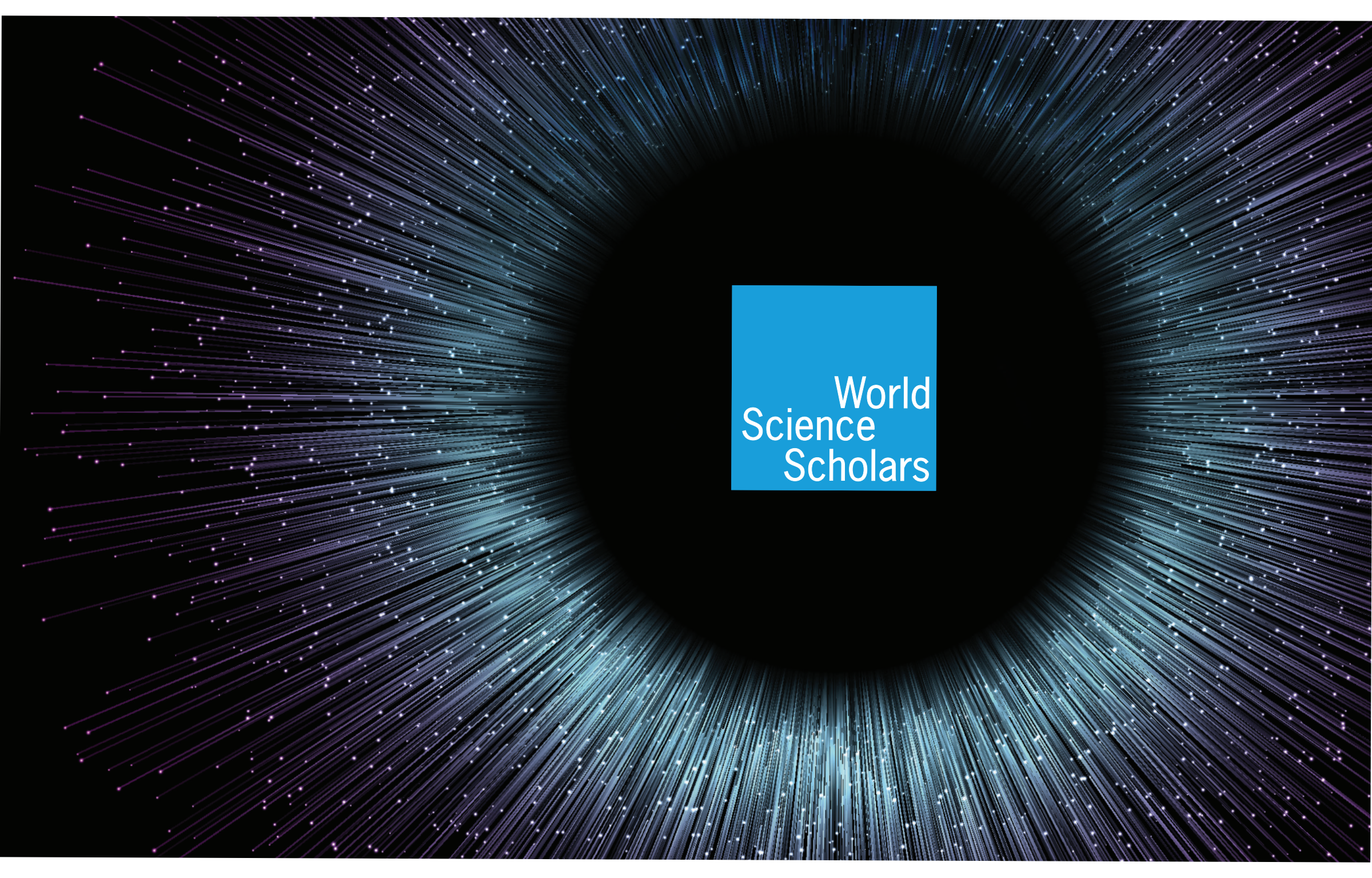
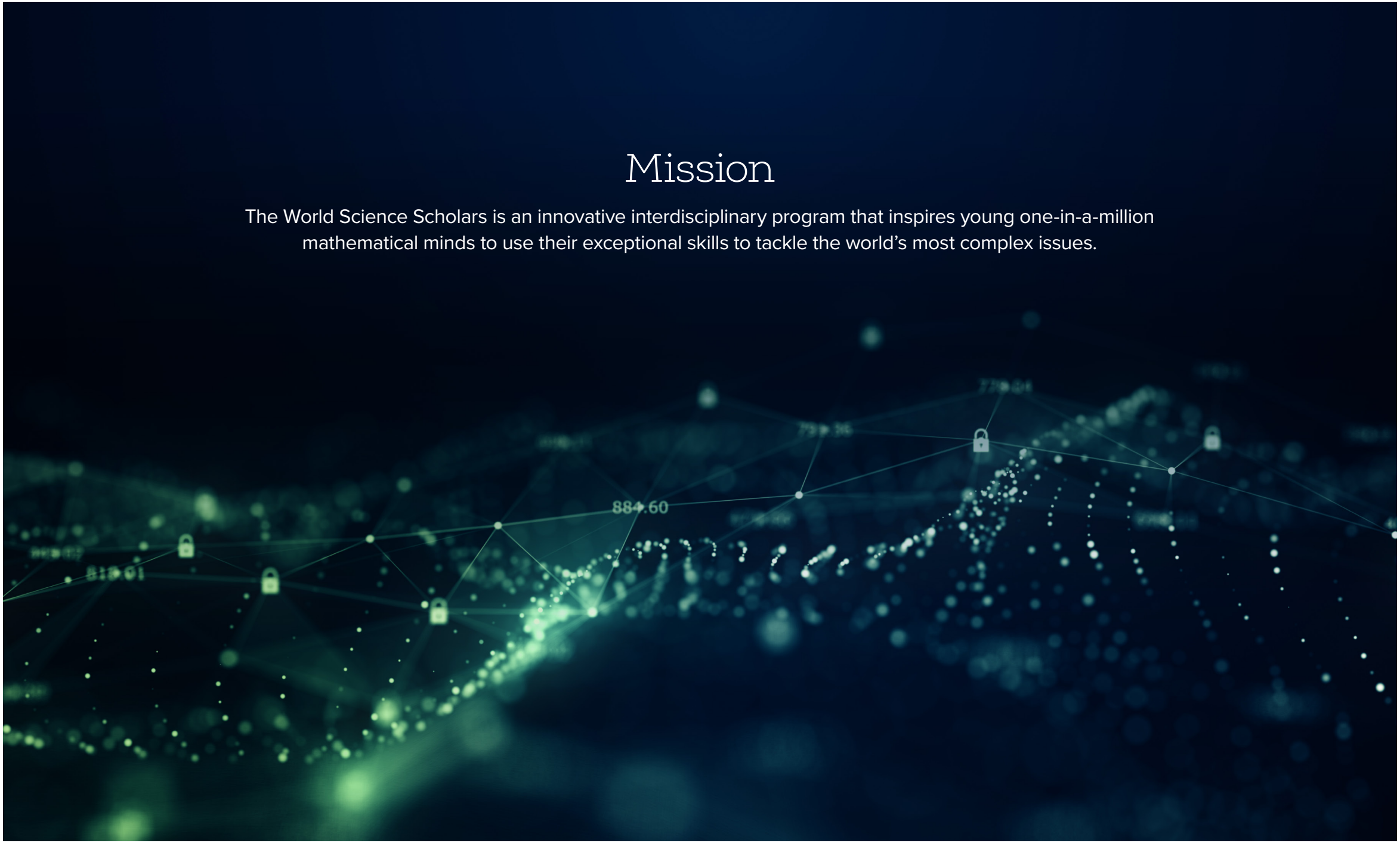

