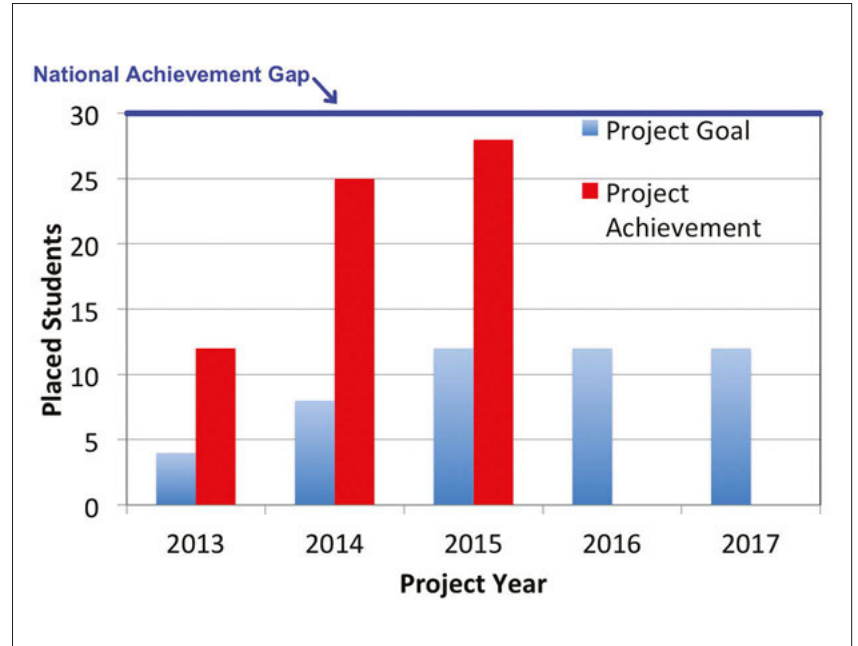


## Bridge Program Makes Significant Headway in Closing Achievement Gap

Now in its fourth year, the APS Bridge Program (APS-BP) is on track to eliminating the achievement gap between undergraduate and graduate degrees earned by underrepresented minorities (URM) in the United States. Only about 30 additional URM PhDs per year will bring the current 5-6% PhD rate up to 10% – the current percentage of undergraduate degrees awarded to URM students in physics. In 2015, we placed 28 students into graduate programs, and our applicant pool has grown each year as students and their advisors become more aware of the program. These are 28 individuals who would not be studying physics today without the Bridge Program, and who will likely receive a PhD in a few years and begin to lend their energies to solving difficult problems and

mentoring the next generation.

While too early to know the outcomes, 95% of our students are still on track to receive a PhD – comparing favorably with the discipline average of 60%. Additionally, the program is learning lessons that can help all graduate programs and students. One example is the formation of graduate student organizations in physics. These groups provide peer mentoring for students, break down isolation barriers, and provide student representation. Nearly all bridge program sites have developed or fostered such groups, and report significant advantages to their programs. The project is building on these achievements thanks to the strong support provided by APS members and the National Science Foundation.



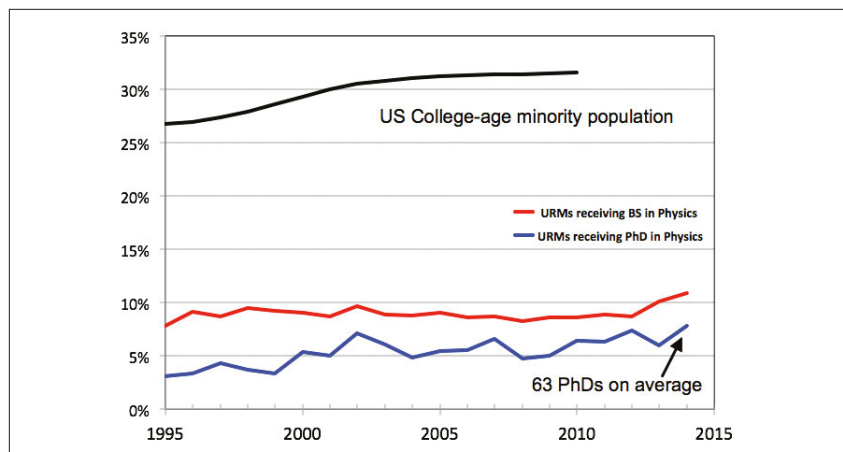
In physics, the addition of about 30 PhD degrees each year will bring the percentage of URM students receiving PhDs up to the same percentage of those students receiving bachelor's degrees. The Program has surpassed its expectations and is well on the way to achieving its goal.

