in nature, seeing rare and new ones or understanding how communities use them, inspired me to aim to become a botanist. I am not a botanist now, but that spirit still motivates me.

### What challenges do women in STEM face generally? What hurdles have you faced?

Women in STEM face a cultural pressure to do something different. There is a lack of support in gaining the background needed to succeed in our current university-based training programs. Women in STEM often face difficulty being taken seriously as peers by their colleagues, or being taken seriously as gifted people who deserve opportunities to learn. This difficulty can be magnified if women have other identities underrepresented in science.

Often women in STEM take on disproportionately large organizational and community-building burdens in order to improve their working environments. The labor to alter scientific culture to be more inclusive falls heavily on the people who are marginalized by this culture. When we do this labor, it is often not taken seriously, as it is seen as a distraction from, rather than a contribution to, advancing our careers.

Due to mainstream American cultural conditioning against women being self-aggrandizing and assertive, some women do not feel that they are as good as men whose work quality as scientists is similar. This confidence gap limits the ability of these women to feel secure enough to stretch themselves and grow as scientists.

I have often felt that I'm not good enough. A friend of mine in college told me, "You're just as good at physics as the rest of us, you just more easily betray the fear we all feel inside." I worry that as a young scientist, most of the challenges lie ahead. When I am an experienced colleague and competitor to more established scientists, I know I will have to navigate being denied resources.

When I was in middle school I had trouble getting permission to take the most advanced science courses, despite the fact that I was doing very well in school. Teachers—particularly women teachers—doubted my capacity to handle the coursework. In high school, I was advised not to take AP Physics because it might be "too stressful" for me. Boys at my school were not similarly dissuaded, so we ended up with 21 boys and two girls in the class. When I was admitted to MIT for college, a woman teacher told me that she thought I was only admitted because I was a girl. In college and in internships I experienced theft of my ideas by men who claimed my work was theirs, or by people who listened to my commentary and then attributed it to the man sitting next to me. I was also sometimes excluded from collaborations on problem sets and in lab classes.

I have perhaps faced fewer challenges than some other women in STEM because I am a white woman who is easily able to engage in a performance of adherence to the superficial cultural standards of academia. I have been afforded opportunities to get a high-quality and impressive-sounding education. The fact that I have faced a number of challenges in pursuing science should be a strong indication of the difficulties that women in STEM in general experience.

#### What personal traits have you relied on to advance in your career?

I have relied on confidence, focus, stubbornness, and being drawn to beauty.



# How can others, regardless of gender identity, help support future scientists?

People who mentor others can provide explicit encouragement to everyone they think shows potential to persist in science and seek more opportunities to grow. Many students feel like they depart from our society's mythic persona of 'the scientist' and/or struggle to construct a sense of belonging in science. Less-established scientists would benefit from hearing others share the belief that they can succeed.

People can get serious about crediting ideas properly in meetings, publications, and interactions in general. This is a slant to those whose ideas and work get ignored or mis-attributed. Everyone feels more comfortable and empowered to share ideas when those ideas get due credit. People with authority can also ensure that opportunities and work get assigned fairly.

Everyone can take a leadership role to foster cultures of respectfulness in their communities. By 'respect' I don't mean just politeness, but a deeper appreciation of the dignity and value of each person. People who are considering working in the sciences who see inhospitable communities are less likely to choose scientific research as a career.

People who make hiring or admissions decisions can think about how different applicants may have received different-sounding feedback on identical work, and how identical job applications are often viewed differently by readers based on the perceived identities of the applicants. If you're choosing personnel, contemplate the complicated surface that is 'the playing field' when evaluating candidates.

#### Who supported you and how?

A large number of people supported me, starting with my parents, who encouraged me to do whatever I wanted. They also provided great examples: I admire my mom's lawyerly skill at approaching an unfamiliar system and seeing its essential structure so that she can address its problems. My dad introduced me to the excitement of research by taking me to a research library to find source material for a fifth grade project. I first realized here that in academic

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A friend of mine in
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work you could view others' arguments, slice them apart, and make your own claim that people had to listen to. My love of this is at the heart of why I do research.

A number of professors in college supported my pursuit of my goals in science and didn't question why I was studying physics or pursuing research. I am especially thankful to the professor who ran after freshman me in a hallway to tell me that he really thought I needed to study astrophysics. My undergraduate advisor, Melissa Franklin, provided me with a bunch of very good advice that I, obstinate, tended to ignore.

# How are you leading the way and supporting the next generation of scientists?

I think that mentoring and encouraging young scientists, especially those who are more vulnerable due to their backgrounds or identities, is critical, so I have become involved in several mentoring projects in physics. Additionally, as a member of the Graduate Recruitment Initiative Team (GRIT), I've been participating in programming which supports equity and inclusion in the science graduate student community. I've been working with GRIT to ensure the presence of diversity-related programming in our upcoming recruitment weekend for new graduate students in physics. I've also been providing graduate and summer program application advice to folks who connected with GRIT at diversity-related conferences!



am a chemical engineer who specializes in theory and computational science of energy materials.

As a child I grew up on an island surrounded by nature. Flowers, rocks, and fish were abundantly present. Growing up, I asked my parents many questions about why certain things in nature happened the way they did. They never brushed off my questions as unimportant. When they did not know the answers, they searched with me using any sources of information they could find, including in books, libraries and the internet. Because of them, asking scientific questions and immersing myself in the process of trying to find and understand answers became an integral part of me.

In addition to my parents, I also consider myself lucky to have had great teachers in high school. My chemistry teacher had a good sense of humor, but could be rigorously strict; my calculus teacher was a bit eccentric but proved theorems beautifully; and my physics teacher gave me a great amount of homework, but also showed me that there is energy in every matter. In college, I decided to pursue chemical engineering because that particular field includes all the subjects that I love pursuing: chemistry, mathematics, and physics. Ultimately, chemical engineering is rooted in the fundamental laws of nature and opens new areas in science and technology.

# What challenges do women in STEM face generally? What hurdles have you faced?

Women in STEM are considered a minority group, especially in physical sciences and engineering. Lack of representation of women has hindered younger girls to be interested in careers in STEM.

There have been many incidents that made me think I was disrespected, rejected, or under-rewarded compared to my male colleagues. During undergraduate, I was the only female member of a research group specializing in computational modeling. One day when I came in, a graduate student suddenly took my desktop computer away and placed it under his desk because his computer was broken. I was upset that he did that and told our professor. The professor told him to apologize, but the student never genuinely did, and continued to bully me. A few years later, the same professor told me that the graduate student had to leave the program because not only did he fail his PhD candidacy exam but also because several female graduate students in his year reported that he had bullied and harassed them.

My graduate supervisor always took his TA's to a school pub where he would buy them a few drinks while they were grading the final exams together. When I became his TA, not only did he ask me to grade all the exams by myself, he did not show any gesture like buying drinks that he did

"Research in STEM is only meaningful if the knowledge accumulated can be passed down to future generations. Therefore, I strive to mentor and spark scientific passion in younger students."

for male TA's. As a graduate student, my mentor was not usually pleased with my ideas for my research projects. But when my male colleague supported my suggestion, suddenly he said that what he previously thought were poor ideas were potentially great ones.

## What personal traits have you relied on to advance in your career?

I have relied on curiosity, persistence, and belief.

### How can others, regardless of gender identity, help support future scientists?

First, give everyone a fair reward. For example, group leaders can give rewards that will be appropriate for everyone, male and female. Or reward something of equal value but appropriate to female students as well, instead of simply excluding them. Second, educate everyone about implicit bias. For example, fewer women pursue math, physics, and computer science because of their disposition in general, not due to their lack of ability. Therefore, one should not assume female STEM researchers to be inferior in their scientific prowess compared to male researchers.

#### Who supported you and how?

My family has never questioned my decision to pursue my career and has supported me even though women are considered a minority in my field. My friends in graduate school gave me constructive criticism and advice on my work and presentation as a researcher—and not because I am a woman. At UChicago, my mentors seem to treat both male and female members of the group equally.

### How are you leading the way and supporting the next generation of scientists?

Even as a graduate and now as a postdoc, I have always volunteered to help anyone who is passionate about science. They can be undergraduates, incoming graduate students, or even older graduate students. Research in STEM is only meaningful if the knowledge accumulated can be passed down to future generations. Therefore, I strive to mentor and spark scientific passion in younger students.

