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## Guest Editorial: The National Mentoring Community Brings Physics Faculty and Underrepresented Minority Undergrads Together

Theodore Hodapp, Director of Education & Diversity



Theodore Hodapp

A few years ago we conducted a study of APS Minority Scholars to ask them what had made the biggest difference in helping them succeed. For most students it wasn't the money, but the advice they had gotten from faculty members at their institutions. This sometimes formal, sometimes informal mentoring helped students see themselves as members of the physics community, it gave them confidence when they didn't get an "A" in differential equations, and it helped make the whole undergraduate experience a little less isolated.

The APS Committee on Minorities in Physics considered these responses, and working with APS staff designed a much broader effort to help underrepresented students complete their bachelors degrees. The new program, the National Mentoring Community, aims to pair mentors and mentees together throughout the country. Loosely modeled on the successful Math Alliance ([mathalliance.org](http://mathalliance.org)), a project in the mathematical

sciences that now boasts more than 250 mentors providing guidance to more than 500 graduate students.

The program is seeking faculty members who are willing to mentor a student, meet with that student on a regular basis, listen to their concerns, and help make them aware of resources to advance their careers. APS will provide prompts for both faculty members and students to consider, provide professional development workshops for students and distribute information on mentoring for faculty. We are also planning our first national gathering of mentors and mentees this fall in Miami, FL. The meeting will be held in conjunction with the APS Bridge Program, and feature physicists who have been successful in building mentoring programs as well as prominent researchers who will discuss impact and effectiveness of mentoring – particularly as it pertains to underrepresented minority students. Travel support is available to mentees and their mentors, so consider registering as a mentor ([aps.org/nmc](http://aps.org/nmc)), and attending the 9-11 October 2015 meeting at Florida International University.

Looking beyond this fall, our goal is to identify students – especially in the early years of college – and to help them in this critical period when the reality of pursuing a physics degree sets in. Understanding ef-

*continued on page 2*

## What Makes a Physicist?

Shannon Palus

APS March Meeting 2015 – How do you spot the physicists at a cocktail party? What do they wear to work, and what do they do when they get home? To a packed room at the March Meeting — some attendees in jeans, some in dresses, some in heels, some with thick-framed glasses and blunt stylish bangs, and many crowding in the back, standing — three researchers painted a picture of what it means to be a “physics person” with surveys, interviews, and an anthropological study of a physics department.

They each repeated the same observation: Physics largely seems stuck in a state of maleness. Each year, just 20 percent of all physics bachelor's and doctoral degrees are awarded to women. The field is very white, too: There are fewer than 75 African American and Hispanic female physics and astronomy faculty in the entire United States. A feeling of belonging is what often separates talent that stays in physics from talent that stays out, recent research underscores. And it goes beyond those who end up pursuing a physics

*continued on page 1*

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**Guest Editorial** *continued from page 1*

fective study habits, considering possible research experiences, or issues like contemplating when it might be a good time to switch roommates are all fair game for discussion. Mentors need to listen a lot, and get to know the students they are helping so that if there is something bigger and more personal, the student will be more willing to bring up the issue that is bothering him or her.

APS is also interested in providing scholarship funds to students whose financial needs will make a difference between completing a degree or dropping out. Mentors will be in a very good position to understand the complex dynamics, and making these funds available for mentors to advocate for their mentees will allow students of the highest need to receive funding that will have significant impact. We hope to build

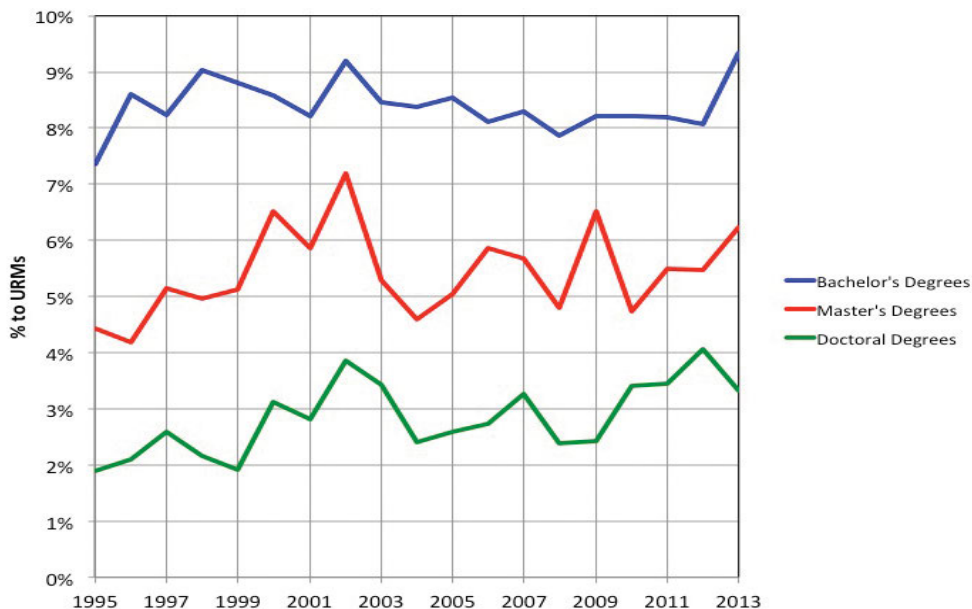
this aspect of the National Mentoring Community in the near future once the basic structure has been put in place.

In 2013, there were about 700 underrepresented minority (URM) students who graduated with a bachelor's degree in physics – about 10% of all physics bachelor degrees. Given that the fraction of URM students getting any kind of bachelor's degree is closer to 21% (about 16% in STEM fields)<sup>1</sup>, we clearly have work to do to bring greater diversity to physics. The APS Committee on Minorities thinks this program has a good chance at changing that demographic. We hope you agree and will give a few hours of your time to mentoring a promising student – to help them succeed, and understand why physics is so exciting. ■

<sup>1</sup> National Center for Educational Statistics

### Percentage of bachelor, master and doctorate degrees awarded to underrepresented minorities (URMs) in physics at US institutions.