## Few Underrepresented Minorities Receive Degrees in Physics

About a third of all college age students in the United States identify as underrepresented minorities (URM: African, Hispanic, or Native American), but only about 10% of undergraduate physics degrees are earned by individuals from these groups. Role models are hard to come by, as the statistics worsen

at the doctoral level: only 5-6% of domestic PhDs are URM. The reasons are varied: not enough money to apply to many schools, performed poorly on the GRE, poor math preparation in high school delayed performance as an undergraduate, received poor advice, or didn't think they would measure up

MINORITIES CONTINUED ON PAGE 3



Underrepresented minorities (URM) currently earn about 10% of all bachelor's degrees and 6% of all PhDs in physics. Trends in these degrees have not changed much in the past 15 years while the US population has continued to become more diverse. Elevating the rate at which URM students receive PhDs to match that of bachelor's degrees is the primary aim of the APS Bridge Program, and can be achieved with only about 30 more degrees each year.



University of Central Florida (UCF) and Indiana University are two of the newest APS Bridge Program selected sites. Members of the newest cohort of Bridge Students (left-right) Brian Zamarippa-Roman, Fernand Torres-Davila, Christopher Tiller, and Michael Sagapolutele have settled in well at UCF under the leadership of Department Chair Talat Rahman.

# STUDENT PROFILES

## Ethel Perez-Hoyos

Ethel Perez-Hoyos is in the PhD program at Ohio State University, starting out in OSU's Bridge Program in 2014. Ethel completed her BS in Physics and Mathematics at West Virginia University (WVU).

### What motivated you to apply to the Bridge Program?

I found that the Bridge program offers an excellent alternate admissions pathway that has allowed schools to tap into excellent physics PhD candidates, where the traditional admissions systems have failed. With most undergraduates starting the process 12 months before application due dates, applying to multiple universities, multiple required external tests, and for-profit companies advertising their 'must have' test taking strategies, the admission process itself can become unnecessarily complicated and somewhat of a minefield for some.

### What is your area of research interest?

Experimental condensed matter physics. My current project is on



the synthesis of novel 2D Transition Metal Dichalcogenide (TMD) materials, specifically molybdenum disulfide ( $\text{MoS}_2$ ) and vanadium disulfide ( $\text{VS}_2$ ). These are exciting materials that, due to their reduced dimensionality and symmetry, present a new realm of phenomena that bulk 3D materials do not have. These materials have the potential to revolutionize electronic devices.

### How has your experience in the Bridge Program at OSU been?

I was very excited to continue my studies at OSU after my under-

graduate education. One thing I like about the OSU Bridge program is its flexibility. The selection of classes are tailored to address the specific needs of the student in working towards a complete physics core.

Moreover, the best thing about the program is the community of great people that are helping you succeed. I feel truly fortunate to belong in a community of so many people that care and want to see me become a better scientist.