World
Science
Scholars

Mission

The World Science Scholars is an innovative interdisciplinary program that inspires young one-in-a-million mathematical minds to use their exceptional skills to tackle the world's most complex issues.



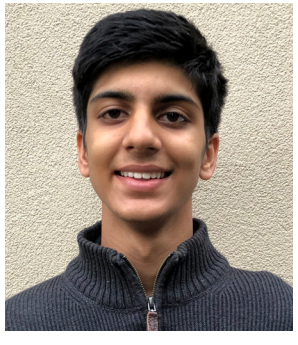
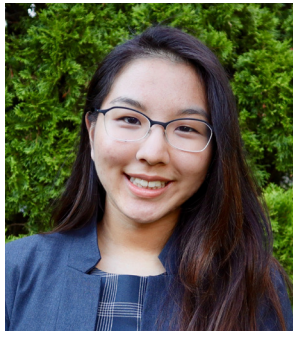
A Unique Program

From decoding the human genome to mapping the brain, mathematics has been employed in diverse multidisciplinary collaborations to unravel some of life's greatest mysteries. World Science Scholars identifies and selects a small group of national and international high school students with extraordinary mathematical talent and provides them with an unparalleled opportunity to apply their abilities to disciplines outside of pure math. Guided by world-renowned experts, Scholars examine the ways that advanced mathematics skills can be applied to solve complex challenges in a wide range of fields, such as physics, biology, genetics, computer science, neuroscience, robotics, artificial intelligence, and economics. In the process, students expand their perspectives and deepen their knowledge by grappling with mathematical ideas in new and unfamiliar contexts. Many of the program's features, including its emphasis on creating a vibrant and enduring community of Scholars, cannot be found elsewhere.

- **Rare opportunity to interact with Nobel Laureates, Breakthrough Prize recipients, and other cutting-edge researchers who serve as WSS Professors**
- **A culture of collaboration, not competition, within a supportive community of Scholars from around the world**
- **Interdisciplinary courses that emphasize open-ended questions and independent problem-solving**
- **Rigorous college-level curriculum**
- **State-of-the-art interactive online learning platform**
- **Opportunity for "real-world" meetups at the World Science Festival**





A Community of Scholars

Coming from a variety of backgrounds, places, and interests, Scholars rank their association with each other as one of the great strengths of the program. Scholars discuss, debate and collaborate on projects, and forge friendships with like-minded peers in an enriching, vibrant, intellectual, and social network that can extend well into the future.

