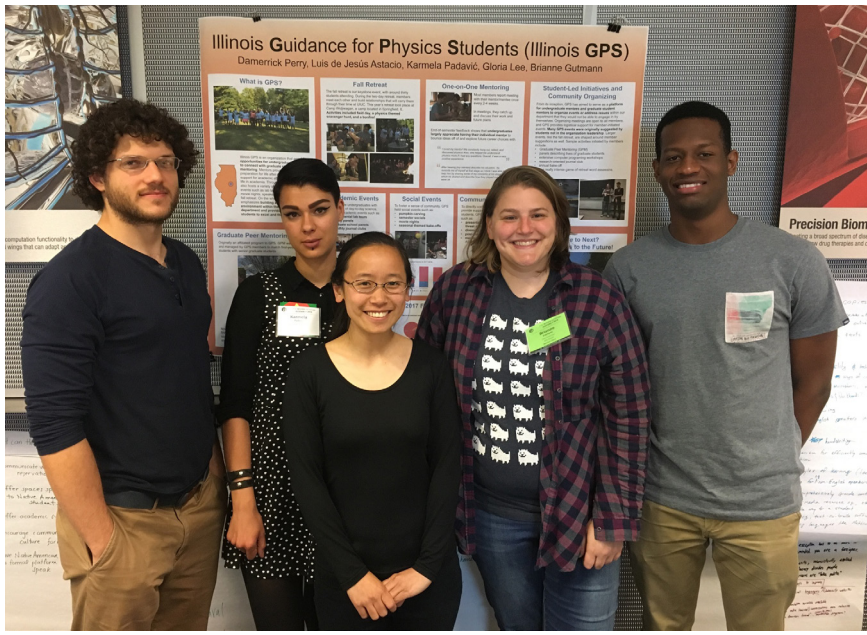
An interview with PER grad student and community builder Brianne Gutmann

Brianne Gutmann, a physics education research graduate student at Illinois Physics, is a staunch supporter of inclusion of all genders, ethnicities, and cultures in STEM enterprises. Through her active involvement in student clubs and her willingness to take a leadership role, she has contributed to the department's climate of openness and support.

Gutmann grew up in Cary, IL, a northwest suburb of Chicago. She received her bachelor's degree in physics from Carleton College in Northfield, MN. Her graduate advisor is Professor Tim Stelzer. She has also worked closely with Professor Emeritus Gary Gladding. Gutmann plans to graduate with her doctoral degree in physics in Summer 2019.



What is the greatest joy of being a physics education research (PER) grad student?

The biggest joy for me is interacting with students and feeling that what I'm doing impacts how they see physics and how they see themselves as physicists. I end up teaching about a hundred students each fall. I love walking around campus or through Loomis and seeing familiar faces and catching up with how they're doing.

There's also a lot of gratification in developing something for students and watching them interact with it. On the flip side, when things don't go well, I also get to listen to them complain about it! (Ha ha!)

And the greatest challenge?

As far as research, one challenge is that most of my data collection comes on a rigid schedule. If I'm running an experiment in a course, I have to wait a full year for the course to run again to collect a new set of data.

The PER group at Illinois is renowned for its evidence-based pedagogies and innovative teaching tools and technologies. How did working in a well-established PER group benefit you?

The University of Illinois has been a great place to do PER, and I've learned a lot of quantitative analysis skills. We're in a good place to do data with big numbers because we have so many

Above: Illinois GPS (Guidance for Physics Students) organizers pose in front of their poster at the 2018 The Access Network assembly. Pictured left to right are Luis Miguel de Jesús Astacio, Karmela Padavić, Gloria Lee, Brianne Gutmann, and Damerrick Perry. Opposite page, from the top: (1) GPS organizers (L-R) Gloria Lee, Brianne Gutmann, and Jacob Rangel (an undergraduate student in the PER research group and Gutmann's mentee through GPS) at a 2017 Access event. (2) The Physics GEO Tutor-In. Standing to the right of Gutmann are Professors Lance Cooper and Nigel Goldenfeld who participated in the event. (3) Physics GEO (Graduate Employees Organization) members take a meal together.
Photos courtesy of Brianne Gutmann

students. And most of our activities are online, so we get a lot of information about how students use the homework and quizzes.