*In this case, URMs include African Americans, Hispanics and Native Americans. The percentage is calculated using degrees awarded to temporary residents, US citizens and permanent residents.*



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## Women in Physics Group Hosts Career Panel

Hilary M. Hurst, Condensed Matter Theory Center, University of Maryland

Lately it seems that everywhere you look there is more news about how tough the academic job market can be. Countless news stories focus on how few jobs there are in academia, and how there are significantly more people graduating with physics doctorates than there are professorships to take them. Recent graduates often feel they are not prepared for the job search once the thesis defense has come and gone. It is not all bad news however, as Fortune recently named a PhD in physics as one of the best graduate degrees of 2015.<sup>1</sup> So where is this disconnect coming from? There appears to be a whole world of career opportunities open to physics graduates, if only we knew where to look.

Academia is the most commonly discussed career for physics students, but it is not where most graduates end up. In 2011 and 2012, 58% of students receiving a bachelor's degree in physics entered graduate school.<sup>2</sup> Most PhD students continue in academia by taking postdoctoral positions with short-term contracts. However, only ~25% of all those graduating with a PhD in the sciences will remain in academia.<sup>3</sup> Therefore, it is imperative that institutions of higher learning provide their students with exposure to alternative career pathways.

To address this need at the University of Maryland, the Women in Physics group hosted a panel discussion on non-academic careers, which was open to all students and postdoctoral researchers. The event, entitled Beyond Academia: Career Pathways in Physics, featured five panelists in physics or physics related fields. Panelists included an AAAS/APS Congressional Science & Technology Policy Fellow, a Program Officer for Atomic and Molecular Physics at the Air Force Office of Scientific Research, a high school physics teacher, a researcher at the government-run Laboratory for Physical Sciences, and a science writer who has contributed pieces for the American Institute of Physics, children's books, and news outlets including Salon and New Scientist.



*Members of the UMD Women in Physics group and organizers of the panel on non-academic careers.*

The panel was attended by over one hundred graduate and undergraduate students. A broad range of topics were addressed, including how to look for a job, the best ways to network, and balancing work and family responsibilities. Audience members asked further questions about job specifics, such as salary negotiations and the application process. Positive feedback from the event suggests that learning about a variety of careers can help students be more flexible in their career choices, thus opening them up to opportunities they may not have previously known about. The interest in this panel shows that many departments could benefit from offering more information about careers outside of the traditional academic path.

Overall, the event was a great success and we hope to be able to host more interesting career related events in the future. More information about the event can be found on our website: [www.physics.umd.edu/wip/panel](http://www.physics.umd.edu/wip/panel) ■

<sup>1</sup> [fortune.com/2015/04/27/best-worst-graduate-degrees-jobs/](http://fortune.com/2015/04/27/best-worst-graduate-degrees-jobs/)

<sup>2</sup> [www.aip.org/sites/default/files/statistics/employment/bach1yrafterdeg-p-12.2.pdf](http://www.aip.org/sites/default/files/statistics/employment/bach1yrafterdeg-p-12.2.pdf)

<sup>3</sup> [www.scientificamerican.com/article/does-the-us-produce-too-m/](http://www.scientificamerican.com/article/does-the-us-produce-too-m/)

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career: Skills learned from taking even just a handful of college physics courses are highly useful in a number of fields.

In a survey of 6,772 undergraduate students from all majors, Florida International University researcher Geoff Potvin quantified the underpinnings of the “physics identity,” and connected it to the likelihood that a student will pick physics as a career. He explored three main factors: performance, interest, and recognition.

As expected, interest in physics is correlated with a strong physics identity. But for women, competence in physics was slightly negatively associated with the identity. “Just doing well is not enough,” Potvin explains.

A student’s feeling of belonging — an example of what Potvin calls “recognition beliefs” — was the number one predictor to whether or not a student, of any gender, would go on to study physics. Recognition can come from teachers or peers; it can be as simple as an acknowledgement of a strong performance in a lab or on an exam.

That praise needs to accumulate to translate to a strong sense of belonging, said Michigan State University physics education researcher Vashti Sawtelle. “It is insufficient to have one positive experience.” Sawtelle offered the session’s refrain: “The data that I have is sad.”

To look at the specifics of what might alter the physics identity for students and faculty of different genders, McGill University education researcher Allison Gonsalves spent seven months in 2007 embedded in a physics department at a large North American university for her doctoral dissertation. She published some of that work in her 2014 paper, “Physics and the girly girl—there is a contradiction somewhere: doctoral students’ positioning around discourses of gender and competence in physics.”

For her research, Gonsalves asked graduate students to keep photo diaries of what it meant to them to be a physicist. They brought her snapshots of tea and cookies from department meetings, and of machines. One woman took a picture of her toilet, and explained that she had fixed it. A physicist, she explained, can fix things. “Being a good physicist entails performing physics,” says Gonsalves, “just in the same way that gender involves repeatedly performing things that signal our gender.”

The way that gender wraps into that identity came in her interactions and interviews with graduate students. After a tour of the scanning tunneling microscope, one told her that women rarely use the machine, joking: “We’ll have to perform a cleansing ceremony when you leave.”

In an interview, a female grad student told her: “People don’t wear dresses, people don’t wear high heels” she told Gonsalves. “If I did those things, I would feel out of place.”

That student’s fears were echoed in a panel at the end of the session in San Antonio. One leader of a women-in-physics group noted that their group had a discussion about whether or not it is appropriate to wear high heels — regarded by most of North America as a standard option for business casual office wear — to an interview. On the reddit.com discussion website, one thread about the March Meeting gave gendered advice on what to wear. One entry suggests flip flops. But when casualness is linked to gender, it may not be as accepted: Another entry warns not to wear a skirt that’s too short, lest the wearer not be taken seriously.

Those stereotypes are knit into who students consider to be a physicist. In research published in 2009, Potvin found that female teachers received lower evaluation ratings, on average, than their male counterparts — regardless of actual classroom behaviors. New research from Potvin paints a “worrying picture”: Students who score higher on the physics identity scale exhibit bias against female teachers more strongly.

There’s little consensus on how to attract more women to the field of physics. In a survey of 7,505 students, Potvin looked at the effects of several approaches: single-sex classrooms, women-scientist guest speakers, role models, and discussions of the problem. Discussing the issue of underrepresentation was the only method that increases the likelihood of pursuing a physics career.

