

APS Bridge Program – an introduction

In 2012, the National Science Foundation awarded APS \$3 million in funding over the next five years to launch the APS Bridge Program (APS-BP), a national effort designed to increase the number of underrepresented minority students who receive doctoral degrees in physics.

Underrepresented minority (URM) students, including African Americans, Hispanic Americans, and Native Americans, earn about 10% of US physics bachelor's degrees, yet they comprise only about 5% to 6% of US citizens who receive physics PhDs at American institutions. The main goal of the APS-BP is to roughly double the number of PhDs awarded to these students within the next ten years by developing sustainable bridge programs to provide these students with research opportunities, advanced coursework, and mentoring, and to facilitate these students' access to graduate programs. Also, the project enables departments to enhance the culture of their physics

graduate education so that all students have the best chance of success.

Program management spent several years visiting minority-serving and doctoral-granting institutions to build relationships and assess the best methods of increasing the number of URM who receive PhDs. The APS-BP decided to base its efforts on existing bridge programs, including those at Columbia University, Fisk-Vanderbilt, MIT, and University of Michigan.

The project selected its first sites to host bridging experiences through an NSF-style competitive proposal process in May 2013. The University of South Florida and The Ohio State University placed 6 students into their newly launched programs in fall 2013. The project anticipates announcing new sites in April 2014.

In its first year, APS-BP was also able to place an additional 6 students directly into graduate programs, and hopes to expand this feature in coming years.

Other components of the APS Bridge Program include: conferences

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APS Bridge Program Selects New Sites



In June 2013, the APS Bridge Program selected The Ohio State University (OSU) and the University of South Florida (USF) to receive funding to develop bridge programs to the physics doctoral degree. The goal of APS-BP is to increase the number of physics PhDs awarded to underrepresented minority students, including African Americans, Hispanic Americans and Native Americans.

Students selected as APS Bridge Fellows receive stipends to participate in programs at the bridge sites. APS-BP had initially planned on placing four students in its first year, but, because the bridge sites were able to secure their own funding as well, there are now six Bridge Fellows,

exceeding project expectations.

OSU launched a one- to two-year Masters to PhD Bridge program in fall 2013, with support from APS and the university. Two APS-funded Bridge Fellows joined two others in the inaugural class. Depending on their academic preparation, Bridge Fellows have taken a mix of undergraduate and graduate courses and have partnered in the development of physics tutorials for "Guided Group Work" based on cognitive education research and peer-facilitated learning. To strengthen the transition to PhD studies at Ohio State or other institutions, Bridge Fellows will gain research experience and engage in professional skills development

BRIDGE SITES CONTINUED ON PAGE 3

Bridge Program Summer Meeting

In late June 2013, APS-BP hosted a meeting that involved a variety of programs and organizations with similar interests. More than 60 people attended the conference, which took place at the American Center for Physics in College Park, MD. Attendees included representatives from APS, the American Association of Physics Teachers (AAPT), the American Institute of Physics (AIP), bridge programs, and colleges and universities across the US.

In its first year, the APS Bridge Program was able to facilitate the placement of 14 students into physics bridge programs or directly into graduate programs. Six students were named Bridge Fellows at two newly selected APS Bridge sites, University of South Florida and The Ohio State University. Each site was also able to admit one student directly into their graduate programs. Students who applied to APS-BP

were considered by other graduate programs as well, with sixteen offers of admission made to ten students. Six of these students accepted offers, bringing the total number of students aided by the program to 14.

The meeting was the first opportunity for newly selected APS Bridge Fellows to meet each other and site leaders at their respective bridge sites. Students began classes, research, and other programmatic activities in fall 2013.

"The conference was a great opportunity for collaborations—especially for students to network with each other and faculty as they begin their bridge programs," said Brian Beckford, APS Bridge Program Manager.

Newly selected Bridge Fellows also had the opportunity to interact with students from existing bridge programs at MIT, Columbia, Michigan, and Fisk-Vanderbilt. These students participated in a panel in which they candidly described their



STUDENT PRESENCE WAS STRONG AT THE 2013 APS BRIDGE PROGRAM SUMMER MEETING HELD IN COLLEGE PARK, MARYLAND.

experiences, talked about how they fared with the GRE, and shared defining moments, among other topics.