My favorite part of working in our group is the chance to work collaboratively with other graduate students. I've worked with older students on projects and then been able to be the older graduate student on a project with younger group members. I really value all members of our group and have learned a lot from them, not just about science, but about everything. Sharing a space for so many years creates a sense of comaraderie, and I love being part of that.

What is the focus of your doctoral dissertation?

My dissertation work focuses on creating tools for underprepared engineering students enrolled in *Physics 100 Thinking about Physics*. More specifically, I've been creating and improving the mastery-style online homework. Our delivery method asks students to retry different similar problems until they have mastery of the material, before moving on to the next material. This is important because some first-year engineering students haven't taken physics at all, or some have taken it but their class wasn't conceptually based or just wasn't as good. This course is meant to get students prepared to do well in *Physics 211 Mechanics*, regardless of how prepared they were at the start of the term.

I love working with the first-term freshmen in this course. It's a time of big transitions, and I love being able to reassure folks and act as a resource in whatever way I can.

We use data to iteratively improve the homework to better suit the strengths and weaknesses of the students. Similarly, we implement frequent low-stakes quizzes. I really want students to feel that learning is a process, and I like that we've developed ways to help students improve without punishing them for where they are at any given moment.

You are involved in a good number of student groups and initiatives, often in a leadership role. Could you share a little bit about the scope of these groups and your roles?

I'm going to give you this as a list!

Illinois GPS (Guidance for Physics Students). I was a co-founder of GPS in 2015, along with grad students Will Morong, Gloria Lee, and Angela Chen. We pair graduate student mentors with undergraduate mentees and plan activities, including an annual retreat. I have acted as one of the leaders of GPS since its inception. We recently were joined by Karmela Padavić, Eli Chertkov, and Luis Miguel de Jesús Astacio (and I'm so relieved, because many of us are graduating soon!).

The Access Network. Illinois GPS is also part of The Access Network, a network of equity-centered mentoring groups in STEM. I have been involved since 2015 and am now a core organizer. The Access Network lets Illinois GPS students make connections with students in like-minded groups. We work together to create reflective activities about equity in STEM. The network is funded by the National Science Foundation (we just got our second grant this

year!), and the money goes toward compensating students for sharing their time and experience and sending students to conferences (like SACNAS and an annual Access Assembly). We have had three physics students as Access Fellows in the last two years (Jake Rangel, Damerrick Perry, and Luis Miguel de Jesús Astacio). The next Access Assembly (Summer 2019) is scheduled to happen at the U of I!

Graduate Diversity Committee. I am a founding member and a coordinator. Since 2016, we have worked together to come up with ways to make the department more inclusive. We work with Lance Cooper [professor and associate head for graduate programs] to implement our ideas. Here's a partial list with notes on my roles:

- Mandatory microaggressions workshop for incoming graduate students
- LGBTQ+ Coffee Hours (I initiated and run this group.)
- ASL (American Sign Language) Learning Group (I work with Colin Luauldi and Rita Garrido Menacho to organize bi-weekly meetings for people to come together and learn signs and have a space to practice.)
- Physics Diversity Journal Club (helped to organize; the main organizer is Shivesh Pathak.)
- LGBTQ+ Allies Workshop for Faculty (I was the organizer.)
- LGBTQ+ Logo Contest (I was the organizer.)

Women in Physics and Astronomy (WIPA). In 2018, I co-organized with Karmela Padavić, Cristina Schlesier, and Carla Stelsel a two-day Women and Genderqueer Physics and Astronomy Retreat. We had 30 participants. I also organized a WIPA Celebration and Solidarity Hour event.

