Born to be a Scientist

SULI experience at Lawrence Berkeley National Laboratory provides more fuel to her research fire

By Allan Brettman

Shira Goldhaber-Gordon spent summer 2024 conducting genome research at Lawrence Berkeley National Laboratory. She earned the 10-week experience through the Science Undergraduate Laboratory Internships program, offered by the Department of Energy's Office of Workforce Development for Teachers and Scientists. (Photo by Shira Goldhaber-Gordon)

Shira Goldhaber-Gordon grew up in a family of scientists.

Both of her parents have PhDs. Her father's PhD is in physics; her mother's PhD is in biology.

"I've been really lucky," said Goldhaber-Gordon, a sophomore at Johns Hopkins University who expects to earn a PhD of her own one day.

Luck, however, hardly explains Goldhaber-Gordon's achievements at this early stage of her career in science.

Her latest milestone was completing a 10-week internship at Lawrence Berkeley National Laboratory (Berkeley Lab) in northern California, through the Science Undergraduate Laboratory Internships (SULI) program, offered by the Department of Energy's Office of Workforce Development for Teachers and Scientists.

At Berkeley Lab, Goldhaber-Gordon worked on a project that complements her future research plans. But that may not have been the internship highlight.

"My favorite part of interning at the Laboratory was talking with other interns and staff scientists about intriguing scientific problems," Goldhaber-Gordon said. "Everyone brings different perspectives and is excited to discuss research questions.

"Our floor in the Laboratory had lots of interns. We'd get together to talk about the different research that we were doing and exchange ideas. That was productive to make connections with those people—and socially, too. I made friends I hope to keep for a long time."

Research at the Joint Genome Institute

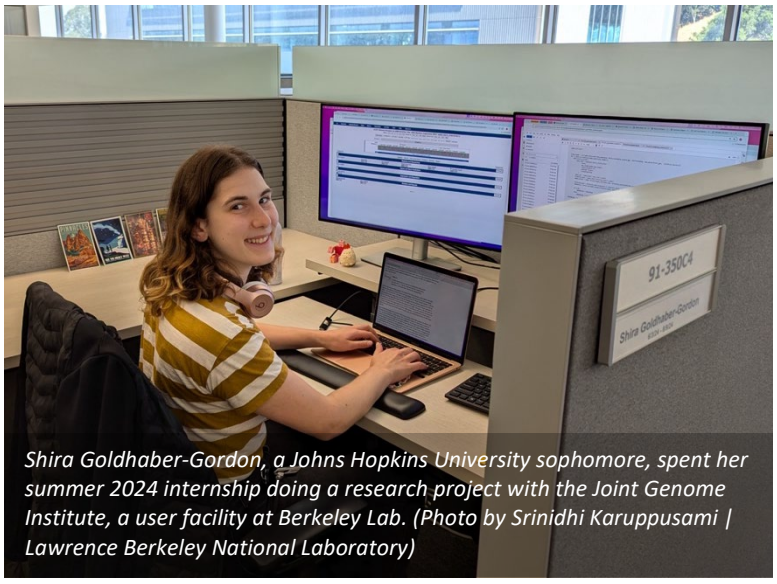
Goldhaber-Gordon's project, conducted at the Joint Genome Institute, a DOE Office of Science user facility located at Berkeley Lab, meshed with her future academic aspirations.

"I worked at the Institute with my mentor, Zhong Wang," she said. "My project evaluated a large language model trained on metagenomic data—it uses similar technology to ChatGPT, but for genomes instead of English. This model could revolutionize the way we study genomics, help us to better understand ecosystems, and assist with gene editing. But before we can get there, it's crucial to evaluate the model's capabilities and shortcomings."

Wang, a computational biologist and genome analysis group leader at the Institute, said Goldhaber-Gordon thrived during the internship and has been invited to continue her work during fall 2024.

“Shira demonstrates remarkable independence, consistently completing assignments both promptly and comprehensively,” Wang said. “Her curiosity and creativity are evident through the insightful scientific questions she poses during group and departmental meetings. Furthermore, she is always willing to assist her teammates with their assignments.”

SULI research has longer-term potential



Shira Goldhaber-Gordon, a Johns Hopkins University sophomore, spent her summer 2024 internship doing a research project with the Joint Genome Institute, a user facility at Berkeley Lab. (Photo by Srinidhi Karuppusami | Lawrence Berkeley National Laboratory)

Goldhaber-Gordon is excited about the promising practical application of the research.

“It has important potential environmental applications if we fine-tune our foundation model to specialize in biosynthetic gene clusters, or BGCs, which are a section of genes that are usually in bacteria or other microbes,” she said. “Our model may be able to identify them or generate them, and then be used for biofuels and medical applications.”

Before Berkeley Lab, Goldhaber-Gordon discovered her interest during two internships. The first was with the Institute for Computing in Research, which offers paid research internships for students in Santa Fe, New Mexico; Portland, Oregon; and Austin, Texas. That internship took place in Santa Fe, near the Los Alamos National Laboratory. And the second internship was at LANL itself. The Institute’s co-founder, Mark Galassi, is an astrophysicist and computer scientist at Los Alamos who played a big role influencing her academic and career path, she said.

“He was really important for me in seeing that I am capable of doing research and that it's fun,” Goldhaber-Gordon said. “He was one of the biggest models and mentors for me choosing this path.”

A SULI choice close to the heart

When it came time to choose a potential SULI laboratory, however, Goldhaber-Gordon chose Berkeley Lab, not Los Alamos.

For the science?

“Not entirely. Because Lawrence Berkeley is closer to home,” said Goldhaber-Gordon, who grew up in Palo Alto, California. “But also, the research going on at Berkeley Lab most catered to my interests. They have a lot of the biological sciences, a lot of machine learning going on—which is definitely present at other labs—but it's really big at Berkeley Lab.”

Next summer, Goldhaber-Gordon may seek a research experience closer to Johns Hopkins University in Baltimore or perhaps study abroad. She had advice for other college students weighing their own internship possibilities.

“I think the biggest thing is just to apply and put yourself out there,” she said. “I have friends who are excited about research but won’t apply for SULI or other internships because they feel like they wouldn't belong or they're not qualified. There's space for everyone in science. Just trying and applying to a program is the first step.”