75
Current Scholars

75
Alumni

91
Male

59
Female

103
United States

47
International

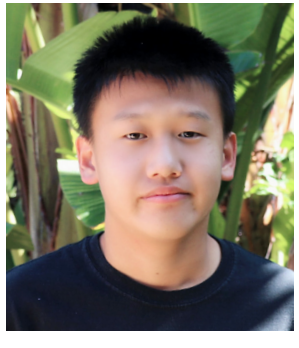
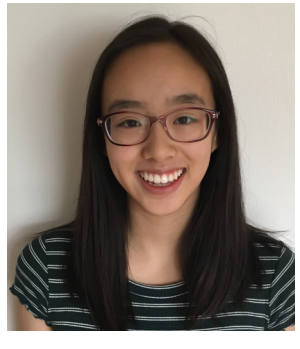










Scholars in the World

Scholars hail from across the United States and 25 other countries across six continents.

Australia
Bangladesh
Belgium
Bolivia
Brazil
Canada
Cambodia
China
Honduras
India
Indonesia
Japan
Korea
Mexico
Nepal
New Zealand
Nigeria
Poland
Qatar
Spain
Saudi Arabia
Taiwan
Turkey
United Arab Emirates
United Kingdom
United States

“It’s a great privilege for me. I wish this program had existed when I was in high school. The subjects explored in WSS courses aren’t part of any standard high-school science curricula — and not part of many undergraduate level classes either.” – WSS Teaching Fellow

World-Class Faculty

The caliber of the WSS faculty is unmatched. Scholars have the rare chance to engage with Nobel Laureate Barry Barish, Breakthrough Prize Laureate Cumrun Vafa, and a host of other internationally prestigious experts from top universities and at the cutting edge of their fields.

Scholars can learn about recent discoveries from the very scientists responsible for the research. For instance, Scholars studied black holes with Prof. Shep Doeleman, Founding Director of the Event Horizon Telescope project that captured the first image of a black hole in 2019. In another course, UCLA Professor of Medicine and evolutionary biologist Barbara Natterson-Horowitz taught Scholars emerging science on a cross-species approach to medicine.

Faculty are recruited from a broad range of disciplines, including physics, computer science, biology, chemistry, medicine, nanoscience, and more. Visionary thinkers and extraordinary teachers, WSS faculty are passionate about engaging with the Scholars and mentoring the next generation of talented youth. Some also began life as math prodigies and have gone on to careers in other fields.

Brian Greene, Beyond the Cloud of Everyday Experience

“The professors’ accomplishments are pretty insane. A lot of them are world-renowned scientists, and it’s pretty cool to be able to learn from them and to have their insight into their particular topic.”

– 2018 Scholar

Sara Walker, Life as the Next Frontier in Physics

WSS Course Offerings

With topics ranging from particle physics, computational thinking, and neuroscience to climate change, astrobiology, and string theory, these college-level courses challenge and inspire. Past courses include:

Vulnerable by Nature: A Species-Spanning Approach to Medicine
with Barbara Natterson-Horowitz, *Harvard University and UCLA*

Accelerate, Collide, Detect: The Future of Particle Accelerators for Pushing the Limits of Physics
with Barry Barish, *Nobel Laureate, Caltech*

Beyond the Cloud of Everyday Experience: Physics and Reality
with Brian Greene, *Columbia University*

A Beautiful Universe: Black Holes, String Theory, and the Laws of Nature as Mathematical Puzzles
with Cumrun Vafa, *Breakthrough Prize recipient, Harvard University*

Chaos in the Ocean: Mathematics of Ocean Boundary Layers
with David Holland, *NYU*

Einstein's Astrophysical Messengers: The Theory and Discovery of Gravitational Waves
with Gabriela González *former LIGO spokesperson, Louisiana State University*

The Universe's Hierarchy: The Emergence of Macro-Properties in Physics and Biology
with George F.R. Ellis, *University of Cape Town, South Africa Medal (awarded by President Mandela), Templeton Prize Laureate*

A Galactic Mystery: Making the Case for Dark Matter
with Justin Khoury, *University of Pennsylvania*

Venom Kill or Cure? The Transformative Power of Venom in Evolutionary and Biomedical Research
with Mandë Holford, *Hunter College*

From Chemistry to Living Materials: What's the Matter with Life?
with Markus Buehler, *MIT*

The Early Universe: Using Cosmological "Fossils" and Other Perturbations to Probe Origins
with Matias Zaldarriaga, *MacArthur Fellow, Princeton University*

Brain Machine Interfaces: From Basic Science to Neurobiological Rehabilitation
with Miguel Nicolelis, *Duke School of Medicine*