Looking back Canoeing with my brother as kids



"Answering questions and engaging with people, especially kids, who might not have a scientific background are the best ways to demystify science and inspire future scientists."

#### What first inspired you to pursue a career in STEM?

I don't think just one thing led me to STEM; however, my love for animals, bugs, and the outdoors is the reason I picked science as my favorite subject in the first grade. I wanted to do something where I could be inventive, and it wasn't until high school that I realized that engineering was the path where I could pursue math and science in a creative way.

# What challenges do women in STEM face generally? What hurdles have you faced?

There's been the perception that engineers and scientists possess a certain archetype, and it's possible many women haven't felt they fit in. This is changing, and I've been fortunate to have many female mentors and advisors who break the mold.

# What personal traits have you relied on to advance in your career?

I have relied on persistence and positivity.

# How can others, regardless of gender identity, help support future scientists?

Explain your research often. Answering questions and engaging with people, especially kids who might not have a scientific background, are the best ways to demystify science and inspire future scientists.

#### Who supported you and how?

My older brother was my first mentor in engineering. When I was a sophomore in high school, he invited me to stay with him at college for days at a time to shadow his mechanical engineering classes. He's currently a Nuclear Scientist at Argonne National Laboratory and still my go-to for advice.

# How are you leading the way and supporting the next generation of scientists?

I share my passion for STEM with the MSI Junior Science Café, After School Matters, and PME's No Small Matter.







# **Looking back**In my homemade pilot outfit with my stuffed cat named Copilot

### What first inspired you to pursue a career in STEM?

When I was young, I wanted to be a pilot because planes go fast. Later I wanted to be an aerospace engineer so I could build the planes, but I found that I liked the physics more. I didn't settle into astronomy until college, and I chose it because of how much I enjoyed a radio astronomy project in a physics lab class.

# What challenges do women in STEM face generally? What hurdles have you faced?

Sometimes I feel a sense of illegitimacy in academic environments, as though I'm not supposed to be there and have just stumbled my way in. I think that many other women in STEM also feel this way because we get the message all our lives that we are strange exceptions to the norm.

# What personal traits have you relied on to advance in your career?

I have relied on self-confidence and a strong work ethic.

# How can others, regardless of gender identity, help support future scientists?

You can give people credit for their ideas and acknowledge when they have done good work. If someone is worried that they aren't cut out for science, a simple "good job" is immensely reassuring.

#### Who supported you and how?

My high school calculus teacher and my high school rocketry team were my biggest supporters. I struggled with being the only girl in many of my math and physics classes in high school, but my calculus teacher was always encouraging and available to talk. My rocketry team respected me and helped me learn in an exciting and judgement-free environment.

# How are you leading the way and supporting the next generation of scientists?

Now, I'm an organizer and lead plot developer for SUMIT, an escape-room-like event for girls that fosters mathematical confidence through collaborative problem solving. I believe that healthy confidence in your own abilities is the most useful skill to develop for future scientists because of how much I have struggled to develop that in myself.

"Sometimes I feel
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I don't remember a time where I didn't want to pursue a career in STEM. When I was younger, I carried around a pocket-sized encyclopedia of animals and wanted to be a zoologist. When I was older, I started collecting rocks and shells whenever I traveled. Eventually, seeing the galactic disk of our Milky Way galaxy in a dark sky region ultimately inspired me to study the cosmos.

# What challenges do women in STEM face generally? What hurdles have you faced?

Women generally face challenges of not being taken seriously, having colleagues undermine their intelligence, and sometimes just being totally ignored. I have also seen female speakers receive particularly pointed, almost attacking questions at conferences after delivering a talk. I have personally faced several instances of "man-splaning" and being completely ignored by senior male faculty members.

# What personal traits have you relied on to advance in your career?

I would say I most heavily rely on passion and determination. Pursuing graduate studies and beyond in academia is very challenging. You have to be able to get up in the morning and say, "I love what I do, regardless of what anybody else tells me I'm capable of." Not every day will be perfect. Some days you'll wake up and dread the tedious tasks laid out for you, but working through this and being excited about the end results are really important.

# How can others, regardless of gender identity, help support future scientists?

I think just listening to someone else's stories and empathizing with their situation is really supportive. Also, I think being able to tell your full truth to future scientists is very important. I never sugarcoat the experiences I've had when talking to aspiring scientists. I think it's important to let them know what's ahead and provide advice on how to handle these situations. The best offense is a good defense! If you're helping prepare future scientists for what lies ahead, they'll be equipped to slay through challenges they may face.

#### Who supported you and how?

My mom has always been my number one supporter. She always encourages me to pursue my dreams no matter what stands in the way and she helps brainstorm ways around these blockades. She is also genuinely interested in what I do. She's always asking for articles to read so we can have meaningful conversations about the science I do. Her curiosity and wanting to connect is above-and-beyond the support I didn't know I needed, but 1000% appreciated.

"Being able to tell your full truth to future scientists is very important. I think it's important to let them know what's ahead and provide advice on how to handle these situations. If you're helping prepare future scientists for what lies ahead, they'll be equipped to slay challenges they may face."

# How are you leading the way and supporting the next generation of scientists?

I try to support the next generation of scientists volunteering for as many STEM outreach programs as I can, especially those that are tailored for underrepresented people in STEM. For example, I'm a pen-pal to a seventh-grade student, Bella, in California who wants to be an astronaut, I'm a Soapbox Science speaker, and I volunteer at Her Story. I am also a mentor to two female undergraduate students in physics and astronomy at UChicago. I try to help them navigate applying to summer research positions, choosing classes, and having conversations about graduate school.



# Looking back Participating in lab activities organized for girls from a high school in Switzerland



"The underrepresentation of women in STEM is currently an issue faced by many scientific institutions. Despite many efforts to curb this issue, the lack of role models at different levels of education often results in female researchers' lack of confidence in their own abilities."

#### What first inspired you to pursue a career in STEM?

As a child I was curious and creative. I believe that these two traits led me to pick science for my education. The idea of translating theory into practice was really exciting to me and it became even more stimulating when, through practice, I got to establish my own theories. Through this process, I realized how much I loved to investigate scientific questions and use my creativity to combine every piece of information to get answers, either to strengthen general knowledge in the scientific community or to address new challenges. I also enjoy the endless learning process that science offers, along with the feeling of never running out of options. Combined, these perspectives ultimately evolved into a strong will to contribute to solving humanity's biggest concerns.

### What challenges do women in STEM face generally? What hurdles have you faced?

The underrepresentation of women in STEM is currently an issue faced by many scientific institutions. Despite many efforts to curb this issue, the lack of role models at different levels of education often results in female researchers' lack of confidence in their own abilities.

# What personal traits have you relied on to advance in your career?

I have relied on passion and perseverance.

## How can others, regardless of gender identity, help support future scientists?

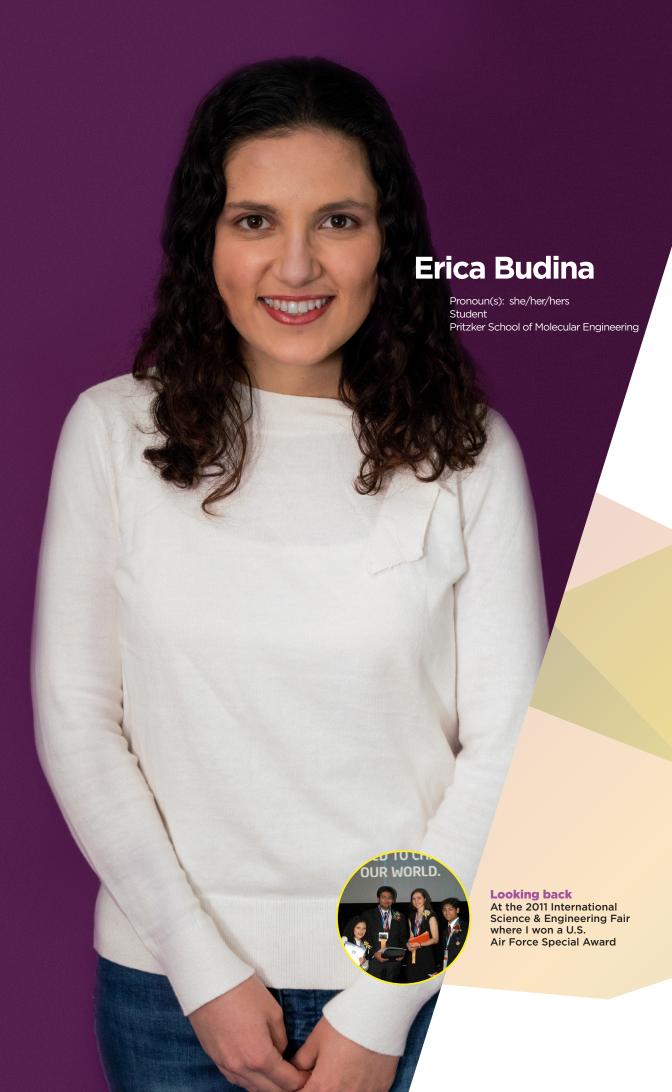
Others can participate in different outreach events.