For Gonsalves, looking at gender alone is not sufficient. “If you are really truly going to understand peoples’ experiences, you need to use a more intersectional lens.” That means taking forces like race and class into account, and expanding the diversity issue beyond just women in physics.

*This piece was originally published in APS News.* ■

**A student’s feeling of belonging — an example of what Potvin calls “recognition beliefs” — was the number one predictor to whether or not a student, of any gender, would go on to study physics.**



## Need a Speaker?

The American Physical Society maintains online lists of women and minority physicists who are willing to give colloquium or seminar talks to various audiences. These lists are wonderful resources for colleges, universities, and general audiences. The lists are searchable by state, fields of physics, or speakers’ last names.

[www.aps.org/programs/women/speakers/](http://www.aps.org/programs/women/speakers/)  
[www.aps.org/programs/minorities/speakers/](http://www.aps.org/programs/minorities/speakers/)

# Two Physicists Take on the Work of Identifying and Celebrating African American Women in Physics

While a graduate student in the department of Physics and Astronomy at Johns Hopkins University, Jami Valentine realized that there were very few professors who looked like her. When she learned that only fewer than 100 African American women had ever earned a Ph.D. in physics, she began to look for them. In collaboration with fellow physicist Jessica Tucker, this work has evolved into the website [aawip.com](http://aawip.com) which is dedicated to celebrating African American women in physics. The goal of the website is to honor the women who paved the way, to inspire future physicists and to connect with people interested in promoting diversity in physics and other STEM fields.

Valentine and Tucker presented their work at the National Society of Black Physicists annual meeting in Baltimore this spring which seems to have kicked off a flurry of news pieces highlighting African American women in physics and some of the challenges that they face. Articles were published online in *Quartz* magazine, *Medium*, the *Huffington Post*, and *Black Enterprise* magazine. Dr. Valentine and Jessica Tucker welcome additions or corrections to update AAWIP information, including volunteers to help with

forthcoming AAWIP content, so please inquire at: [africanamericanwomeninphysics@gmail.com](mailto:africanamericanwomeninphysics@gmail.com).

**Dr. Jami Valentine** earned her bachelor's degree in physics from Florida A & M University and has a master's degree in physics from Brown University. In 2006 Jami became the first African American woman to earn a Ph.D. in physics from the Johns Hopkins University where she studied the physics behind magneto-electronic materials and devices. Dr. Valentine joined the U.S. Patent and Trademark Office (USPTO) in July 2006. She examines semiconductor patent applications for phase-change memory, nanoscale memory and spintronic devices.

**Jessica Tucker** earned her bachelor's degree from Eastern Michigan University and later a master's degree in 2013. During her graduate studies, she studied the optical activity of polymers using a laser pump-probe experiment. Currently working as a data analyst, Jessica would like to further her physics education at the doctoral level. ■



Dr. Jami Valentine



Jessica Tucker

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## Inclusive Astronomy Conference

Meredith Rawls



Meredith Rawls

We spent three days exploring topics such as intersectionality, career paths, white supremacy and colonialism, microaggressions, accessibility and ableism, racism, policy recommendations, being an active ally, sexual harassment, committee and panel selections, and our vision for a more inclusive future.

Last week (June 17-19, 2015), more than 150 astronomers gathered in Nashville for a conference. Unlike many scientific meetings, however, the topic was not distant galaxies or nearby planets. Instead, we spent three days examining fundamental questions in our field: Who gets to practice astronomy? How can we make astronomy more inclusive?

The goal of the Inclusive Astronomy meeting was to discuss issues affecting underrepresented minorities in the community of astronomy. We accomplished this with plenary talks and breakout sessions in four topical areas: Creating an Inclusive Environment, Barriers to Access, Establishing a Community of Inclusive Practice, and Power, Policy, and Leadership.

Perhaps you are thinking something like I did, before the conference: “These things are important, but inclusivity isn’t a fundamental part of doing astronomy. Shouldn’t astronomers put their time and energy into doing science rather than worry about policies that determine who gets to do that science?”

I know now that science and scientists are inseparable. If I learned anything at Inclusive Astronomy, it is this truth. To successfully land a rover on Mars, we have to invest in the livelihoods of the people who plan and build each part of that mission. To discover new things about the composition of asteroids, we must also examine the composition of our scientific collaborations.

### Inclusive Astronomy 2015 conference

This is what the future of astronomy looks like.

So, who is underrepresented in astronomy? People of color. Women. People who identify as LGBT. People with disabilities. These identities do not encompass all marginalized groups, but they were the focus of our discussions at Inclusive Astronomy. When we exclude members of one or more of these groups, intentionally or not, the resulting scientific community is stymied. We often hear that science needs creative thinkers, innovators, risk-takers, and fresh ideas. But you can’t create a community like this with a single (straight, white, cis, non-disabled, male) cookie cutter. Consciously or not, people who deviate from this arbitrary social “norm” are being excluded from fully participating in the astronomical community, and as a result, everybody loses.

One topic that particularly spoke to me was Master’s-to-PhD Bridge programs. These research-based programs are breaking down barriers and revolutionizing graduate education. Bridge programs like Fisk-Vanderbilt’s work hard to recruit and retain underrepresented minorities, reject arbitrary test score cutoffs for admission, and actively mentor students as they earn a Master’s degree at one institution and a PhD at another. Systemic racism, sexism, and other “-isms” have been at work in these students’ lives for decades, and as a result, many would not have been admitted into a more traditional graduate curriculum.

Bridge programs find these success stories waiting to happen and give motivated students the opportunity they need to become PhD scientists.

Thanks to the outstanding organizing committees at Inclusive Astronomy, we spent three days exploring topics such as intersectionality, career paths, white supremacy and colonialism, microaggressions, accessibility and ableism, racism, policy recommendations, being an active ally, sexual harassment, committee and panel selections, and our vision for a more inclusive future.

In the coming weeks, conference organizers will release official Inclusive Astronomy recommendations for all members of the astronomical community. But our work is just getting started! I can’t wait to see how much exciting science we can do with a more inclusive community of astronomers. With your support, we can make this a reality.

Lots of tweets from the conference can be found by searching the hashtag #IA2015. Storifies can be found on the original blog post.

### Important Links

Please visit the original blogpost for links offering more information on topics discussed in this blog.