Hacking Biology for Nanotechnology: Exploring Biochemical Space in Search of New Molecular Functions
with Rein Ulijn, *Advanced Science Research Center at the Graduate Center, CUNY*

Rewriting the Code of Life with CRISPR: How Studies of Bacteria Transformed Genetic Engineering
with Sam Sternberg, *Columbia University*

Life as the Next Frontier in Physics: Exploring the New Science of Astrobiology
with Sara Walker, *Arizona State University*

Illuminating the Mysteries of Black Holes: Probing and Imaging the Extremes of Spacetime
with Shep Doeleman, *Founding Director, Event Horizon Telescope Project*

A New Kind of Science: The Importance of Language
with Stephen Wolfram, *Wolfram Research*

Big Brains, Small Brains: The Conundrum of Comparing Brains and Intelligence
with Suzana Herculano-Houzel, *Vanderbilt University*

The WSS Experience

Each fall, a new cohort of Scholars begins a yearlong journey of discovery with an option to continue for a second year. After meeting one another through introductory videos and a virtual orientation, Scholars start their self-paced curriculum in a prescribed sequence. Scholars agree that the multiple opportunities to collaborate on projects and informal discussions is a major highlight of their WSS experience, second only to interactions with their professors.

- **A typical course lasts 5-8 weeks and features 3 modules of scaffolded learning anchored by video lectures**
- **Other course elements: interactive demonstrations, animations, exercises, discussion forums, and virtual office hours**
- **Live Sessions with every professor to ask questions and discuss course material**
- **Coursework facilitated by expert, engaging teaching fellows who work with the professors on their research and are deeply knowledgeable on course content**
- **Scholars from across the globe collaborate on projects, mentored by alumni and Teaching Fellows, and present their projects to course professors**

"Learning how scientists worked through and how they approached the problem, and then having a problem handed to us to actually do it by ourselves... that is what the program is all about. I don't really feel that I could get this kind of knowledge on the forefront of research in any other format."

– 2018 Scholar

Interdisciplinary Coursework

DEEP THINKING AND COLLABORATION

Scholars tackle big questions and open-ended problems in all courses.

“What is life? How can we measure it?”

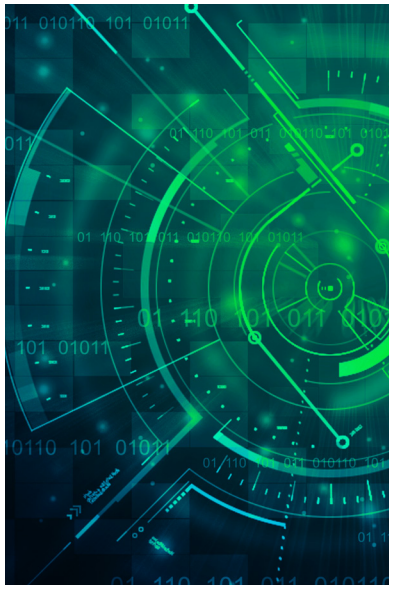
“Through the astrobiology course we learned about mathematical ways that you can actually quantify life or ways to describe life through math....I thought biology would be the most removed from math, but the course showed that there was almost a direct connection.”

“How can species-spanning and evolutionary perspectives on illness make us more compassionate and medicine more humanistic?”

“The most interesting moments were working on group projects and collaborating with other scholars on emerging ideas within the different scientific disciplines. It was great to hear others’ thoughts on science and learn more from each other in the process.”

“How can we design materials from the bottom up, and how can we cross boundaries of science and art?”

“Sometimes, there is no answer yet, which I really enjoyed, because we always learn the stuff that we do know, but we never learn stuff that we don’t know.”



Getting To Know Neil

WSS Cohort: **2018**

Age Joined WSS: **15**

Hometown: **Macungie, Pennsylvania, USA**

Hobbies: **Road Biking, Video Games**

Favorite Math Theorem: **Eucler's Famous Identity**

"The main reason I wanted to become a World Science Scholar was to meet other kids that are really passionate about their respective fields. The thing I wanted most was to meet with these kids, discuss with them, figure out exactly where our fields interconnected, and to learn more about the ways I could improve the work I was doing and the ways that I could help others."

SCHOLAR SPOTLIGHT

Neil Deshmukh

It started with a fifth-grade book report. In 2013, 10-year-old Neil sent his report on *The Fabric of the Cosmos* to author Professor Brian Greene, who invited Neil to attend the World Science Festival and answered his questions backstage. Fast forward to 2018, and Neil reconnected with Professor Greene as a member of the first World Science Scholars cohort.

Passionate about math, science, and technology from an early age, Neil, a first generation Indian-American, wants to use his computer science skills to change the world for the better. By the age of 15, he had created two award-winning apps using Artificial Intelligence technology. The first, PlantumAI, lets farmers use their phones to easily identify and treat crop diseases in the developing world, maximizing yields and reducing the use of toxic pesticides. The second, VocalEyes, enables visually impaired users to navigate their environment, read lettering and identify objects through their phone. Neil was inspired by his grandparents to create both apps.