### Do you feel like the Bridge Program has prepared you for a PhD program?

The Bridge Program has helped me immensely. My mentors at OSU have helped me to choose a balanced load of courses that have further developed my conceptual understanding of physics. Working with the tutors, I have been able to develop strategies that help me work on my own learning techniques and problem solving strategies. At the same time, I was able to contribute and expand

PEREZ-HOYOS CONTINUED IN PAGE 3

## Daniel Silva



Daniel Silva joined Florida State University's bridge program in 2014. As an undergraduate physics and math major at California State University Long Beach, Daniel attended an REU at UC Davis that sparked his interest in obtaining a PhD in physics. Having been informed of the APS-BP by his research advisor, Daniel felt encouraged to apply and pursue a graduate degree.

Less than a year after joining FSU's Bridge program, Daniel successfully entered their PhD program. He believes the bridge program

SILVA CONTINUED IN PAGE 3

## Douglas Tuckler

As an undergraduate, Douglas Tuckler always set his sights on attending graduate school, and now he is on track to earning a PhD in physics. Without remarkable grades and sufficient research experience however, securing entry into a PhD program through the typical path was not an option. Fortunately, his undergraduate advisor at Florida International University, Dr. Pete Markowitz, informed him of the APS Bridge Program. He applied in the program's second year, one of 60 applicants. Although not offered admission into any of the four established bridge programs at the time, his application was passed onto a second round of graduate schools that agreed to look at bridge applications that year. The University of Cincinnati offered him admission in the summer of 2014, and Douglas accepted.

Though the material is challenging, Douglas is flourishing at UC, passing his PhD qualifier and acing his advanced coursework. Douglas' research interests lie in high energy theoretical physics, and he aspires to work in the Perimeter Institute for Theoretical Physics in Canada.

Douglas found a welcoming atmosphere and camaraderie among the



graduate students at UC, a school he never considered when applying to graduate school initially. Impressed by the research occurring there, he is extremely happy with his choice.

Douglas' undergraduate record did not reflect traditional indicators of success in graduate school, but given the opportunity, he is excelling in a challenging field and has a bright future as a physicist. "I'm happy to be at UC...this is an amazing program that gives students great opportunities," says Tuckler about the Bridge Program.

## APS Profile: Bridge Program Manager

Dr. Geraldine L. Cochran has assumed the role of APS Bridge Program Manager as of January 2016. Cochran earned her bachelor's degrees in physics and mathematics from Chicago State University. It is there that she became interested in physics teaching and physics education research. She earned a master's degree in teaching with a specialization in secondary school physics, which afforded her the opportunity to gain more experience in teaching at the secondary level. She later earned an Ed.S. and her PhD in science education and curriculum and instruction, respectively, with a cognate in physics from Florida International University.

Cochran came to APS after serving as the Associate Director of the Multicultural Center for Academic Success (MCAS) and an Adjunct Professor at Rochester Institute of Technology (RIT). In her role at MCAS, Cochran supported STEM student initiatives by collaborating with the STEM colleges at RIT, writing grants to support MCAS programs, and completing assessment and program evaluation for the center.



Photo by Ken Cole

Geraldine L. Cochran

She also advised a caseload of STEM students, an aspect of her role she greatly enjoyed. As an adjunct professor at RIT and Nazareth College (through a collaboration with RIT) Cochran was able to continue teaching courses in mathematics, STEM education, and physics teacher preparation.

Cochran is very excited to join the American Physical Society and to manage the APS Bridge Program. She is passionate about increasing diversity in physics and supporting inclusive environments that encourage individuals to capitalize on the benefits that diversity offers. Having faced

COCHRAN CONTINUED ON PAGE 3

played a significant role in helping to prepare him for a PhD in physics. He found the professors at FSU enthusiastic about helping him achieve his goals as well as very caring about students' well-being.

Upon completion of his PhD, Daniel plans to work in the private sector in his chosen field of interest, Condensed Matter Research. He is currently working on spin systems, specifically long-range vs. short-range interactions. Daniel believes the Bridge Program is "a great opportunity for anyone interested in pursuing a graduate education in physics."