APS Bridge Program:

[www.APSBridgeProgram.org](http://www.APSBridgeProgram.org)  
[gradmap.astro.umd.edu/resources\\_bridge.html](http://gradmap.astro.umd.edu/resources_bridge.html)

Women in Astronomy blogspot:

[womeninastronomy.blogspot.com](http://womeninastronomy.blogspot.com)

Intersectionality blog post:

[womeninastronomy.blogspot.com/2014/05/aint-i-woman-at-intersection-of-gender.html](http://womeninastronomy.blogspot.com/2014/05/aint-i-woman-at-intersection-of-gender.html)

Statistics:

[www.aip.org/statistics](http://www.aip.org/statistics)  
[www.aps.org/programs/education/statistics](http://www.aps.org/programs/education/statistics)

Diversity Articles and Resources:

[www.astrobetter.com/wiki/Diversity](http://www.astrobetter.com/wiki/Diversity)

*This post was originally published on the Planetary Society blog [www.planetary.org/blogs/guest-blogs/2015/0625-inclusive-astronomy.html] on 2015/06/25 14:00 UTC, and is reprinted here with the permission of the author and the Planetary Society.*

**Meredith L. Rawls** is a Ph.D. Candidate in Astronomy at New Mexico State University, where she uses binary stars as tools to better understand how all stars live and evolve. She is passionate about quality science education for all, enjoys playing viola, and loves watching people get excited about astronomy. She writes for *astrobit*es ([astrobit.es/author/mrawls](http://astrobit.es/author/mrawls)) and tweets @merrdiff. ■



## Inclusive Astronomy Conference Confronts Diversity Issues in Science

Emily Conover, APS Staff Writer

Astrophysicist Jedidah Isler has not always felt welcomed by the scientific community. “Being part of a minority group can feel very daunting and very lonely,” says Isler, an African-American woman and a postdoc at Vanderbilt University. And although scientific organizations—physics and astronomy included—have paid great attention to the status of women in recent years, other under-represented groups have remained in the shadows. Among those are LG-BTIQ scientists, racial or ethnic minorities, scientists with disabilities, neurodiverse scientists (scientists with autism, for example) and those who belong to more than one under-represented group—like African-American women such as Isler.

But change is on the horizon. Isler and others recently convened the inaugural Inclusive Astronomy conference, held June 17-19 at Vanderbilt University in Nashville, Tennessee, to explore how to make astronomy accessible to all. Following two influential Women in Astronomy meetings in recent years, the group “felt that the field was really ready to think about... diversity and inclusion more broadly,” says Keivan Stassun, a professor of physics and astronomy at Vanderbilt and the chair of the local organizing committee for the meeting.

The goal is not just diversity, but also an atmosphere where everyone is welcome. Making science more inclusive is crucial for its success, the meeting’s participants say. “Talent is not restricted to one group, so when you limit yourself to one group, you’re necessarily excluding a lot of talent, a lot of genius,” says Jesse Shanahan, a graduate student at Wesleyan University in Middletown, Connecticut. “A lot of people in science like to claim that this is a true meritocracy, and that’s not true.”

Organizers designed the conference not only to help attendees understand the issues, but also to give

them tools and strategies to improve the inclusiveness of their communities. It’s also a chance to introduce people to one another, allowing attendees to meet and learn from people of different underrepresented groups and connect with astronomers like themselves.

One issue the conference-goers tackled was how to promote access for under-represented groups. “One of the most important and very concrete barriers that we talked about is the use of standardized tests—for example, the GRE—as part of admission to graduate programs,” says Stassun. Research has shown that the GRE is a poor predictor of performance, Stassun says, and also that it is biased: “If you rank-order applicants to your program even just in part based on their GRE scores, you will systematically exclude women and minorities.”

Participants also discussed the concept of intersectionality—the idea that people who fall under more than one under-represented group can’t be treated as if they fall solely under one group alone. “The lived experiences of people with intersectional identities don’t fall along one particular facet, because they live all of them,” says Isler. “It’s unfair to ask me to identify either as a woman or a black person, when the fullness of my identity is seated in both.” And while the percentage of female astronomers has grown over the years, female African-American astronomers are still few and far between.

Although scientific organizations like APS have paid significant attention to addressing the underrepresentation of racial or ethnic minorities, says APS Diversity Programs Administrator Arlene Modeste Knowles, “I think those efforts have still been limited in scope and the commitment to racial and ethnic diversity in the scientific community does not seem

*continued on page 9*

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**“It’s not just having people at the table, it’s making sure that they feel like they are encouraged to be who they are.”**

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*2015 Inclusive Astronomy Conference Participants*



## Michigan State University Students Address the Lack of Diversity in Physics through Mentoring and Outreach

*Bethany Niedzielski*

For over five years, the Department of Physics and Astronomy at Michigan State University and the National Superconducting Cyclotron Laboratory has supported the student group Women and Minorities in the Physical Sciences (WaMPS). We are entirely organized and run by the department's graduate students and aim to promote diversity in the physical sciences by encouraging women and minorities to pursue these fields. We also work to aid women and minorities who are already members of the physical science community.

WaMPS works toward these goals by holding monthly discussion-based meetings and social events, organizing informal meetings with visiting female and/or minority speakers, performing outreach events in the local community, and running a mentoring program for undergraduate students. While the exact structure of WaMPS has evolved over the years, our group was founded on a shared interest in addressing the lack of diversity in the typical physics department.

Mentoring has been a core practice since the group's inception. The WaMPS mentoring program pairs undergraduate students with a graduate student mentor based on common research interests and hobbies. Pairs are encouraged to meet monthly during the academic year to discuss topics ranging from what to expect from a major in physics, to physics graduate school and the GRE, to dealing with college life in general. Group events involving all mentoring pairs are also held to nurture a community of support. WaMPS strives to create a program that fosters collaboration and professional growth in a relaxed atmosphere. We feel that this type of mentoring can be extremely beneficial for undergraduate students as graduate student mentors have recently experienced and successfully navigated the journey to a bachelor's degree. We understand the unique stresses and joys of

an undergraduate physics program more intimately than a faculty member could.