Throughout the WSS program, Neil has enjoyed contributing to the community while also learning from others. Motivated by the plight of his mother, a frontline healthcare worker, Neil recently repurposed 3-D printers from his high school to produce Personal Protective Equipment for local hospitals during the current pandemic. He has donated scores of face shields, viral-bacterial ventilator filters, and stethoscopes, and has reached out to other Scholars to offer help and encouragement to those who wish to join the effort.

Neil, a humble leader, has racked up an impressive array of awards for his apps and intellectual achievements. He was one of 25 young people worldwide to win a 2019 Gloria Barron Prize for Young Heroes, and TIME Magazine featured Neil as a 2020 Davos Young Innovator with a spread in "TIME for Kids."

Neil was inspired by WSS to study the intersection of math, technology, and physics. He will attend MIT in Fall 2020.

Recruitment and Selection

WSS seeks applicants who demonstrate exceptional mathematical ability; are highly motivated and interested in learning outside a formal school setting; and can understand and communicate complex mathematical and scientific concepts in English. WSS targets high school students.

The WSS program takes a creative, holistic approach to the highly selective process. Instead of test scores and academic transcripts, WSS requires letters of recommendation and asks applicants to provide personal statements, videos, coding, or other materials that best represent their intellectual and personal interests.

WSS identifies potential Scholars through a number of different channels, including an extensive international network of over 250 recruitment partners. These include Mathematical Sciences Research Institute; MathCamp USA/Canada; Math for America; Society for Science and the Public; The Davidson Academy of Nevada; and Advantage Testing Foundation's Math Prize for Girls.

WSS is particularly committed to expanding outreach to mathematically-gifted students in under-resourced and underrepresented communities. The Visiola Foundation: STEM Education for African Girls, for example, recently helped identify several female candidates from Nigeria, one of whom was selected as a 2020 Scholar.

“The last two years have been an incredible journey as a World Science Scholar. Whether I learned about the motions and fractures of material at the minutest scale, or the equations that govern our expansive universe, I loved and enjoyed mastering these fascinating subjects.”

SCHOLAR SPOTLIGHT

Pritvik Sinhadc

Not many teenagers are declared a state asset, but Pritvik, an aspiring astrophysicist, was declared just that by the Ruler of Dubai.

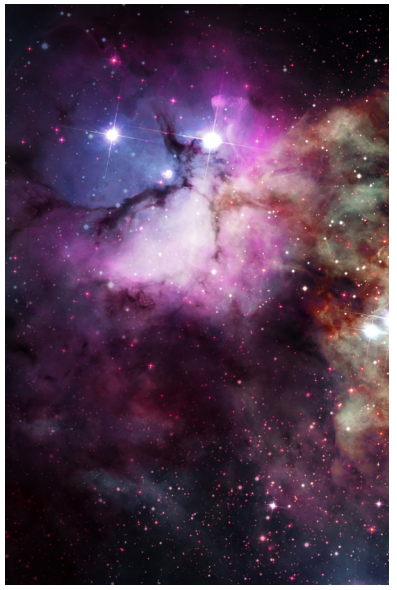
Pritvik’s enthusiasm, energy, and intellectual curiosity know no bounds. He published his first book, “When Dinosaurs Roamed the Earth,” at seven years old and is passionate about paleontology as well as mathematics, theoretical physics and many other topics. Despite suffering from severe health problems and living in a different time zone, Pritvik attended all Live Sessions and completed all courses during his two years in the WSS program, even if that often meant participating from his hospital bed at 2 a.m.

After taking Professor Sara Walker’s astrobiology course “Life as the Next Frontier in Physics,” Pritvik was inspired to reach out and discuss the possibility of working in her research group at Arizona State University. In the summer of 2020, as a newly-minted WSS graduate, he was invited to join her group as a research intern at BEYOND: Center for Fundamental Concepts in Science.

On his 16th birthday, Pritvik made his first presentation, titled “Life or False Positives? The Probability Of Biotic Or Abiotic Factors On An Exoplanet,” to the research board.

Pritvik found his time with WSS incredibly valuable, and is eager to give back as a WSS alumnus in any way he can, whether as a mentor to new cohorts, an intern, or in another capacity. He is also planning to increase WSS visibility in the United Arab Emirates and encourage more students to apply.

A student at Dubai College, Pritvik has garnered numerous awards for his academic and other achievements. His long-term goal is to pursue his passion for mathematics and physics and contribute to the research on a unified all fundamental forces and matter.