PEREZ-HOYOS CONTINUED FROM PAGE 2

my research skills by working in Prof. Johnston-Halperin's group. All these preparations have given me the confidence to become a more complete and strong PhD candidate.

**What advice do you have for aspiring URM physics graduate students?**

The Bridge Program is a very flexible program that will provide you with the tools and experiences to help you achieve your goals. Like any other graduate program, it requires a lot of hard work and will not be devoid of highly rewarding challenges, yet at the same time it is designed to give you the best support to succeed.

in a more competitive environment.

The APS-BP has seen about as many causes as we have students, and nearly every student we have admitted to a doctoral program through the APS-BP has risen to the occasion. In many cases they just need to take an advanced undergraduate class at a higher level of rigor, for others, it just took recognition and guidance by concerned faculty members to mentor a student onto a proper path.

The encouraging news is that to raise the 5-6% up to 10% only

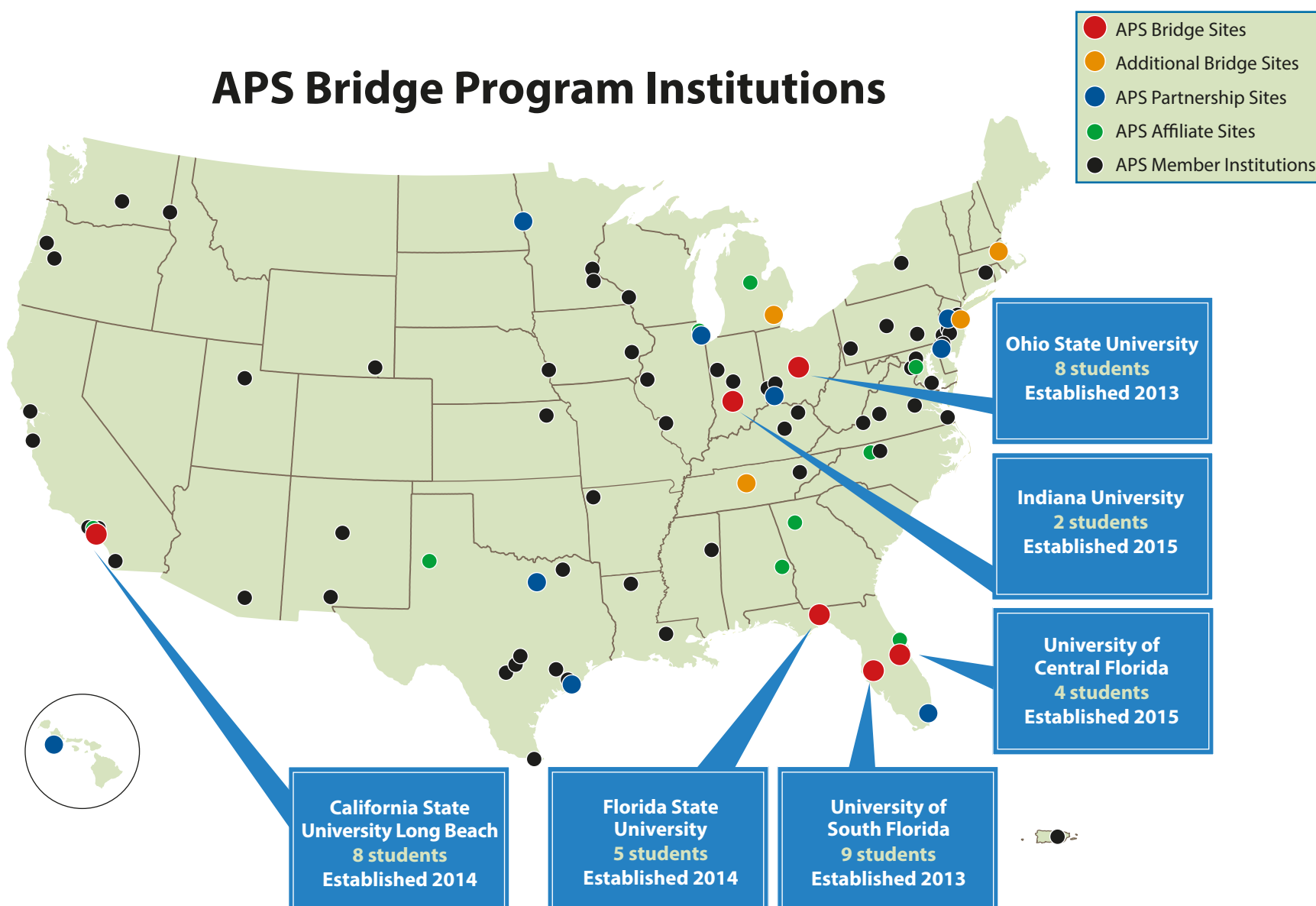
requires that we graduate about 30 more URM PhDs each year. This is a goal that the APS believes is attainable, and the premise that the Bridge Program is designed to address. The critical issues are a) finding students who can be successful with appropriate guidance and coursework, and b) finding faculty and departments that are willing to provide this assistance. The APS-BP is on track to eliminate this achievement gap, and is lending assistance to students and faculty willing to take on these challenges.