GEO (Graduate Employees' Organization). Since 2017, I have served as Stewards' Council co-chair with Roshni Bano. As co-chairs, we do outreach to physics grad students and create agendas for meetings with the steward. Last year, we participated in a 12-day strike to ensure tuition waiver guarantees and advocate for better graduate conditions (such as a living wage, health care, a better non-discrimination clause, immigration leave, childcare, etc.). I think this is really important as part of my work to make the department inclusive—not all students are traditional students who can afford academia without support from the university.

March for Science 2017. I was an organizer starting in 2016. I was the coordinator of volunteers and served on the Diversity Committee. This isn't totally department specific, but there were a lot of physics folks present! We worked hard to make sure that the march was accessible and inclusive. Our speakers emphasized scientists' responsibility to self-reflect on issues of equity and to think critically about the intersection of science and oppression. Topics included the whitewashing of math history taught in schools, indifference during the HIV/AIDS epidemic, and the effect of the Muslim Travel Ban on the research and livelihood of an Iranian graduate student. This past year, I also participated in a March for Science Summit, which focused on the ways society, policy, and science interact. I strongly believe

This page, top: Attendees of the Women and Genderqueer Physics and Astronomy retreat. Bottom: Attendees of the 2018 The Access Network assembly. Opposite page, top: The bubble activity at the 2017 annual Illinois GPS retreat—Gutmann is enveloping Illinois Physics sophomore Alexandra Trauth in a bubble. Opposite page, bottom: Illinois GPS members at the 2018 annual retreat. Photos courtesy of Brianne Gutmann

"If you want something to happen, be the person to initiate it. Don't just wait for it to happen."

that, as scientists, we must hold ourselves accountable and be critical of oppressive structures, and I feel really proud of the march! With Gloria Lee, we led the march with children from the community, to put the emphasis on our future scientists.

Why is it important to get involved in student groups/initiatives?

It has been important to me to connect with others in the department who also care about these initiatives. The people I've worked with on these projects have been some of my best friends and allies in grad school. It's important for me to try to reciprocate that feeling. The department is huge and I think without active effort, it's easy to feel lost in a large university.

Did you feel supported in your efforts by other students or faculty/staff?

Nearly all of the things I've done have been joint efforts by a lot of fantastic people, and Lance has always been enthusiastic and supportive. As soon as I realized that our ideas could happen, it became much easier to keep pushing for more. Each successful project or initiative made me that more confident that the next could also be successful.

What do you enjoy most about departmental life?

I love that whenever I'm having a bad day or week, I can find someone to get lunch or coffee or just take a quick break and pop into someone else's lab. I feel surrounded by people who get me and care about things that I care about.

What is next for you?

I'd like to focus more explicitly on supporting underserved populations in STEM. I'm currently applying to postdoc positions, with the long-term goal of becoming physics faculty in a department that supports physics education research. A lot of my passion work has been focused on equity, which has been somewhat aligned with my work in Physics 100, but I'd love to find a position where I can study student ownership and belonging, adaptive learning, and identity-based mentoring.

How did your time at Illinois Physics benefit you in terms of your future goals?

My time at Illinois has given me a lot of space to self-educate and to be part of initiatives that support students and equity, and I'm grateful to have been able to have that space. My adviser is extremely patient and understands my need to spend time on these projects, while still helping me get closer to graduation. I'm expecting to graduate this summer and hope to begin a postdoc next fall in physics education research.

What advice do you have for students just beginning their graduate studies?

If you want something to happen, be the person to initiate it. Don't just wait for it to happen. You'll find others who want it too, and often lots of people are thinking the same thing, and it just takes someone to get the ball rolling. I've learned a lot over the last few years, but even if you know nothing when you start (me), you'll learn. Also, take time for what makes you happy and fulfilled! ■