Surveys collected at the end of each program reveal extremely positive feedback. 100% of mentor and mentee survey respondents would recommend involvement in the WaMPS mentoring program to other students. Responses from mentors indicate they wished a program like this was available when they were undergraduates. They were glad to have had the opportunity to cultivate their mentoring ability as these skills could be an important part of their future professional aspirations. They thought it was a great program and hope it continues to thrive and help students. Mentees felt we provided a friendly and supportive atmosphere. They liked being able to talk to a woman in physics, and were pleased by their mentors' genuine desire to help.

WaMPS is always looking for ways to improve their program to better serve the next generation of physicists. Conversations with undergraduates have revealed that some students are deterred from the program because they are intimidated by repeated one-on-one mentoring meetings. To accommodate these concerns, WaMPS is rolling out a new version of the mentoring program this year which will include monthly group mentoring where two graduate or upper level undergraduate mentors will meet with a small group of undergraduate mentees. Multiple mentoring groups will be available each month so mentees will have the opportunity to meet with several different mentors to gain more perspectives.

While undergraduate mentoring is essential for maintaining retention rates, WaMPS also aims to increase minority and female enrollment in STEM majors through outreach. WaMPS members travel around Michigan to science fairs, science museums, and even a Girl Scout STEM Day to recruit the next generation of STEM majors. WaMPS outreach events cover all age groups from elementary school to teenagers preparing for college at events organized by MSU Graduate Women in Science, MSU Society of Women Engineers, and Lansing Big Brother Big Sister, to name a few. The two primary goals of the outreach program are to excite kids about science (with help from demos including a Van der Graaff generator, an electromagnetic ring launcher, and magnetic levitation) and to show children of all ages that they are capable of doing science. Whether because of poor instruction or societal pressure, many children believe from a young age that they are not "cut out" for science. We want to show them that the only requirement for doing science is wanting to do it.

WaMPS is currently in the planning stages of expanding the outreach program to include a weeklong summer event for Lansing-area high school students in summer 2016. This program would teach physics



*WaMPS member Chris Izzo demonstrates superconductor levitation to a Daisy troop at Girl Scout STEM Demo Day outreach event.*





concepts, show the students how to build an interactive demonstration about one of these topics, and create a lesson plan for the students to bring the demo back to their high schools to teach their classmates what they have learned. We hope that this style of learning will bring ownership of the educational process and help physics come alive for these students. Positive early career experiences like this will encourage students to consider a profession in science. Both the MSU Physics Department as well as the National Superconducting Cyclotron Laboratory have already agreed to help fund the project, but WaMPS is currently seeking supplementary funding sources as well.

For more information about Michigan State University's Women and Minorities in the Physical Sciences or to contact an officer, please visit our website at [msu.edu/~wamps](http://msu.edu/~wamps). ■



*WaMPS members enjoy a day at the University of Michigan Natural History Museum.*

### **Inclusive Astronomy Conference** *continued from page 7*

to be as widely held as the commitment to women.” Furthermore, she says, “Although APS has not focused on intersectional issues, I think this is an area of great opportunity for us.”

In traditional academic spaces, Shanahan says, “when there is an issue, people don’t feel like they can speak up.” But the Inclusive Astronomy meeting was different. “The organizers worked incredibly hard to create a space where people would be respected, listened to, and a space that would accommodate as many people as possible,” says Shanahan.

Shanahan participated in a panel on establishing inclusiveness in astronomy, in which she focused on disability issues. Shanahan, who is disabled and often walks with a cane or wears braces, says, “I feel like I’m excluded kind of on a daily basis because a lot of people don’t think about including people with disabilities.”

Transgender scientists, as well, still face many hurdles, says astronomer Jessica Mink, of the Smithsonian Astrophysical Observatory in Cambridge, Massachusetts, a transgender woman and one of the organizers of the meeting. “There’s still a prejudice that people have that doesn’t come to the surface very easily,” she says. And there can be negative career repercussions for young scientists. “If you’re early in your career you’re dependent on what a lot of people think about you,” which can make coming out as transgender a scary prospect.

The meeting had its snags. A banquet was held on the other side of campus, an unmanageable journey for some attendees with disabilities. And other types of exclusion cropped up along the way. Mink, who despite her many important contributions to astronomy does not have a PhD, pointed out that much of the discussion centered around the academic pipeline. It is also important, Mink says, to appreciate the contributions of scientists who have not followed the traditional path.

Despite the inevitable hiccups, the meeting “was incredibly supportive,” Shanahan says. “People were really willing to learn.”

Talking about racism, sexism, ableism, and other exclusionary practices was a challenge, participants say. “One of the ground rules they put up was ‘it’s okay to be uncomfortable,’” says meeting attendee Meredith Rawls, a graduate student in astronomy at New Mexico State University. “As the conference went on, people would actually call each other out in a very friendly way,” if they were excluding someone, Rawls says.

One aim of the Inclusive Astronomy meeting was to produce a concrete set of recommendations for improving diversity and inclusion in the field, following in the footsteps of previous Women in Astronomy meetings. Conference organizers are collecting and synthesizing feedback from the meeting’s 160 attendees for a report that they will share with the community and the American Astronomical Society (AAS) leadership in 2016.

AAS President Meg Urry, who also attended the meeting, noted that the AAS leadership is looking forward to seeing the recommendations. “The AAS supported this meeting because we believe deeply in equity and inclusion, and in making sure that qualities that aren’t relevant to the practice of astronomy not be used in determining one’s suitability for it,” Urry wrote in an email.

The meeting left a big impression on attendees in how they viewed diversity and inclusion. “The more you are aware of this stuff you start seeing it everywhere,” says Rawls. “When I first learned calculus it changed the whole way I saw the world,” she says. “Learning about all this—how inclusivity is necessary to do good science... that realization was equally big in my mind.” ■

**The organizers worked incredibly hard to create a space where people would be respected, listened to, and a space that would accommodate as many people as possible.**

## XMaS Scientist Experience: Changing Perceptions about Careers through Interactions with Scientists at a Central Facility

Kayleigh Lampard, University of Warwick

National laboratories, along with central facilities around the world, have developed a wide range of excellent outreach activities that highlight their activities to the general public and provide unique opportunities to support the uptake of women into STEM. However, tackling uptake issue more generally needs additional activities that address the career choices for young people as well as challenging the perceptions within the wider public that such career aspirations often produce. To this end, we developed a project to take 14 female Physics students aged 16-17, on a life changing trip to Grenoble, France in April 2015<sup>1</sup>. The trip was supported by the Department of Physics, University of Warwick<sup>2</sup> as well as the XMaS facility<sup>3</sup> and explored the European Synchrotron Radiation Facility<sup>4</sup> (ESRF) and the Institute Laue-Langevin<sup>5</sup> (ILL). The aim was simply to give the students an insight into possible careers through meeting inspirational scientists working there. We actually found the project achieved so much more.