several challenges in her own academic career, Cochran is sensitive to the numerous challenges that underrepresented students face in their academic career including, but not limited to academic, personal, financial, and familial. It is Cochran's goal to positively contribute to the APS Bridge Program as it continues to make a positive impact on the number of underrepresented students receiving doctoral degrees in physics.



The annual Bridge Program Conference and inaugural National Mentoring Community (NMC) Conference was a resounding success. Over 175 faculty, bridge students, mentors, and mentees attended the conference at Florida International University in Miami on October 9-11th, 2015. The next Bridge Program conference will be held in February 2017.

## APS Bridge Program Institutions



# Fellow Puerto Rico Graduates Succeed in USF Bridge Program

Manuel Bonilla and Joshua Robles-García are both APS-BP students at the University of South Florida (USF) in Tampa. Manuel is in his third year in the program, while Joshua is in his first. Both students have bonded over the usual rigors of graduate school, but they also shared a unique transition: both completed their undergraduate studies at the University of Puerto Rico at Humacao (UPRH) and came to the US mainland for graduate school. Here's what they had to say about their experiences so far:

## How was your experience so far in the bridge program?

**Joshua:** My first semester at USF was excellent. Having previous Bridge and Spanish-speaking students at USF helped me understand the graduate courses I was taking a lot better. I found the courses challenging but not impossible. The Bridge Program is helping me overcome my limitations in order to obtain a PhD in Physics.

**Manuel:** If it were not for the BP I would not be pursuing a graduate degree in physics. The BP gave me the chance to pursue my goal. Through the program, I've had the opportunity to attend conferences where I met inspiring people and saw firsthand how vital it is to get students like me accepted into graduate school. The BP gave me the confidence to

believe I belong in graduate school. I now believe anyone who is willing to strive in graduate physics should have the opportunity to do so, regardless of if their profile matches statistical standards that do not account for underrepresented minorities.