Getting To Know Pritvik

WSS Cohort: **2018**

Age Joined WSS: **14**

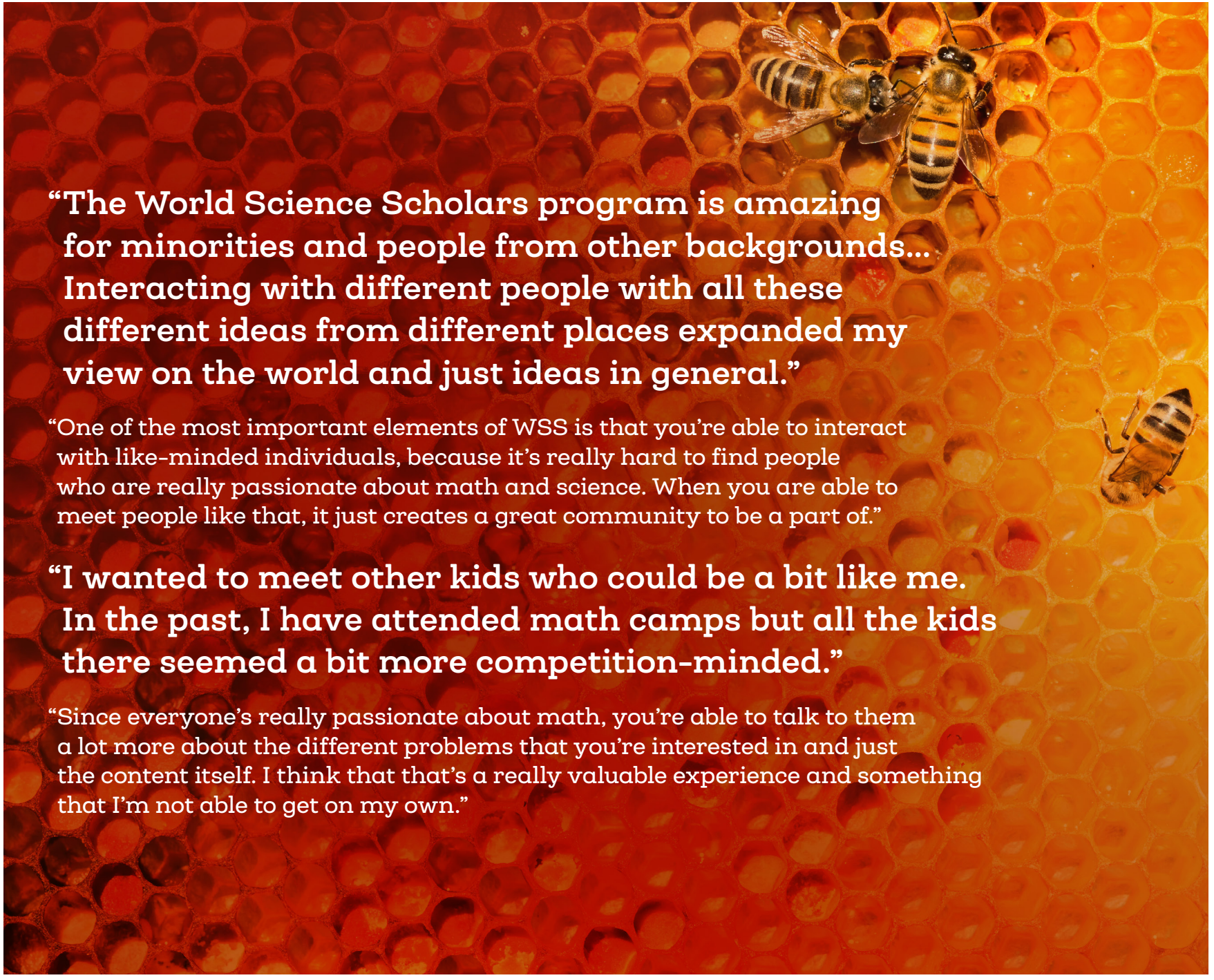
Hometown: **Dubai, United Arab Emirates**

Hobbies: **Painting, Organizing Charity Works for the Differently-abled, Theatre**

Favorite Math Theorem: **The Hairy Ball Theorem**

Making Meaningful Connections

Forming relationships with peers who share deep intellectual fervour for math and science is an invaluable part of the WSS experience. Scholars feel included and safe in the program's non-competitive environment.

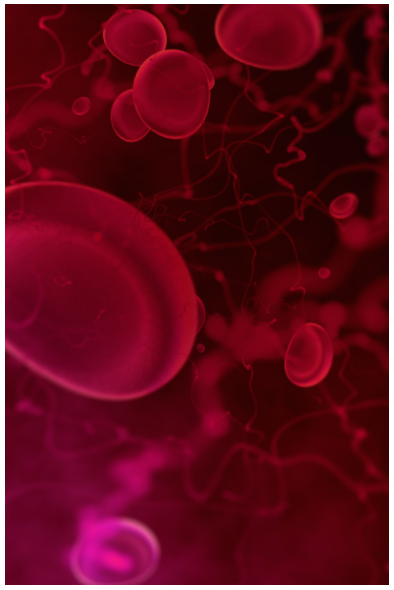


"The World Science Scholars program is amazing for minorities and people from other backgrounds... Interacting with different people with all these different ideas from different places expanded my view on the world and just ideas in general."