The students were selected through a competition which asked them to prepare a short report on ‘What is the legacy of Dorothy Hodgkin, both on the study of structure on an atomic scale and for women in Science?’ This question specifically encouraged students to reflect on the impact of women in science and the achievements of an inspirational researcher and role model.

After an informal evening in the UK, the students went on a four day trip to France where their eyes were opened to the world of STEM in an international, collaborative research setting. They toured the ESRF, XMaS and the ILL over two days and were introduced to scientists from different backgrounds, and nationalities.

A central component of the trip was to facilitate

interactions between the students and the staff working at the facilities providing them with inspirational and accessible role models. To ensure that the students could have open and frank discussions, these sessions were held informally over lunch and dinner with staff from different scientific areas and at different career points.

To highlight the outcomes of the trip and to challenge the perceptions of parents, teachers and peers, the students produced and presented videos and presentations themed around ‘what scientists do’ to a varied audience. These presentations were inspiring and clearly showed that the girls had engaged with the project and were enthused about potential careers within STEM.

It became increasingly clear both during and after the trip that the student’s perceptions and stereotypes of people working in STEM careers had changed. They were shown possible careers in STEM subjects and saw successful role models who combined a fulfilling scientific career with family life. They also saw STEM careers as being within their reach

*“I guess I had the impression that you had to be extremely intelligent (borderline genius) to do a PhD in physics and doubted whether I was smart enough, but speaking to the scientists here has helped me to see that hard work, determination and passion are equally important and as long as I was willing to put the work in it was something that I could do” — S. Eastabrook*

A surprise was the students’ rather limited knowledge of what possible scientific careers involved and they were both surprised and delighted by the opportunities and teamwork required in collaborative research.

**“My favourite part of the trip was talking to the scientists; they were really friendly and they honestly wanted to answer our questions, give us advice and insights into the world of physics”.**

— S. Eastabrook

*Students at the ESRF Visitor Centre learning about X-rays and their uses with an ESRF staff member.*





The students at the EPN Campus in Grenoble, France.

*“It was interesting to see how scientists from a wide range of different disciplines all use the ESRF and ILL” — F. Woolley*

An important element of the trip was to highlight the inter-disciplinary nature of research and links between different STEM areas. The students were able to see parts of the high-school curriculum being used at the cutting edge of research.

*“I really enjoyed seeing what I’ve learnt in school. It allowed me to place the syllabus into context and made me realise that there is much more to science than mark schemes.” — M. Correa*

Overall, the students agreed that the activity made it more likely they would choose to study STEM related subjects in the future:

As research has shown that STEM enrichment and enhancement activities have deepest impact when students build long lasting relationships amongst themselves, a key strategy was to support and encourage networking between the participants. The girls now support each other through social media and continue to be involved in ambassadorial roles through their schools and our network of partner organisations where the aims and ideas of the project are showcased. The student generated presentations provide excellent

materials for future years (please visit [www.xmas.ac.uk](http://www.xmas.ac.uk) to view videos produced by the students).

A parallel program is being launched in Sweden by the department of materials physics, University of Uppsala. The aim remains the same, but with a wider scientific remit and participation in the synchrotron@schools day. This activity further enlarges the community of students and schools, building a European level engagement activity that supports STEM uptake and careers. It has become clear that an activity of this kind generates a lasting impact on a wide group of people including not only those involved directly but also with their schools, peer groups and families.

We would like to take this opportunity to thank the ESRF and ILL as well as all the staff involved in making the XMaS Scientist Experience such a success.

For more information please contact Kayleigh Lampard [Kayleigh.lampard@warwick.ac.uk](mailto:Kayleigh.lampard@warwick.ac.uk) ■

<sup>1</sup> For more information, please consult the beamline webpage [www.xmas.ac.uk](http://www.xmas.ac.uk) or the twitter feed @XMaS-SchoolTrip

<sup>2</sup> <http://www2.warwick.ac.uk/fac/sci/physics>

<sup>3</sup> XMaS ([www.xmas.ac.uk](http://www.xmas.ac.uk)) is a facility supported by the UK Engineering and Physical Sciences Research Council.

<sup>4</sup> [www.esrf.eu](http://www.esrf.eu)

<sup>5</sup> [www.ill.eu](http://www.ill.eu)

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**“The trip made me more confident in pursuing my scientific aspirations as a female scientist and helped me to see that STEM industries were open to females.”**

— A. Couzens

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## Attention Undergraduate Students

Apply by **October 16** to attend the  
**APS Conferences for Undergraduate Women in Physics (CUWiP)**  
 The application opens **September 1** at [www.aps.org/cuwip](http://www.aps.org/cuwip)

Interested in hosting a future  
**APS Conferences for Undergraduate Women in Physics (CUWiP)?**  
 Apply to be a host site by **November 1** at [www.aps.org/cuwip](http://www.aps.org/cuwip)



## Grants for Groups to Improve Recruitment & Retention of Undergraduate Women in Physics

Deanna Ratnikova

The American Physical Society (APS) Committee on the Status of Women in Physics (CSWP) invites applications for grants to women in physics (WiP) groups at US colleges and universities. The purpose of these grants is to support the CSWP mission towards the recruitment and retention of women in physics at the undergraduate level. WiP groups are uniquely able to address this mission locally by encouraging and supporting the participation of women in their departments. The deadline for proposals is October 1.

### Purpose

The purpose of this program is to improve recruitment and/or retention of women in physics through (1) the establishment of new WiP groups, (2) expansion or strengthening of existing groups, and (3) improvement in sustainability within new and existing groups. To this end, the CSWP is calling for proposals from WiP groups who wish to provide meaningful experiences to students pursuing or considering an undergraduate degree in physics. Attendees of the APS CUWiP conferences are especially encouraged to apply.