## How would you describe your relationship with your fellow Bridge student?

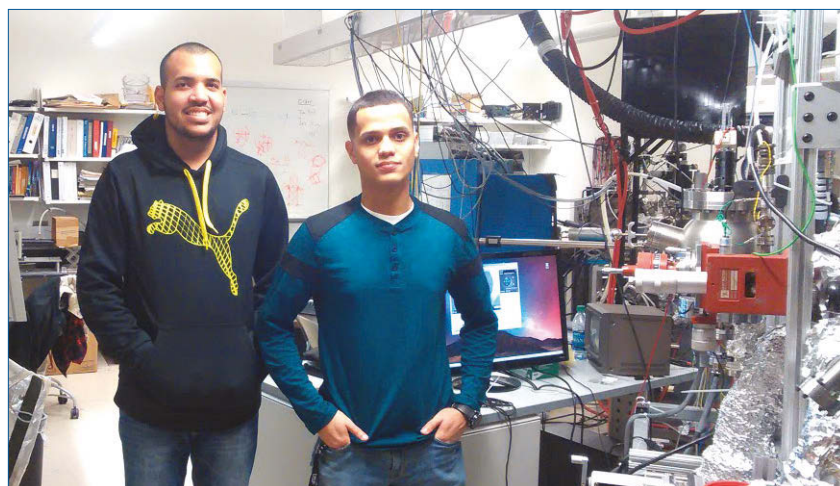
**Manuel:** Joshua and I were good friends at UPRH since our research advisors shared a laboratory. We spent a lot of time doing research in the same lab. We've become really good friends and help each other, mutually, as much as we can.

**Joshua:** I would consider us to be friends. Every time I have concerns about courses or any problems at USF, I contact Manuel for advice.

## As a veteran bridge student, how do you work with Joshua?

**Manuel:** Rather than a mentor, I feel like a friend. I remember when I arrived at USF I did not know anybody and it took time to find people to talk with. I talk to Joshua about the courses I've taken and my ongoing research projects. Even though I am a PhD student now, I still identify with Bridge students because of the good experience I had as part of the program.

## How was the transition from Puerto Rico to USF? What is the best



University of South Florida (USF) Bridge students Joshua Robles-García (l) and Manuel Bonilla (r) pictured in their lab. Joshua started at USF in 2015, while Manuel is in his third year in the PhD program. Both students entered the Bridge Program from University of Puerto Rico Humacao.

## piece of advice Manuel gave you, as an experienced Bridge student?

**Joshua:** My transition from UPRH was easy since I already had family and friends in Tampa and Orlando. Manuel also helped me a lot in my transition. Having a friend and staff who speak Spanish at USF made it easier. The best advice Manuel gave me was last semester when he suggested that I not take a very heavy course load.

## How do you like Tampa and USF?

**Manuel:** Tampa is a goodsized city with a diverse community in which I feel I can fit in comfortably especially compared to other places in the States. It is very di-

verse and the weather is similar to Puerto Rico, where I was raised.

**Joshua:** The faculty at USF are pleasant and helpful. I like my research and my research group...as well as the weather.

## Can you describe your research?

**Manuel:** I am currently working at the Surface Science Laboratory under Dr. Matthias Batzill and will soon finish coursework requirements for the PhD program.

**Joshua:** Last semester I joined the Functional Materials Lab. I'm working on the synthesis of magnetic nanostructures. I'm currently getting ready to apply to PhD programs.

## Join as a Member or Partnership Institution

### Member Institution

The APS-BP is developing a coalition of academic institutions that share a commitment to increasing educational opportunities for underrepresented minority (URM) physics students.

### Partnership Institution

The APS-BP is developing a national network of graduate institutions where bridge and other students, if admitted, will receive mentoring and assistance in making the transition into a doctoral program. Among the benefits of becoming a Partnership Institution are:

- Eligibility to apply for a Partnership Grant for up to \$10,000 to improve access to graduate education, especially for URM students.
- Early access to APS-BP bachelor's and master's student applicant database.

## Students: Apply for the Bridge Program

The APS Bridge Program aims to increase the number of underrepresented minorities who earn a PhD in physics by helping students gain admission to graduate programs. African American, Hispanic American, and Native American students interested in pursuing a PhD in physics are encouraged to apply.

### Eligibility Requirements

Underrepresented minorities who will complete or have already completed a bachelor's degree in physics or a closely related field and plan to pursue a physics doctoral degree.

### Deadline:

March 21, 2016

### More Information:

Email: [bridgeprogram@aps.org](mailto:bridgeprogram@aps.org) or [www.apsbridgeprogram.org/](http://www.apsbridgeprogram.org/)

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