#### Who supported you and how?

My Pl's and friends have supported me.

How are you leading the way and supporting the next generation of scientists? I hope to become a role model for women in STEM.





When I was in my first year of high school, my biology teacher encouraged me to enter my local science fair. I had no expectations; I was just excited to share my project and my results with others. To my surprise, I ended up winning the chance to compete at the International Science and Engineering Fair. These opportunities to participate had an immense impact on my career plans. When I was presenting my project to the judges, it was the first time that I had the chance to talk to professors and researchers and learn about what career scientists do.

# What challenges do women in STEM face generally? What hurdles have you faced?

One challenge that women face is representation. Despite being just as brilliant, hardworking, and dedicated as their male counterparts, women in STEM remain underrepresented in tenured faculty positions, in junior faculty positions, in postdoctoral positions, and often in the graduate student body as well. As a consequence, there are fewer female scientists and engineers than males who can act as role models and mentors. Although not seeing as many women in these leadership positions can be disappointing, it also motivates me to work even harder to change this status quo for the next generation. Here at UChicago, I am very fortunate to work alongside a great many outstanding female scientists who I can turn to for advice and feedback.

### What personal traits have you relied on to advance in your career?

As a first-year graduate student, I have just begun what I hope will be a long career in science. I believe that the most important qualities needed to succeed in STEM are passion, hard work, perseverance, and collaboration. As scientists and engineers, we work at the intersection of the known and unknown, and challenge ourselves to solve difficult problems. Passion for the topic is immensely important because it gives you purpose and motivation to persevere and work even harder when experiments do not go as planned. Because science is hypothesis-driven, sometimes we discover that our hypotheses are proven wrong; in these cases, we must persevere and use these findings to inform new studies. The willingness to collaborate and share knowledge with others can also lead to stronger science.

# How can others, regardless of gender identity, help support future scientists?

Everyone can serve as an ally by calling out gender discrimination when they observe it happening. Ally trainings are especially useful in helping people understand what constitutes gender discrimination and how it can be prevented. In addition to training allies, it is also important to create supportive spaces where female scientists can discuss the challenges that they face and work together with the community to develop impactful solutions. It is also very important for the science and engineering community to ensure that female scientists are represented in training programs and provide opportunities for early career female scientists to connect with mentors who can provide valuable advice for advancing in their careers.

#### Who supported you and how?

When I was in my second year of high school, I was given the opportunity to conduct research in Prof. Lauren Black's biomedical engineering laboratory at Tufts University through the Tufts University Biomedical Engineering Re"I would not be where I am today if my first research mentor had not taken a chance on a motivated 16-year-old student from the nearby public school and allowed her to conduct research in a lab."

search Scholars Program. During my three years in the lab, I had the honor of being mentored by Dr. Corin Williams, a postdoctoral fellow at the time. I am very grateful to Corin for taking the time to teach me the basics of laboratory research, help me design an independent research project to pursue in the lab, and provide feedback and advice as I presented the results of my project at the local, state, and international science fairs. I could not have asked for a better role model to introduce me to biomedical research. I am also very grateful to Prof. Lauren Black for making it possible for a high school student to conduct research in his laboratory and for encouraging me to present my research at science fairs and even a scientific conference. Having the opportunity to work in a scientific laboratory in high school changed my life. It opened my eyes to a new area of research that I did not previously know existed and it inspired me to major in bioengineering during my undergraduate studies. I will never forget how excited I felt that first day I stepped into the lab; now almost eight years later I continue to feel the same way and that is how I know that I am in the right place.

### How are you leading the way and supporting the next generation of scientists?

I would not be where I am today if my first research mentor had not taken a chance on a motivated 16-year-old student from the nearby public school and allowed her to conduct research in a lab.

Having witnessed first-hand the impact of STEM outreach programs, in my current role as a graduate student, I hope to pay it forward by mentoring undergraduate and high school students in the laboratory. As a mentor, I am excited not only to introduce these students to research but also, if they express interest, to help them design and execute independent research projects, and provide advice as they apply to college or graduate programs.

I grew up in India; my mom was a doctor and my dad a scientist, and these were the two career paths presented to me. My rationale as a kid for choosing my dad's path was because I was afraid of the mere sight of blood! I remember my dad telling me that a PhD was the minimum degree that I needed to obtain in order to become a scientist, so little Sunanda assumed that every scientist has to study at least that much. I got lucky to be selected in the competitive entrance exam for Ecole Polytechnique in France and was admitted as the first Indian in their Diplome d'Ingenieur undergraduate program. Even though I did not speak French, my examiners, who were later my mentors, encouraged me to join the school. I was supported tremendously both by the student and academic community and I made many close friends.

At Polytechnique, engineering education was grounded in theory and this strong foundation fueled my curiosity in the basic sciences. I pursued a double major in electronics and applied mathematics and continued on to a PhD in quantum electronics at Northwestern University in the US. I was one of my advisor's first PhD students. My nanotechnology and prototyping experience in the lab led me to a job in product design after my PhD. Looking to connect my scientific background to this experience where I designed stories for products, I serendipitously found Nancy and the STAGE Lab at PME. At the STAGE Lab, I work at the intersection of the arts and sciences and apply my science and design skills to create innovative theatre and film projects.

### What challenges do women in STEM face generally? What hurdles have you faced?

Starting from high school, and then in my undergraduate going to my PhD in the electrical engineering department, I was often the only woman in my classes. Although I never felt it to be a hurdle, I felt I had to be extra determined to prove my worth at every step along the way. There was little room for self-doubt and hesitations along the path, which was often the challenge.

### What personal traits have you relied on to advance in your career?

I have relied on curiosity, a positive attitude, adaptability, honesty, and determination.

### How can others, regardless of gender identity, help support future scientists?

The best way in which I strive to support future scientists is to lead by example. I also teach the students the scientific process, rather than focus on outcome and results. It is often during the scientific journey that students realize the rewards of serendipitous discoveries and learning from failure. The goal is motivating students to pursue their chosen path with investment, enthusiasm, and motivation.

#### Who supported you and how?

My mentors and families supported me throughout my journey. I have great admiration for my undergraduate mentor Jean-Louis Basdevant, who accepted me into the undergraduate program at Ecole Polytechnique. During the entrance exam, although I had arrived at the incorrect solutions to some of the questions, he focused on my thought process and procedure to arrive at the outcome. He also greatly encouraged me to take the plunge to study in a completely new language, learning alongside the top students in France and internationally. He supported me for my PhD applications, and I am very grateful for his guidance throughout my career.

In the US, I am very grateful to my PhD mentor, Professor Matthew Grayson from Northwestern University, for being a constant guiding force, supporting me tremendously

"During my undergraduate and graduate studies in France and U.S.A., I was often one of the few women in my engineering program, in addition to being an international student. It took me quite some time to understand the people I was working with and find my voice in these new milieus."

professionally and teaching me the rigor and critical thinking required to do good research. Last but not least, I am honored to be mentored by Professor Nancy Kawalek at PME. For my postdoctoral program, Nancy trusted me to undertake research projects which were in the area of film, a field in which I had never worked. She allowed me the independence to grow both the project and my own skills in this area. She guided the work to be a high quality, unique contribution to the field of art and sciences.