### Proposal

A successful proposal will be focused on recruiting and/or community building, and may include networking, mentoring, professional development, and/or scientific activities. Examples include, but are not limited to:

- Career workshops
- Workshops on communication, leadership, dealing with bias, or other skills (One possibility is the Communication and Negotiation Skills Seminar for Women; email seminar requests to [women@aps.org](mailto:women@aps.org)).
- Classroom visits (high school, middle school, or undergraduate)
- Seminars relevant to women's participation in physics
- Lab tours or field trips
- Research expos
- Book club or journal club
- Coordinating with other women in STEM advocacy groups on joint events
- Group lunches, dinners, or social events

A critical part of the proposal is a discussion of how the proposed activities are well-suited to the type and size of department at your institution. Preference will be given to proposals that show high potential for sustainability after the terms of the grant are completed.

### Awards

CSWP will award grants up to a total of \$1,000 over one to two years. Funds will be distributed as one lump sum at the beginning of the grant and are to be used within a one or two year period, ending October 31. Funds will be distributed to a group account when available. APS funds cannot be used to support university overhead or indirect costs.

At the end of each year, a brief report on WiP activities and expenditures is required. A template will be provided for the activity reports, which may be published on the web by APS. Each group should provide a copy of their report to their department chair.

In addition to the year-end report, WiP group leaders will be required to complete surveys when they apply for the grant and at the end of each academic year. The WiP group will acknowledge APS support on their website, social media, and/or at events. ■

In 2014, CSWP surveyed US institutions to better understand and support the formation of Women in Physics groups. Sites that responded to the survey are listed at [www.aps.org/programs/women/resources/wipgroups.cfm](http://www.aps.org/programs/women/resources/wipgroups.cfm). If you wish to edit a listing or add a group, email [women@aps.org](mailto:women@aps.org).

University of Maryland's Women in Physics Group hosts a career panel.



Post-panel networking proves valuable for students at the University of Maryland.



## APPLICATION PROCESS

Graduate or undergraduate students are eligible to apply. The women in physics group must have a faculty mentor who is an APS member. Groups can re-apply, however, preference will be given to new applications. To apply, please submit the following information in a single PDF document by October 1:

### Cover sheet should include:

- The contact information of the applicant, including name, address, phone number, and email
- The name of your WiP group
- The department and institution of which you are a member
- The name and contact information (including email and phone) of your faculty mentor
- Amount of funding requested
- Names of officers of the group and whether they are APS members (existing groups)
- Date group was established (existing groups)
- Estimate of current membership or average participation at events (existing groups)
- Is the group recognized as a student organization by the university or department (y/n)?
- Indication that the group leader has completed the online survey.

### Narrative description of your program (no more than two pages) should include:

- A description of the activities of the group (either proposed or existing), how these will address the stated goals of the APS WiP program, and the potential impact of these activities.
- A description of the leadership structure of the group including the responsibilities of each position, and how leadership is transferred to improve sustainability. If there is a plan to become an official student group, please include this.
- A plan for administering the required online APS WiP survey to participants in your group at the end of the academic year.

### Budget (one page).

Provide a breakdown of what funds are requested and a short justification for each amount (e.g., “We request \$200 for refreshments for our monthly journal club discussions on gender and race. We expect to have 10 meetings over the course of the year with an average of 10 participants.”).

### Letter of support from a faculty mentor.

Although CSWP’s intention is that students will submit proposals, the involvement of a faculty member is necessary. She/he will know what the local rules are to get approval to submit the proposal.

### Letter of support from your department chair (if different from the faculty mentor).

This should address how the department will help sustain the program (e.g., contributing funds, providing meeting space, hosting email list, etc.).

Email application materials to [women@aps.org](mailto:women@aps.org) no later than October 1.

For more information, contact [women@aps.org](mailto:women@aps.org).

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**CSWP has started an email list for Leaders of Women in Physics Groups. To be added, email: [women@aps.org](mailto:women@aps.org).**

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## SELECTION CRITERIA

- The quality/creativity of proposed ideas.
- Preference is given to groups that have not received previous support from APS for WiP.
- The proposal addresses stated purpose of grant program.
- The impact of the proposed activities including:
  - Group is new or expanding (especially if expansion targets undergraduate members).
  - Focused activities to support women of color.
  - Number of women affected (internal, outreach, other activities).

## APS Goepfert-Mayer Award goes to Aficionado of Cold Atoms

Michael Lucibella, APS Staff Writer

This year, the APS Maria Goepfert-Mayer Award was presented to Gretchen Campbell of the National Institute of Standards and Technology (NIST). The award recognizes outstanding achievement by a woman physicist in the early years of her career. The award is named after German-American physicist Maria Goepfert-Mayer, the second woman to win a Nobel Prize in Physics (after Marie Curie).

In addition to a certificate honoring her achievement, Campbell will receive a \$2,500 stipend plus \$4,000 in travel funds for giving lectures at up to four U.S. universities and at an APS meeting.

Campbell is a Fellow at the Joint Quantum Institute (JQI), a collaboration between NIST and the University of Maryland. She is an atomic, molecular, and optical physicist who specializes in Bose-Einstein condensates (BECs). “I’m definitely an experimentalist and I really love ultracold experiments. They are tabletop [experiments] but you get to do all kinds of things with them,” Campbell said. “It’s a pretty neat system that’s behaving in a quantum way but it’s a pretty big system.”

In particular, she pioneered work that uses a ring-shaped condensate to better understand superfluidity and superconductivity in BECs. “In many ways it behaves similar to a superconductor,” Campbell said.

Campbell hails originally from western New York state and first became interested in physics while in high school. “I was very much a kind of animal person as a kid,” she said. “From a very young age I was pretty convinced I was going to be a vet.”

It was during her freshmen physics class that she was drawn to the reasoning of physics as opposed to the rote memorization she encountered in biology. She was also encouraged by teachers who shared with her their own enthusiasm for science.

“Both the instructor and the lab instructor were really dynamic,” Campbell said.

“I found it challenging in a way that I didn’t find other classes. ... I really enjoyed the challenge and the problem-solving aspects of it.”

She majored in physics at Wellesley College then attended the Massachusetts Institute of Technology for her Ph.D. There she did her first experiments with BECs in optical lattices. Afterwards, she won a National Research Council postdoctoral fellowship to work at JILA in Boulder, Colorado. In 2009, she joined the JQI.