"One of the most important elements of WSS is that you're able to interact with like-minded individuals, because it's really hard to find people who are really passionate about math and science. When you are able to meet people like that, it just creates a great community to be a part of."

"I wanted to meet other kids who could be a bit like me. In the past, I have attended math camps but all the kids there seemed a bit more competition-minded."

"Since everyone's really passionate about math, you're able to talk to them a lot more about the different problems that you're interested in and just the content itself. I think that that's a really valuable experience and something that I'm not able to get on my own."



Getting To Know Uma

WSS Cohort: **2018**

Age Joined WSS: **16**

Hometown: **Highland Village, Texas, USA**

Hobbies: **Tae Kwan Do Black Belt, Varsity Debate**

Favorite Math Theorem: **Central Limit Theorem**

"The experience of being a World Science Scholar has been so enriching. It's given me the opportunity to understand incredible theories in science. It's allowed me to view the world differently."

SCHOLAR SPOTLIGHT

Uma Obalapuram

Before joining the World Science Scholars program, Uma knew she wanted to be a doctor. Passionate about math, science, and medicine, she worked with a professor in a cancer research lab during her high school summers and earned multiple science awards.

Uma was excited about meeting fellow Scholars with varied cultures and backgrounds, and deepening and expanding her knowledge of science. What Uma didn't anticipate was that WSS would change the trajectory of her goals.

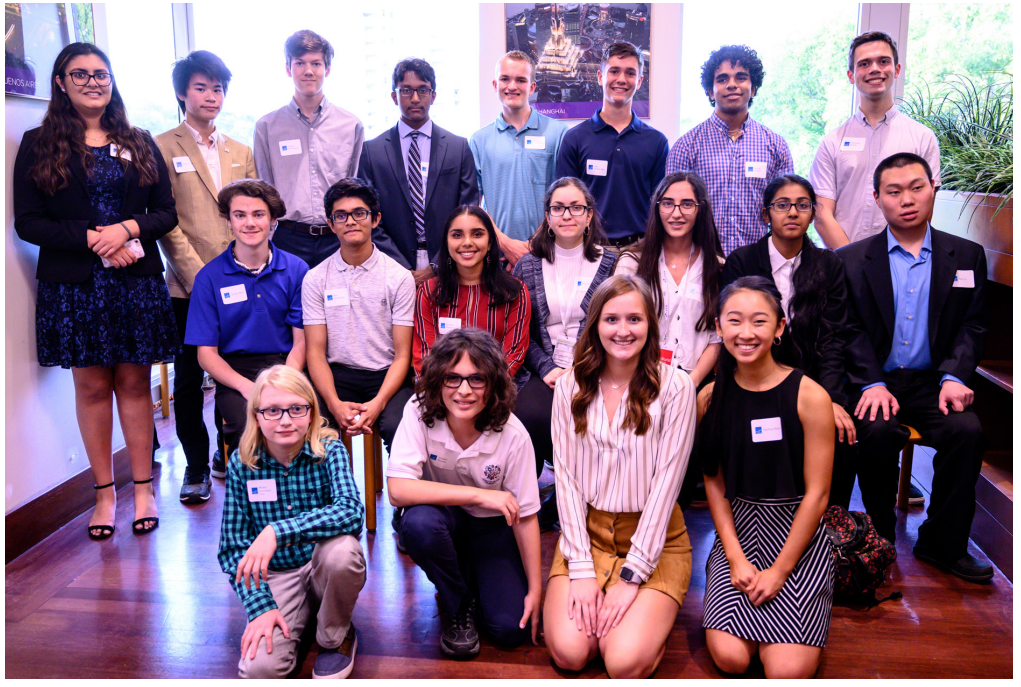
The WSS program was the first time Uma had been exposed to modern physics. Taking Cumrun Vafa's course "A Beautiful Universe" and other physics courses opened her mind to new, amazing concepts and interdisciplinary fields.

During a visit to Harvard University for a debate tournament, Uma was able to attend Professor Vafa's "Puzzles in Physics" freshman class and talk with him afterwards about her college plans.

Uma is now seriously considering majoring in biophysics to continue more in-depth studies of these topics while meeting pre-med requirements. Uma will be attending Emory University as a Woodruff Scholar in Fall 2020.

Real Life Connections

An exciting part of the Scholar experience is the chance to meet with fellow Scholars and professors in person at the annual World Science Festival (WSF) in New York City. Each spring the WSF gathers great minds in science and the arts to present live and digital programming designed to cultivate a general public informed by science, inspired by its wonder, convinced of its value and prepared to engage with its implications for the future.



"The World Science Festival has been really good. No matter what type of learning you prefer, there's a way for a person to learn here and have fun."

– 2018 Scholar

"I would like to become a mathematician, a physicist, an architect, an engineer, or any combination of those."