Peter Henderson, Senior Advisor to the President at University of Maryland, Baltimore County, delivered the opening plenary at the meeting. Henderson discussed the National Academies Report *Expanding Underrepresented Minority Participation: America's*

Science and Technology Talent at the Crossroads. He explained why broad participation matters, and presented recommendations from the report. He also discussed UMBC's Meyerhoff Program, designed to increase diversity among future leaders in STEM.

William Sedlacek, University of Maryland, gave a talk on "What more do I need besides grades,

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PROFILE

Brian Beckford

APS Bridge Program
Project Manager



In April 2013, Dr. Brian Beckford joined the APS Bridge Program as program manager, taking the lead on management of day-to-day affairs and program logistics. Before coming to APS, Beckford earned a Ph.D. in nuclear physics at Tohoku University in Sendai, Japan, and received M.S. and B.S. degrees in physics from Florida International University (FIU).

Upon arriving at APS, Beckford was immediately thrown into planning the annual Bridge Program summer meeting, held in June 2013. This meeting introduced Beckford to many of the

individuals and programs taking the lead on improving diversity in physics. Beckford worked very closely with 2013-2014 Bridge Fellows during the first year of the application process, filling the roles of mentor, advisor, and liaison between students and APS.

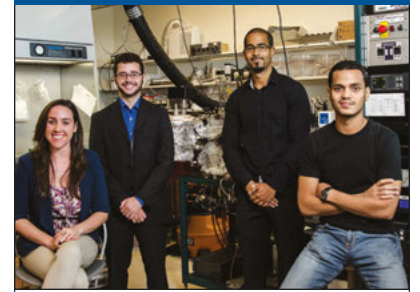
Beckford was motivated to study physics so that he could understand how the universe works at the most fundamental level. After completing his undergraduate studies, Beckford was looking for a challenge and ready to move away from his comfortable setting at FIU, so he decided to

pursue his doctoral studies in Japan, which also allowed him to deepen his understanding of Japanese culture.

He also wanted to study at a school that had its own research laboratories – Tohoku University fit this bill. Beckford's research interests include strangeness nuclear physics, primarily in the photoproduction of strangeness, particularly neutral kaons and Λ , as well as hypernuclear physics. Fortunately, he was able to gather the data he needed to complete his thesis before the historic earthquake and subsequent tsunami of 2011 did considerable damage to the university and lab.

Beckford returned to the U.S. after five years in Japan to take charge of the Bridge Program, and is excited about his involvement in the program. In the program's near future, Beckford would like to see the number of sites increase and the inclusion of women as statistically underrepresented group. He sees this job as a chance to change the definition of what it means to be a physicist, including the paths that people take to it.

Apply to become a Bridge Fellow



The APS Bridge Program is designed for students with undergraduate degrees in physics or related disciplines interested in pursuing doctoral studies in physics. African Americans, Hispanic Americans, and Native Americans are especially encouraged to apply.

Deadline: March 21

Questions? Contact
bridgeprogram@aps.org

www.apsbridgeprogram.org/link/apply.cfm



Brian Casas applied to the APS Bridge Program and was placed directly into the doctoral program at the University of South Florida in fall 2013. Casas attended high school in New Jersey, then went on to earn his bachelor's degree in physics as well as a minor in music at Rutgers University.

Casas always had questions about the things he saw just outside his window, and although his questions went unanswered for some time, he realized during high school that most of these answers lay in physics and sometimes in chemistry. "I chose to study physics because it gave me the appropriate knowledge and tool set to help me understand the world we live in," he said.

Casas said his time at USF has been a valuable learning experience. Although Casas tried to prepare himself for graduate school by taking upper level physics courses, teaching an undergraduate

lab, and spending a lot of time in the lab during his final year at Rutgers, he found his first year of graduate school to be challenging, with increased expectations and responsibilities in class, research and teaching. With good time management, however, he has been able to tackle his responsibilities. After adapting to his new physics department, Casas said he has learned a lot about his own interests as well as what he hopes to gain from graduate education.

"I chose to study physics because it gave me the appropriate knowledge and tool set to help me understand the world we live in."

Casas had varied research interests and projects in undergrad – he studied electrical properties of strongly correlated systems at temperatures above

300K, as well as interactions between vortex-like topological defects in hexagonal rare earth manganites.