The sodium BEC rings she’s been studying are essentially superfluid “atom circuits.” Campbell has been working on her current experiment to study the analog of how currents of atoms flow in these systems, much like electric currents in superconductors. The hope is to understand how to make the first practical “atomtronic” devices. Also, she hopes to use some of the prize money to develop a second experiment.

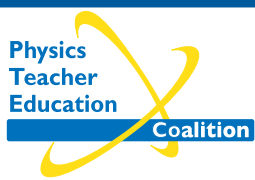
She added also that she was excited to win and looked forward to traveling to other institutions to talk about her work. “It’s definitely an honor and it’s very exciting to win an award, especially considering the people who’ve won it in the past,” Campbell said.

*This article was originally printed in APS News.* ■

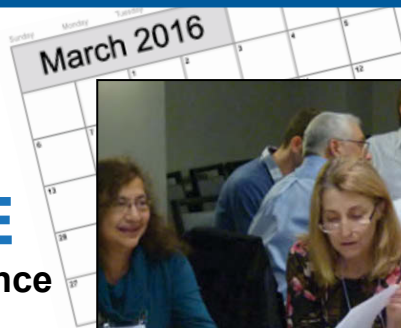


Gretchen Campbell

**“It’s very exciting to win this award, especially considering the people who’ve won it in the past.”**



**Physics  
Teacher  
Education  
Coalition**

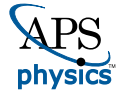




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**In conjunction with the 2016 APS March Meeting**



## The Physicist's Cat: A Memoir by Dr. Enid K. Sichel

Reviewed by Linda M. Alviti, B.A. in English, California State University, Los Angeles

Cats are known for having minds of their own. *Quantum* cats (sans observation) can lay claim to an extra level of unpredictability, thanks to the one featured in Erwin Schrödinger's famous 1935 thought experiment.

In her recent memoir, *The Physicist's Cat*, Dr. Enid Sichel likewise celebrates surprising aspects of life. "Expect the unexpected," Sichel says, "is a good motto," and she clearly has fun sharing observations and stories about topics ranging from high-maintenance cats to dewars full of liquid helium (resembling "giant Thermos bottles") to the sweet alchemy that produces maple syrup.

The chapters of the book, which contain clusters of related anecdotes and vignettes, read equally well in any order, much like browsing through a three-ring binder or recipe box filled with sorted index cards. The chapter titles, including "Inverse squares law" and "Alternate universe," delightfully serve as the book's organizing principle while mirroring the structure of a science textbook. Sichel relies on the reader's imagination to make connections between the headings and the anecdotes grouped beneath them. The brisk narrative style aptly conveys her can-do spirit.

A condensed matter physicist "of a certain age," Sichel has spent many fulfilling decades studying her field, working in academic and industrial labs, doing government consulting work, lecturing, attending conferences, and teaching students physics. During the 1960s, she herself was a physics student, first at Smith College and later at Rutgers University, where she received her Ph.D. and studied low-temperature superconductivity.

Her descriptions of the maddeningly delicate procedures then required to work with superconducting magnets are especially vivid. There was also the possibility of equipment exploding at any time. Fortunately, when a dewar containing liquid helium *did* explode in Sichel's lab, no one was in the room!

Not one to mince words, Sichel does not shy away from discussing episodes when she encountered (and had to overcome) preconceived notions about women's limited ability to be scientists or to do other "unconventional" things. Self-doubt may well have crossed her mind at those times, but Sichel's confidence prevailed. When a renowned graduate physics program admittedly discouraged her applica-

tion because of her gender, Sichel framed the dismissive letter behind glass and continued applying to other schools.

Role models (in person and in stories) helped Sichel's confidence bloom. Among the many inspiring, resilient women in *The Physicist's Cat* is Sichel's mother, who was both a nurturing parent and a professor of zoology at Trinity College in Vermont. A building there was eventually named in her honor.

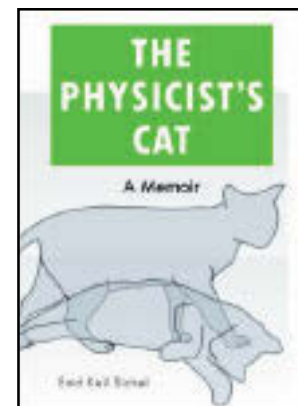
Elsewhere in the book, a sea captain with the Sea Education Association in Woods Hole—an expert in the ancient art of celestial navigation who provides a "guided tour of the heavens" to Sichel and other fascinated skywatchers—turns out to be a woman. A group of women sitting around a table in a library, hooking rugs as if in an "18th century tableau of a quilting bee," are also retired mathematicians and computer programmers, discussing their favorite computer operating systems.

A family friend, John Lochhead, regaled the young Sichel with stories of "women explorers, scientists, and athletes." He undoubtedly would have been pleased to see her reach the ocean floor in a submarine, sail boats, hike, play tennis and become an accomplished physicist and inventor.

Like Lochhead, Sichel has a keen eye and enjoys telling stories about the people that she meets. Among the quirky people and situations she mentions is a man who popped out of a manhole just as Sichel was walking by with fresh-picked flowers. When he asked, "For me?," she made sure to hand him a flower, then watched in amazement as he disappeared down the same manhole.

Sichel's lifelong interest in animals and plants is evident in many of her stories. Making an appearance are (among others) ants, moths, turtles, nesting pheasants, cows, American chestnut trees, Lady Slipper plants and a cornucopia of cats. Her enjoyment of them is contagious!

Sichel's memoir provides candid, humorous glimpses into the recent history of experimental physics—into how science really gets (and got) done. She also offers highlights from her personal journey through life, in an inimitable voice. Longer versions of her stories would be more than welcome. Who knows what else might happen now that the cat is out of the box? ■




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**Sichel's memoir provides candid, humorous glimpses into the recent history of experimental physics.**

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One Physics Ellipse  
College Park, MD 20740-3844



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APS Minorities in Physics Facebook group  
[www.facebook.com/groups/APSMinorities](http://www.facebook.com/groups/APSMinorities).

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Find us on  
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Conferences for Undergraduate Women in Physics

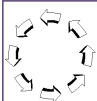
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