SCHOLAR SPOTLIGHT

Moses Samuelson-Lynn

A highly-gifted mathematician, Moses' favorite book as a preschooler was *Basics of Quantum Physics: Understanding the Photoelectric Effect and Line Spectra.* Moses joined the first cohort of Scholars. At the age of 10 Moses joined the first cohort of Scholars as the youngest Scholar in the WSS program. He was primarily homeschooled and entered the program having already mastered some graduate level math. However Moses was still significantly younger than most of his peers.

Through his two years of work as a Scholar, Moses' confidence, maturity and self-assurance have exponentially grown. When the 2019 cohort came on board, Moses took it upon himself to welcome and mentor another young Scholar, 9-year-old Simon. Together, they co-presented a project to Wolfram Instructional Designer and Technologist Rory Foulger on "visualizing the Hadwiger-Nelson problem from geometric graph theory."

Moses was a 2019 winner of the Spirit of Ramanujan Award. Winners of this international talent search receive up to $5000 to fund participation in research programs around the world. Now 12 years old, Moses was named a 2020 U.S. Presidential Scholar and a National Merit Scholar, and will be attending the University of Utah Honors College, Mathematics. In the Fall 2020 semester, he will be part of a research group in the Math Department, focusing on symmetry, manifolds and flags.

Getting To Know Moses

WSS Cohort: **2018**

Age Joined WSS: **10**

Hometown: **West Valley City, Utah, USA**

Hobbies: **Chess, Origami**

Favorite Math Theorem: **Gödel's Incompleteness Theorem**

Impact

Through an increasingly diverse array of WSS courses, Scholars have expanded their horizons by combining their math talent with collaboration and creative problem-solving to tackle some of the world's most challenging issues.

80%

Professors believe Scholars have the potential for significant future impact in scientific fields

90%

Scholars say courses reinforced their long-term goals, made them more likely to investigate new disciplines, and deepened or challenged their thinking

87%

Scholars report increased confidence in communicating complex ideas in science and mathematics

"Now instead of just going into pure mathematics, I think it would be really cool to take whatever I know and find ways to implement it into all these other fields."

— 2018 Scholar

Getting To Know Emma

WSS Cohort: **2019**

Age Joined WSS: **15**

Hometown: **New York City, NY, USA**

Hobbies: **Film Photography, Reading**

Favorite Math Theorem: **Church-Turing Thesis**

"Reaching out to other World Science Scholar students who are also interested in technology and science has been really valuable for me."

SCHOLAR SPOTLIGHT

Emma Yang

Emma, a confident girl comfortable speaking to large audiences, has always been interested in computer science and the ability to create new technology using applied science. She began coding at the age of 6, and by the age of 10 had started to consider how apps could be used for social good. After participating at the age of 12 in the Technovation Girls challenge, Emma found her calling by combining her love of coding, machine learning and Artificial Intelligence (AI) with her interests in entrepreneurship and health care.

Inspired by her many hours spent with her grandmother who was suffering the effects of Alzheimer's, Emma created Timeless, an app that empowers Alzheimer's patients to stay connected with their loved ones using AI facial recognition. She also created the ap Concussion Checker, which detects early signs of concussions. Both apps have garnered many national and international awards. In 2016, Emma was named a First Place National Grand Prize Winner at ProjectCSGIRLS, a national computer science competition. Most recently, she was named one of New York's 10 Under 20 Innovators to Watch.

A strong advocate for STEM, Emma wants to encourage all girls to explore their interest in science and technology. While still in middle school, she gave a TEDx Foggy Bottom talk about coding's ability to change the world, and became the youngest Mentee ever in the Wolfram Mentorships Program for machine learning. During Stephen Wolfram's WSS course on computational thinking, Emma presented information about her work during a Live Session.

Emma's goals are to become the world's top AI and computer science expert, and a leading tech entrepreneur.

Multiplying the Impact

The WSS program has created a community of scholars who support each other in multiple ways. Upon completion of the WSS program, Scholars become members of a growing alumni network and in turn support future cohorts by mentoring their younger peers on course content and projects and serving as informal college advisors. WSS's growing alumni involvement includes the opportunity for ongoing access to future courses, networking events, and special access to the annual World Science Festival.

- **Mentorship opportunities**
- **Alumni Networking for future academic and professional pursuits**
- **Potential for future research collaborations**
- **Enduring relationships**

Looking Ahead

In 2022 and beyond, the WSS program will expand to further support Scholar achievement and increase the amount of free, high-quality online content available to students everywhere through WSU.
Our goals include:

- **Increasing the size of each class of World Science Scholars, and continuing to expand the curriculum with a wide range of new courses for both the Scholars, and for the general public through WSU.**
- **Introducing workshops that complement the Scholars' formidable intellectual skills by honing communications, networking and advocacy skills.**
- **Securing sufficient funds to enable all future Scholars to network with professors and peers in person at the World Science Festival in NYC.**
- **Expanding outreach to underrepresented students in the United States and abroad.**

THANK YOU! The World Science Scholars program is made possible through the generous support of the John Templeton Foundation.

JOHN TEMPLETON FOUNDATION

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World Science Scholars