### How are you leading the way and supporting the next generation of scientists?

My postdoctoral work includes leading the efforts on an original web series entitled Curiosity: The Making of a Scientist. Curiosity is a unique research project encompassing storytelling, science communication, and documentary filmmaking. The web series takes us into the labs and lives of scientists to dispel stereotypes and reveal the human side of those who practice science. The goal is to explore what motivates and is involved in choosing a career in science, what inspires scientific investigation, and the nature of curiosity itself.

Curiosity is an interdisciplinary project that speaks to a wider public, as well as to the collaborative creative team. This team is comprised of postdoctoral scholars, graduate students, and undergraduates from diverse disciplines across the campus. This mélange affords the project a broad perspective and the best of both the science and art worlds.

This work allows me to have one leg in the world of science and another in the world of arts and allow a similar cross-cultural experience to both our students and also, to the broad audience that we intend for our web series.





I have been interested in a career in STEM basically my entire life. I was pre-med since kindergarten—I dressed up as a doctor for career-day and there was no turning back. But a big change of heart happened during my third year of college when I took astronomy. I discovered a deep passion for the cosmos that connected with my faith in a unique way and that I couldn't shake. I decided to leave behind my pre-med ambitions to pursue a career in astrophysics. Some of my sweetest memories involve being outside under a sky full of stars. I have fond memories of watching a lunar eclipse in the dark countryside with my dad as a child. Also my astronomy and astrophysics professor and advisor, Dr. Erin Bonning of Emory University, is a total rockstar and encouraged me to pursue my dream of being an astrophysicist even though I received my bachelor's degree in biology.

# What challenges do women in STEM face generally? What hurdles have you faced?

I would say many women in STEM struggle with feeling less than—less qualified, less experienced, less confident to succeed, and so on. But it's all a lie; we're just as qualified, if not more so. As a double minority (black and female), I've definitely struggled with years of imposter syndrome and stereotype threat, seriously psyching myself out of being successful. It's definitely dangerous and a killer of dreams if we don't have the proper support.

#### What personal traits have you relied on to advance in your career?

I have relied on resilience, passion, my faith, a bit of stubbornness, and rebellion against the status quo for sure. I definitely have a bit of a daring personality. I get bored if I'm not being challenged. I'm not too afraid to take crazy risks, as long as they're not too crazy.

### How can others, regardless of gender identity, help support future scientists?

Many people don't like physics and other STEM fields and speak negatively because STEM can be very hard. Encourage youth, especially youth of color, to give STEM a chance. If I hadn't been encouraged at a young age to do science projects, visit national labs, go to science museums/planetariums, look up at the stars, etc., I probably wouldn't be pursuing a STEM degree today. I was encouraged and rewarded to be a nerd, and I am so glad I was.

One can pursue STEM regardless of age, race, or gender identity. I have some amazing friends who identified my love of the stars and encouraged me to try it out. So if you have a friend who loves something scientific, like nature documentaries or quantum physics novels, encourage them to take the next step and learn more. A hobby or interest could turn out to be a promising career. Dream big and keep an open mind; with the proper training, support, and encouragement, we are often capable of much more than we give ourselves credit for.

"Encourage youth, especially youth of color, to give STEM a chance.

If I hadn't been encouraged at a young age to do science projects, visit national labs, go to science museums and planetariums, look up at the stars, etc., I probably wouldn't be pursuing a STEM degree today."

#### Who supported you and how?

My parents are some of my biggest supporters. My father would always say that I was the "smartest girl in the world" when I was a child, and I would respond to him that I definitely was not, but I loved hearing how much he believed in me, and still does.

Two of my biggest mentors would be Camille Avestruz, PhD, and Brittany Kamai, PhD. Camille Avestruz, PhD, is an amazing friend, mentor, and supporter—and fun fact, taught me how to rock climb!

Brittany took me under her wing when I first came to UChicago as a post-baccalaureate research tech before I began my graduate career. She is a history maker in her own right, being one of the only Native Hawaiians in physics and astrophysics—period. I followed in her footsteps starting my graduate career in a bridge program, as well as working on the Fermilab Holometer with her for a short time. She always encouraged me to sit in the front (still struggling with that one), to never be afraid to ask questions, and most importantly to convey confidence through power-posing.

# How are you leading the way and supporting the next generation of scientists?

I would say that the most rewarding part of my doctoral journey is the ability to mentor and act as a role model, especially for women and people of color. I love encouraging people and sharing the joy of being a scientist.

I've also had the privilege to speak out on being a black women in physics and astronomy on various panels at a variety of venues, including multiple screenings of the movie Hidden Figures, Wakandacon, Fermilab, and the Adler Planetarium.



Looking back
With my parents in
front of Rockefeller Chapel
when I received my
PhD in chemistry in 1990

Both of my parents were the eldest in large rural families and had to give up school at an early age in order to help their parents. But both remained self-taught life-long learners. My father had a natural talent for math and science and my excitement to learn STEM fields originated from him.

#### What challenges do women in STEM face generally? What hurdles have you faced?

Remaining strong and passionate in expressing my views in my own personal style is one of the hardest obstacles that I have had to face as a woman in science.

## What personal traits have you relied on to advance in your career?

I have relied on resilience, faith, compassion, gratitude, and forgiveness.

### How can others, regardless of gender identity, help support future scientists?

Mentorship and paying it forward! None of us can achieve our goals without the support of others. Support can be teaching and guidance or just as simple as listening and showing empathy at a difficult time in someone's chosen STEM career path. No one makes it throughout life without questioning their decisions. Students should be encouraged to feel confident and question not just themselves but also others in the institution in their STEM careers.

#### Who supported you and how?

My parents sacrificed for me and supported and encouraged me unconditionally. My Serbian Orthodox community supported me with encouragement and pride in my accomplishments. Teachers in high school and college also encouraged and helped me. My research mentor, Bill Wulff, was truly amazing in his support. He epitomizes the best that there is in all the vital areas of training PhDs in chemistry: scientific merit and creativity, teaching and mentoring, collegiality and service. When I came back to UChicago Chemistry from industry, Greg Hillhouse was an invaluable mentor for helping me understand the importance of supporting our students. When I began my academic hybrid career as Executive Officer of the Department of Chemistry, Jim Norris was the Chair and a great mentor showing me that a strong and decisive leader always starts his decision making process with collegiality and working hard to build consensus, which is very difficult to do with so many strong personalities.

#### How are you leading the way and supporting the next generation of scientists?

I have always found the most satisfaction in my academic hybrid career in supporting students. And now I have been given the opportunity to focus solely on student support, both graduate and undergraduate, as Director of Academic Programs. I feel strongly that it is important for the students to be aware that they have, within the department, a non-faculty, non-peer resource available to them, since they may not, at first, feel comfortable bringing a concern to a faculty member or fellow student.

I hope to be a resource that can provide guidance and explain the procedures, or just listen and affirm. I hope to act as a sounding board and to serve as a trial run for articulating the concern. I have found many students appreciate having this type of resource, as they find the confidence to voice their concerns. I want to ensure that our students feel not only empowered to contribute to the department but also feel safe in speaking when their views may be different and not accepted. I want to help them be strategic in advocating for themselves in difficult situations. To be, as I said, "passionate in expressing my views in my own personal style," is something I want to help others to gain. We need confident personal voices to enhance our Chemistry Community in the three vital areas that make for an outstanding department: research, teaching, and collegiality.







Looking back
Me in middle school,
with one of my science
teachers and another
student who won a prize

One day, out of the blue, my middle science teachers asked me to represent our school at the state-wide science competitions in physics, chemistry, geology, and biology. Until that point, I enjoyed math, but I had no experience or interest in other science topics. So, I was very surprised to be asked.

I grew up in a small village and our village school did not have many resources or much infrastructure for hands-on science. But my science teachers tried their best to help me prepare for the competitions by doing small hands-on experiments after school in physics, chemistry, geology, and biology.

The competitions were structured like a tournament, and I was the first girl to win first prize. They announced the news on the radio and then in the newspaper. When the radio reporter announced it, he said that I was a boy because that's what he assumed. He was corrected later.

"I grew up in a small village and our village school did not have many resources or much infrastructure for hands-on science. But my science teachers tried their best to help me prepare for the competitions by doing small hands-on experiments after school in physics, chemistry, geology, and biology."



Looking back
Me swearing in, with Neal Lane,
NSF Director, and Jack Gibbons, Director
of the Office of Science & Technology
Policy, during the spring of 1994

I loved math in high school and was especially stimulated by a teacher my senior year who told me I would not get my usual A without doing extra credit. I loved the freedom to pursue new material and questions! I graduated with a degree in math from the College at the University of Chicago. After working for three years as a mathematician and computer science intern at the National Security Agency (1966-67), and then as a programmer at the Biomedical Computation Facility (1968-70), I decided to continue my studies. I won a fellowship in Measurement, Evaluation, and Statistical Analysis (MESA) in SSD, earning an MS in Statistics in 1972 and a PhD in 1973. I loved doing research, so I continued working at UChicago, initially as a statistician on another study and then on my own research grants.

I have been active in STEM support and capacity-building activities since my graduate school days. While a graduate student, I served on a committee for women at UChicago. Our major accomplishment was obtaining faculty status for three very distinguished women scholars at the University. At the same time, I was part of the Chicago Women in Research, a sort of citywide support group. Once in faculty roles, I worked at many levels: with friends and peers, and structurally at university levels. In leadership roles, I served as a role model, and led as well as created programs for women scientists at universities and the NSF.

# What challenges do Women in STEM face generally?

While I didn't even recognize it initially, gender-based discrimination is still prevalent in STEM. I was very stubborn and persisted through my degrees and research. Like many women, I tended to attribute any possible discrimination to personal deficiencies. When this happens it creates a compounding effect of discrimination.

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Like many women, I tended to attribute any possible discrimination to personal deficiencies. When this happens it creates a compounding effect of discrimination."









**Looking back**On a science field trip at 13 to a volcanic site

"Don't be all bark and no bite."
Nothing is more insidious
than performative allyship.
Listen to what people
from marginalized identities
not just women—need in
your community and actually
do something about it."

# **Jean Salac**

Pronoun(s): she/her/hers Student Computer Science

I took my first computer science class my first semester of undergraduate studies. At the time, I just wanted to get it over with, since it was a requirement for the engineering major. I had a poor impression of CS from a summer lab internship in high school where I was the only student who wasn't from the elite science magnet school in my state. Some of my peers in that program made me feel awful because I didn't know how to code. However, I was surprised to find that I really enjoyed that CS class so much that I took more CS classes and ended up majoring in it. At the same time, I was reflecting on why I hadn't discovered it earlier.

Later, when I took an internship at the National Science Foundation, I learned about all the systemic and structural issues keeping historically marginalized groups out of computing, and how CS could complement efforts to address issues faced in those communities. I saw the power CS had to amplify the scale at which these issues could be addressed. It was this internship that started me on my current career path.

Through my research, I hope to make computer science more diverse and equitable by improving the way programming is taught. I identify barriers that students face when learning to program and develop strategies to overcome them.









Looking back
Presenting my science project
at the Massachusetts State Science
and Engineering Fair at 16





"We can help support our future scientists by providing them with opportunities to participate in science at a young age, giving them room to fail, encouraging their interests, and helping develop their passions.

We can show them just how great science really is."

Jessica Morgan

Pronoun(s): she/her/hers Student Biophysical Sciences

I was first inspired to pursue a career in STEM when I was in seventh grade. We were tasked with coming up with a future technology. Select students would then get the chance to compete in an Explora Vision contest where the winners would work with a team to develop their invention. I came up with the idea for Carbon Nanotube Nutrition Sensors—a device that released nanorobots to check vitals and provide nutrients—as a plausible aid in treating eating disorders. This project piqued my interest in nanotechnology. Now, eleven years later, I am designing nanodevices to use to study biochemical pathways in plants.



**Looking back**With my middle school science fair experiment

"Future scientists evaluate the community they may someday join and ask, 'Will I be welcome here? Can I be happy here?' We lose them when we say things that indicate that we haven't done the work of confronting our own biases, because then we represent a risk—not an asset—to their future happiness and success in science."

# Liza Mulder

Pronoun(s): she/her/hers Student Physics

In general, I think women in STEM get less exposu to science early on and face discouraging stereotypes. the isolating experience of being outnumbered in all your classes, and the horror stories about how other women have been treated. Personally, I was lucky to have learned science from middle school through college in a majority-female environment, so I think I felt less negative pressure than many. Even with that support, coming to grad school was a huge change and the imposter syndrome hit me really hard; I attended a small college and had taken fewer advanced courses than many of my classmates, so I felt like everyone else knew more and was better at physics and that I was going to fail. I'm still struggling with the imposter syndrome, but the support of my classmates and lab-mates has been really great and has helped me to keep going.



# At the interdisciplinary research outreach program ExploreU, teaching mathematics and computer science with artificial-intelligence





"As one of the Co-Directors of Undergraduate Studies in Mathematics and departmental counselors, I get to support and influence the next generation via teaching, outreach, and my work as an adviser to all mathematics majors."

# Jitka Stehnova

Pronoun(s): she/her/hers Co-Director of Undergraduate Studies in Mathematics, Sr. Lecturer Mathematics

I was always interested in science and, especially, math. I grew up building with Legos and solving puzzles. Math, chemistry, physics, and computer science were among my favorite subjects in school. The choice to pursue math for my career felt natural.

My parents always encouraged me to follow my dreams. My PhD thesis advisor, David Manderscheid, introduced me to the mathematics community and set me on my path. When I was an Assistant Professor of Mathematics, I was most influenced and supported by Rick Spellerberg, who, at the time was full professor and chair of the Mathematics Department at Simpson College. Rick is now a CEO of ICIT Institute (lowa Center for Interdisciplinary Teaching), which he founded in 2016



**Looking back** Surrounded by papers in the Lindquist lab in 1999

"There are too few women in STEM so there is an absence of role models and the women who are in STEM fields are stretched very thin."

### **Julie Feder**

Pronoun(s): she/her/hers Alumna Institute for Biophysical Dynamics

My brother, who is twelve years older than I am, recognized that I was a curious kid and gently encouraged me to study biology in college. I knew I had found my calling. Later, while I was teaching at a liberal arts college, a former UChicago faculty member, Susan Lindquist, welcomed me into her lab for a summer. When that summer experience was over, we stayed in touch and I eventually joined her lab—first as a postdoc and, eventually, taking on the duties of a lab manager. I was lucky to have someone as gracious and smart as Sue as a role model, mentor, and friend. Now, I take every opportunity to help trainees at the University.



Looking back
With my parents and my brother
at my college graduation





"I think a big problem is the way we, as a field, talk about scientific and mathematical ability, and our expectations for how science and math should be learned. I think we can help support future scientists by being more accepting and accommodating of all learning styles, by emphasizing that scientific and mathematical ability can be learned, and by making the field as inclusive as possible."

Sarah Reitzes

Pronoun(s): she/her/hers Student Mathematics

When I was a kid, I loved solving math problems and doing math puzzles. In fourth grade, I was the only girl in the advanced math class at my school. Another girl had been assigned to be in my class, but chose to stay in the on-level class. With the support of my teacher, I chose to stay in the advanced class. This was pivotal for me because it was one of the first times I actively chose math over fitting in. I succeeded in the class, enjoyed the challenge, and made many friends. After that, there was no stopping me from studying math.

Now, I am supporting the next generation of scientists with my involvement in GRIT. I am a co-leader of the disabilities team and the math department representative, and I work to retain and recruit diverse grad students to our university in these capacities. I also mentor undergraduates for the math department's directed reading program and summer REU. I serve as vice president for the Association for Women in Math. Additionally, I am on the organizing committee for the UChicago Women in STEM Symposium, which is open to women in STEM at all levels.



During an undergraduate internship at SLAC, I received the Earnest Coleman Award for exemplary citizenship as well as research ability

"My interest and drive to pursue physics started when my high school physics teacher taught us about the Large Hadron Collider at CERN. I was instantly skeptical that such a machine could exist and work in the way he described. It was that skepticism and desire to understand the physics and engineering involved in particle accelerators that launched me into STEM."

# Lipi Gupta

Pronoun(s): she/her/hers Student Physics

One of the major hurdles that many women face, and which I face often, is doubt. Being talked down to about subjects that I have studied for years is frustrating in the short term but can also lead to doubt of my own abilities and qualifications in the long term. One experience from very early in my career still haunts me: instead of asking me a question at the end of my presentation, a male audience member turned to my male advisor and asked him the question. This audience member assumed that I would not know the answer, and he did not give me a chance to respond. My advisor also acknowledged that he should have asked the audience member to direct his questions to me, but he responded to the question on instinct. It is important to note that this kind of behavior was instinctual for both parties; and the root cause must be addressed in order to change this behavior in the future.

Looking back
In front of the instrument
that I used as a postdoc





"I always wanted to know not only how something in our natural world worked but also why it worked. In middle and high school, I liked the seemingly neat answers of science. Once I got to college and graduate school, I better understood that science is messy and complex, but, in the end, this only made STEM more appealing."

Sarah King

Pronoun(s): she/her/hers Neubauer Family Assistant Professor Chemistry

It sometimes feels like as a woman in STEM you don't have permission to fail—if you screw up, then maybe this isn't the job for you. Even when you are successful, people will say things like "oh you only got that award/fellowship/job because you're a woman." This can make it hard to maintain the levels of confidence and resilience needed daily for a career in science. As a PI, I feel like it's a tough line between being assertive so you don't get taken advantage of, and being perceived as a bitch. A strong network of other women can be a good way to vent frustration and get needed support. I've been lucky enough to find that among other female faculty in the PSD.



**Looking back**With my grandparents after I received my pilot's license

"It's important to increase exposure to science by doing outreach and serving as a mentor for undergraduate research experiences."

# **Tiffany Shaw**

Pronoun(s): she/her/hers Associate Professor Geophysical Sciences

> It's important to increase exposure to science by doing outreach and serving as a mentor for undergraduate research experiences.

Everyone should educate themselves about bias. When you see or experience bias, do something (point it out, report it, etc.). We are making some progress on these issues but we have a long way to go.



**Looking back** Running my first observing night for the public at Penn





"I loved learning about and researching cosmology because it allows me to better understand two of humankind's deepest questions: How did the universe come to be. and what does the future hold? Every single person has grappled with these types of philosophical questions, and I feel like I am making an impact by helping to answer them for other people and for myself."

# **Abigail Lee**

Pronoun(s): she/her/hers Student Astronomy and Astrophysics

My sophomore year of college, I was the only woman in my partial differentials class, and for our final project we had to present on a topic. I ended up doing most of the work, yet one of the men in my group was more confident than me so he presented and made it seem like his own work. He ended up getting a good grade and I got a subpar grade, and he gaslit me when I complained, telling me I was overreacting. I was so discouraged because I felt like there was noting I could have done to prevent something like that from happening. However, I went to one of my female physics professors and told her I was thinking of dropping the physics major. She encouraged me to stick with it and said that, while there will always be challenges, it would be worthwhile in the end. She ended up becoming one of my strongest mentors and is the reason I believe mentorship relationships are so important for minorities in STEM.



Doing geological field work for the first time as an undergraduate—still smiling after three weeks of camping and without a shower in Namibia

"I've always had a love of the natural world.
As a child, I kept 'treasure boxes' full of interesting twigs, flowers, seashells, stones, and anything else that caught my eye in the outdoors, but it wasn't until college that I realized studying Earth sciences was an option."

### Clara Blättler

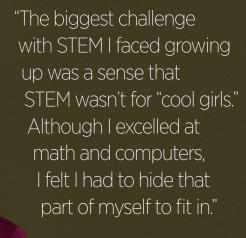
Pronoun(s): she/her/hers Assistant Professor Geophysical Sciences

Women in STEM are not the dominant practitioners and therefore struggle to influence the general culture of the discipline. This can lead to a sense of solation or fact of belonging, which can amplify and make us overly susceptible to negative feelings arising from the myriad of disappointments, failures, and frustrations that go along with scientific work. I nearly chose a different carear path because I thought that being a scientist would require constant arguing and aggressive posturing, which made me uncomfortable. I have since been happy to discover my own, different ways of interacting with my professional orld that better match my personality.



The night I won the University of Illinois College of Education Young Alumni Award with two women who inspire me and supported me in my research and development work: Michelle Perry, my graduate advisor, and Linda Sims, my dear colleague and mentor





# **Meg Bates**

Pronoun(s): she/her/hers Senior Research and Evaluation Scientist and Director of Digital Teacher Learning Research UChicago STEM Education

I try to do several things to lead the way and support the next generation of scientists. First, I acknowledge and support exunnoticed. Second, I call out inequity where I see it and try to help elevate voices of women of color (from my position of privilege as a white woman). There are a lot of times people ways been done," and I will always push back on that. Third, on research projects, I encourage younger scholars to take the lead on research inquiries and articles, supporting them as they have questions and issues, and affirming consistently that they belong. Fourth, I am openly and unabashedly a "STEMinist," meaning I support women in STEM and work to promote a collaborative rather than competitive ethic among my female colleagues.

I could still get better at all these things. I know I am privileged in many ways and benefit from that privilege, so I'm still trying to become better at seeing that and raising others up.



Looking back
My first time on a boat collecting
in situ data with my mentor
David Murray during junior year
of college



With a toad I encountered in Thailand, where I was working at a high school to help science teachers incorporate scientific inquiry in their curriculum





"I have always been interested in animals and how bodies work. so originally I wanted to be a doctor when I was young. My seventh and eighth grade science teachers expanded my view of possible careers in science beyond that, and my high school biology teacher got me thinking about even more options. I became a PhD biologist and STEM educator, rather than a medical doctor, because of them."

### iz Lehma<mark>n</mark>

Pronoun(s): she/her/hers School Development Manager UChicago STEM Education Staff and Alumna AB'00, Biological Sciences

Not work focuses on supporting prekis teachers to teach STEM in their classtooms, as well as expanding access to out-of-school STEM learning for youth in Chicago. By ensuring that more kids have audity STEM learning experiences, I am excanding the number of individuals who know that STEM is for them and consider it as a career path.

Everyone, regardless of gender identity, can advocate for adequate funding for public preK-12 education and equity in STEM learning. There are huge discrepancies in opportunities to learn STEM based on race and socioeconomic status that we can't ignore. That advocacy will benefit all children. For children you know personally: take time to learn about their interests and help them see how STEM connects to those interests, help them get connected to learning opportunities, and talk to them about STEM. Talk about all kinds of STEM jobs, not just doctors and professors.



My second birthday party was spacethemed and included papier-mâché models of the planets that my parents and I made

"I have often felt that
I'm not good enough.
A friend of mine in
college told me,
'You're just as good at
physics as the rest of us,
you just more easily
betray the fear we all
feel inside."

### **Meg Panetta**

Pronoun(s): she/her/hers Student Physics

When I was in middle school I had trouble getting permission to take the most advanced science courses, despite the fact that I was doing very well in school. Teachers—particularly women teachers—doubted my capacity to handle the coursework. In high school, I was advised not to take AP Physics because it might be "too stressful" for me. Boys at my school were not similarly dissuaded, so we ended up with 21 boys two girls in the class. When I was admitted to college, a woman teacher told me that she I was only admitted because I was a girl. I and in internships I experienced theft of my men who claimed my work was theirs, or by who listened to my commentary and then attribu it to the man sitting next to me. I was also sometimes excluded from collaborations on problem sets and

I have perhaps faced fewer challenges than some other women in STEM because I am a white woman who is easily able to engage in a performance of adherence to the superficial cultural standards of academia. I have been afforded opportunities to get a high-quality and impressive-sounding education. The fact that I have faced a number of challenges in pursuing science should be a strong indication of the difficulties that women in STEM in general experience.



Looking back
With a science Olympiad
team at high school





"Research in STEM is only meaningful if the knowledge accumulated can be passed down to future generations. Therefore, I strive to mentor and spark scientific passion in younger students."

# Elizabeth M. Y. Lee

Pronoun(s): she/her/hers Postdoc Pritzker School of Molecular Engineering

As a child I grew up on an island surrounded by nature. Flowers, rocks, and fish were abundantly present. Growing up, I asked my parents many questions about why certain things in nature happened the way they did. They never brushed off my questions as unimportant. When they did not know the answers, they searched with me using any sources of information they could find, including in books, libraries and the internet. Because of them, asking scientific questions and immersing myself in the process of trying to find and understand answers became an integral part of me.

In addition to my parents, I also consider myself lucky to have had great teachers in high school. My chemistry teacher had a good sense of humor, but could be rigorously strict; my calculus teacher was a bit eccentric but proved theorems beautifully; and my physics teacher gave me a great amount of homework, but also showed me that there is energy in every matter. In college, I decided to pursue chemical engineering because that particular field includes all the subjects that I love pursuing: chemistry, mathematics, and physics. Ultimately, chemical engineering is rooted in the fundamental laws of nature and opens new areas in science and technology.



Looking back Canoeing with my brother as kids

"Answering questions and engaging with people, especially kids, who might not have a scientific background are the best ways to demystify science and inspire future scientists."

**Rachel Weathered** 

Pronoun: she/her/hers Student

Pritzker School of Molecular Engineering

I don't think just one thing led me to STEM; however my love for animals, bugs, and the outdoors is the reason I picked science as my favorite subject in the first grade. I wanted to do something where I could be inventive, and it wasn't until high school that I realized that engineering was the path where I could pursue math and science in a creative way. My older brother was my first mentor in engineering. When I was a sophomore in high school, he invited me to stay with him at college for days at a time to shadow his mechanical engineering classes. He's currently a Nuclear Scientist at Argonne National Laboratory and still my go-to for advice



Looking back
In my homemade pilot outfit with
my stuffed cat named Copilot





"Sometimes I feel
a sense of illegitimacy
in academic environments,
as though I'm not supposed
to be there and have
just stumbled my way in.
I think that many other
women in STEM also feel
this way because we get
the message all our lives
that we are strange
exceptions to the norm."

# Karia Dibert

Pronoun(s): she/her/hers Student Astronomy and Astrophysics

When I was young, I wanted to be a pilot because planes go fast. Later I wanted to be an aerospace engineer so I could build the planes, but I found that I liked the physics more. I didn't settle into astronomy until college, and I chose it because of how much I enjoyed a radio astronomy project in a physics lab class.

My high school calculus teacher and my high school rocketry team were my biggest supporters. I struggled with being the only girl in many of my math and physics classes in high school, but my calculus teacher was always encouraging and available to talk. My rocketry team respected me and helped me learn in an exciting and judgement-free environment.

Now, I'm an organizer and lead plot developer for SUMIT, an escape-room-like event for girls that fosters mathematical confidence through collaborative problem solving. I believe that healthy confidence in your own abilities is the most useful skill to develop for future scientists because of how much I have struggled to develop that in myself.



Looking back
In second grade with a replica of a beaver dam

"Being able to tell your full truth to future scientists is very important. I think it's important to let them know what's ahead and provide advice on how to handle these situations. If you're helping prepare future scientists for what lies ahead, they'll be equipped to slay challenges they may face."

**Adina Feinstein** 

Pronoun(s): she/her/hers Student Astronomy and Astrophysics

I don't remember a time where I didn't want to pursue a career in STEM. When I was younger, I carried around a pocket-sized encyclopedia of animals and wanted to be a zoologist. When I was older, I started collecting rocks and shells whenever I traveled. Eventually, seeing the galactic disk of our Milky Way galaxy in a dark sky region ultimately inspired me to study the cosmos

My mom has always been my number one supporter. She always encourages me to pursue my dreams no matter what stands in the way and she helps brainstorm ways around these blockades. She is also genuinely interested in what I do. She's always asking for articles to read so we can have meaningful conversations about the science I do.

try to support the next generation of scientists by volunteering for as many STEM outreach programs as I can, especially those that are tailored for underrepresented people in STEM. For example, I'm a pen-pal to a seventh-grade student, Bella, in California who wants to be an astronaut, I'm a Soapbox Science speaker, and I volunteer at Her Story. I am also a mentor to two female undergraduate students in physics and astronomy at UChicago.











Looking back
At the 2011 International
Science & Engineering Fair
where I won a U.S.
Air Force Special Award

"I would not be where I am today if my first research mentor had not taken a chance on a motivated 16-year-old student from the nearby public school and allowed her to conduct research in a lab."

# **Erica Budina**

Pronoun(s): she/her/hers

Student

Pritzker School of Molecular Engineering

One challenge that women face is representation. Despite being just as brilliant, hardworking, and dedicated as their male counterparts, women in STEM remain underrepresented in tenured faculty positions, in junior faculty positions, in postdoctoral positions, and often in the graduate student body as well. As a consequence, there are fewer female scientists and engineers than males who can act as role models and mentors.

Although not seeing as many women in these lead ership positions can be disappointing, it also mot vates me to work even harder to change this status quo for the next generation. Here at UChicago, I am very fortunate to work alongside a great many out standing female scientists who I can turn to for ad vice and feedback.



**Looking back**Learning kung fu in Hong Kong
wearing a motion capture suit





"During my undergraduate and graduate studies in France and U.S.A, I was often one of the few women in my engineering program, in addition to being an international student. It took me quite some time to understand the people I was working with and find my voice in these new milieus."

Sunanda Prabhu Gaunkar

Pronoun(s): she/her/hers
Postdoc

Pritzker School of Molecular Engineering

I grew up in India; my mom was a doctor and my dad a scientist, and these were the two career paths presented to me. My rationale as a kid for choosing my dad's path was because I was afraid of the mere sight of blood! I remember my dad telling me that a PhD was the minimum degree that I needed to obtain in order to become a scientist, so little Sunanda assumed that every scientist has to study at least that much. I got lucky to be selected in the competitive entrance exam for Ecole Polytechnique in France and was admitted as the first Indian in their Diplome d'Ingenieur undergraduate program. Even though I did not speak French, my examiners, who were later my mentors, encouraged me to join the school. I was supported tremendously both by the student and academic community and I made many close friends.

At Polytechnique, engineering education was grounded in theory and this strong foundation fueled my curiosity in the basic sciences. I pursued a double major in electronics and applied mathematics and continued on to a PhD in quantum electronics at Northwestern University in the US. I was one of my advisor's first Ph.D. students. My nanotechnology and prototyping experience in the lab led me to a job in product design after my PhD Looking to connect my scientific background to this experience where I designed stories for products, I serendipitously found Nancy and the STAGE Lab at PME. At the STAGE Lab, I work at the intersection of the arts and sciences and apply my science and design skills to create innovative theatre and film projects.

Looking back
Me excitedly holding a Sunspotter,
a wooden solar telescope,
during my senior year of college





"Encourage youth,
especially youth of color,
to give STEM a chance.
If I hadn't been encouraged
at a young age to do
science projects, visit
national labs, go to science
museums and planetariums,
look up at the stars, etc.,
I probably wouldn't be
pursuing a STEM degree
today."

**Andrea Bryant** 

Pronoun(s): she/her/hers Student Physics

I have been interested in a career in STEM basically my entire life. I was pre-med since kindergarten—I dressed up as a doctor for career-day and there was no turning back. But a big change of heart happened during my third year of college when I took astronomy. I discovered a deep passion for the cosmos that connected with my faith in a unique way and that I couldn't shake. I decided to leave behind my pre-med ambitions to pursue a career in astrophysics.

Some of my sweetest memories involve being outside under a sky full of stars. I have fond memories of watching a lunar eclipse in the dark countryside with my dad as a child. Also my astronomy and astrophysics professor and advisor, Dr. Erin Bonning of Emory University, is a total rockstar and encouraged me to pursue my dream of being an astrophysicist even though I received my bachelor's degree in biology.



# Looking back With my parents in front of Rockefeller Chapel when I received my PhD in chemistry in 1990

"Remaining strong and passionate in expressing my views in my own personal style is one of the hardest obstacles that I have had to face as a woman in science."

# **Vera Dragisich**

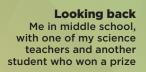
Pronoun(s): she/her/hers Senior Lecturer, Director of Academic Programs Chemistry

Both of my parents were the eldest in large rural families and had to give up school at an early age in order to help their parents. But both remained self-taught life-long learners. My father had a natural talent for math and science and my excitement to learn STEM fields originated from him.

I have always found the most satisfaction in supporting students in my academic hybrid career. It is important for students to have a non-faculty, non-peer resource available to them within the department, since they may not, at first, feel comfortable bringing a concern to a faculty member or fellow student. As Director of Academic Programs, I hope to be a resource to provide guidance and explain the procedures; or just listen and affirm; or act as a sounding board and provide a trial run for articulating the concern. I want to ensure that our students feel not only empowered to contribute to the department but also feel safe in sharing their views. I want to help them be strategic in advocating for themselves in difficult situations.

I continue to work on being strong and passionate in expressing my views in my own personal style as I help others gain a confident personal voice that contributes to and enhances our chemistry community in three vital areas: research, teaching, and collegiality.









"I grew up in a small village and our village school did not have many resources or much infrastructure for hands-on science. But my science teachers tried their best to help me prepare for the competitions by doing small hands-on experiments after school in physics, chemistry, geology, and biology."

Young-Kee Kim

Pronoun(s): she/her/hers Louis Block Distinguished Service Professor and Chair Physics

One day, out of the blue, my middle science teachers asked me to represent our school at the state-wide science competitions in physics, chemistry, geology, and biology. Until that point, I enjoyed math, but I had no experience or interest in other science topics. So, I was very surprised to be asked.

I grew up in a small village and our village school did not have many resources or much infrastructure for hands-on science. But my science teachers tried their best to help me prepare for the competitions by doing small hands-on experiments after school in physics, chemistry, geology, and biology.

The competitions were structured like a tournament, and I was the first girl to win first prize. They announced the news on the radio and then in the newspaper. When the radio reporter announced it, he said that I was a boy because that's what he assumed. He was corrected later.



Me swearing in, with Neal Lane, NSF Director and Jack Gibbons, Director, the Office of Science & Technology Policy during the spring of 1994

"While I didn't even recognize it initially, gender-based discrimination is still prevalent in STEM. I was very stubborn and persisted through my degrees and research.

Like many women, I tended to attribute any possible discrimination to personal deficiencies. When this happens it creates a compounding effect of discrimination."

### **Anne Petersen**

Pronoun(s): she/her/hers Alumna, AB/SB'66, SM'72, PhD'73 Math/Statistics

I loved math in high school and was especially stimulated by a teacher my senior year who told me I would not get my usual A without doing extra credit. I loved the freedom to pursue new material and questions. I graduated with a degree in math from the College at the University of Chicago. After working for three years as a mathematician and computer science intern at the National Security Agency (1966-67), and then as a programmer at the Biomedical Computation Facility (1968-70), I decided to continue my studies. I won a fellowship in Measurement, Evaluation, and Statistical Analysis (MESA) in SSD, earning an MS in Statistical in 1972 and a PhD in 1973. I loved doing research, so I continued working at UChicago, initially as a statistician on another study and then on my own research grants.

I have been active in STEM support and capacity-building activities since my graduate school days. While a graduate student, I served on a committee for women at UChicago. Our major accomplishment was obtaining faculty status for three very distinguished women scholars at the University. At the same time, I was part of the Chicago Women in Research, a sort of city-wide support group. Once in faculty roles, I worked at many levels: with friends and peers, and structurally at university levels. In leadership roles, I served as a role model, and led as well as created programs for women scientists at universities and the NSF.



### **Women in STEM and Beyond**

### A Selection of Notable Moments in History

1895 Marie Curie became the first woman to win a Nobel Prize in Physics, sharing the prize with her husband for "joint researches on the radiation phenomena discovered by Professor Henri Becquer-el" in 1911, she became the first woman to win the Nobel Prize in Chemistry. 1903 1920 American bacteriologist **Ruth Ella Moore** became the first African-American woman to receive a PhD in the natural sciences completing her doctorate in bacteriology at Ohio State University. 1933 1949 American computer scientist Grace Hopper completed what is considered to be the first compiler, a program that allows a computer user to use a human-readable high-level programming language instead of machine code. It was known as the A-O compiler. 1952 1957-Photograph 51, an X-ray diffraction image of crystallized DNA, was taken by Raymond Gosling in May 1952, as he was working as a PhD student under the supervision of British chemist and biophysi-cist Rosalind Franklin; it was critical evidence in identifying the structure of DNA. 1958 1963 Astronomer **Vera Rubin** published the first evidence for dark matter. 1970 The Pregnancy Discrimination Act banned employment discrimination against pregnant 1978 1980 1981 Sandra Day O'Connor was appointed by President Ronald Reagan to serve as the first woman on the Supreme Court. 1983 In Johnson v. Santa Clara County, the U.S. Supreme Court ruled that it was permissible to take sex and race into account in employment decisions even when there was no proven history of discrimination but when evidence of a manifest imbalance existed in the number of women or minorities holding the position in question. 1987 1992 Dr. Ellen Ochoa became the first Hispanic woman to go to space when she served on a nine-day mission aboard the space shuttle Discovery. Ochoa is also the first Hispanic person (and second woman) to be named director of NASA's Johnson Space Center. 1993 1994 American theoretical physicist **Shirley Ann Jackson** was awarded the National Medal of Science. Jackson had been the first African-American woman to receive a PhD from M.I.T. during the early 1970s, and the first woman to chair the U.S. Nuclear Regulatory Commission. 2014 2018 Iranian mathematician Maryam Mirzakhani became the first woman to receive the Fields Medal, for her work in "the dynamics and geometry of Riemann surfaces and their moduli spaces".

Professor **Ka Yee Lee** became the first woman to be appointed as Provost of the University of Chicago

2020

ENDURANCE GRATITUDE

BRAVERY

# **PASSION**

HARD-WORK

**SELF-BELIEF** 

### RESOURCEFULNESS

**STRONG WORK ETHIC** 

BELIEF

**CREATIVITY** 

**STRONG VALUES** 

**MOTIVATION** 

### DETERMINATION

**POSITIVE ATTITUDE** 

GRIT

ORGANIZATION

**DEDICATION** 

# RESILIENCE

COMMUNICATION

**FORGIVENESS** 

**HARD-WORKING MENTALITY** 

# CURIOSITY

PROACTIVITY FAIRNESS

AIRNESS

COLLABORATION

# PERSEVERANCE

**ADAPTABILITY** 

# PERSISTENCE

REFLECTIVE TENACITY

**STUBBORNNESS** 

### **POSITIVITY**

**SELF-CONFIDENCE** 

**HONESTY** 

# DRIVE

OPTIMISM

**GRATEFULNESS** 

### **FRIENDLINESS**

COMPASSION

### FAITH

**ACCEPTANCE OF MISTAKES** 

"Modern science increasingly involves a team effort. A balanced gender representation makes for a better scientific team. Not only is gender diversity important for social justice, it is crucial to advance science."

ROCKY KOLB, Arthur Holly Compton Distinguished Service Professor and Director of KICP Department of Astronomy & Astrophysics, KICP

"The healthy creativity and imagination required for advances in science, engineering and mathematics depend on active, inclusive participation from all with no gender barriers."

MATTHEW TIRRELL, Dean and Robert A. Millikan Distinguished Service Professor Pritzker School of Molecular Engineering

"Improving gender equality in STEM is not only the ethically right thing to do, but it is also one of the best things we can do for our disciplines. A body of evidence-based research shows institutions with better gender parity to have superior performance along measures of productivity, innovation, talent retention, and employee satisfaction."

**ANDREW FERGUSON,** Associate Professor Pritzker School of Molecular Engineering

"If you're seeking talent, why cut out half of the most talented people?"

**AARON DINNER,** Professor of Chemistry and Deputy Dean of the PSD **Department of Chemistry** 

"The full integration of women in science at all levels is of paramount importance not only to the individuals involved but also to vitality of science in general. The energy, creativity, brilliance, and leadership that women bring to the discipline is essential for achieving the scientific breakthroughs of generations to come."

STEVEN SIBENER, Carl William Eisendrath Distinguished Service Professor and Director of The James Franck Institute Department of Chemistry, JFI

"The experiences and perspectives of all genders are necessary for science to be a truly effective institution. We must continually work to dismantle structures and environments that prevent women from rising up in STEM, especially trans/nonbinary women and women of color."

JAKE HIGGINS, Graduate Student Department of Chemistry

"We know that talent is found everywhere, so if we want to work at the highest levels, we have to look everywhere."

DANIEL HOLZ, Professor
Department of Astronomy & Astrophysics,
Department of Physics, EFI, KICP

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In the PSD EDI office, we work with all PSD units to advance discovery, innovation, and impact by cultivating an environment where our diverse community feels supported and valued. Additionally, the PSD aims to create sustainable infrastructure for access and development for groups underrepresented in the mathematical and physical sciences, promoting a climate where equity, diversity, and inclusion are foundational and all constituents achieve their version of success.