Since arriving at USF, Casas has spent considerable time deciding on a lab, ultimately joining the Functional Materials Laboratory in December and beginning his own research on the various magnetic properties of complex metal oxides in February. "I am excited to be a part of this work as it allows me to be involved in each step of the experiment, starting with synthesis of my samples as well as measurements and analysis."

After completing his PhD, Casas aims to continue on with a postdoctoral position in a national lab or research university and ultimately become a physics professor. "While I'd love to continue research in condensed matter physics, I'd like to be in a position where I can help influence educational policy, education methodology, and so much more. I really believe that education is one of the only ways to help bridge the ever-growing social and racial hurdles that are plaguing this country. I want to be a proponent for growth and change."

STUDENT PROFILE

Brian Casas

test scores, and the right courses?” Sedlacek described the GRE as an insufficient predictor of graduate school success, and advocated using “non-cognitive” variables in measuring prospective graduate students. These variables include demonstrating leadership, having long-range goals, taking advantage of support networks, and being involved in the community, among others.

Leaders from bridge programs from around the country presented the nuts and bolts of their programs during a session on bridge program logistics. Summer Ash, Assistant Director of Columbia University’s “Bridge to the PhD” Program, described the two-year non-degree program, in which students are hired as research assistants as they prepare for graduate school in the natural sciences. Çağliyan Kurdak explained that the University

of Michigan Applied Physics Imes-Moore Fellows Program emphasizes program flexibility and personalized mentoring in preparing students to complete doctoral degrees in applied physics. Keivan Stassun said that the Fisk-Vanderbilt bridge program looks for basic content preparation and “grit” in students accepted into its two-year master’s sequence, designed to lead to a Vanderbilt PhD.

The conference also featured sessions on research on mentoring, building community, generating administrative and faculty support, being a successful mentee, research/evaluation questions on increasing diversity, and admissions criteria and their correlation with success.

In a plenary talk, Valerie Purdie-Vaughns of Columbia addressed stereotype threat—the well-documented effect of scoring below ability in

high-stakes measures when seeing oneself through the lens of a negative stereotype. She presented values-affirmation as a way of reducing stereotype threat by reminding people of sources of their self-worth.

Mandana Sassanfar described the two-year non-degree Biotechnology Biology Bridge (B³) Program at MIT, which provides students with research training in industry as well as rigorous academic preparation at MIT.

Philip Kutzko, University of Iowa, spoke about the National Alliance for Doctoral Studies in the Mathematical Sciences, which has similar goals to the Bridge program. It seeks to increase the number of students from “families, regions and ethnic backgrounds that have had little prior contact with the profession and culture of the mathematical sciences” who enroll in doctoral studies, earn

doctoral degrees, and enter the workforce. The Alliance has built a sizable community of faculty mentors, math sciences students, and math sciences departments committed to promoting a diverse workforce.

The project anticipates holding another meeting June 25-27, 2014, featuring the role of Master’s degrees in improving diversity. Workshops, panel discussions, and presentations will address topics including establishing MS/PhD institutional relationships, role of Master’s degrees for URM students, barriers to student advancement to the PhD, mentoring, and non-cognitive admissions measures, among others. The meeting will be held at the American Center for Physics in College Park, MD. (See advertisement below for more information).

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with topics on graduate mentoring, improving students’ graduate applications, and other topics relevant to students and faculty; building a national network of institutions committed to improving diversity in graduate education; and publicizing good practices in attracting and retaining underrepresented students in graduate programs.

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activities focused on graduate applications and GRE preparation.

“There is great enthusiasm for the OSU Physics Bridge Program at a variety of levels across the university,” said Bridge site leader Jon Pelz. The OSU Center for Emergent Materials provided substantial help in establishing the program by securing and providing funding and administrative support for the

program. The program also received significant support from its physics faculty, the Dean of the Division of Mathematical and Natural Sciences, and current graduate students.

The University of South Florida in Tampa admitted Bridge Fellows into a hybrid post-baccalaureate/transitional master’s program. Students can elect to complete their master’s degree and contin-

ue on to complete their physics PhD at USF or another institution.

Casey Miller, Bridge Program Site Leader at USF, said, “Tackling diversity is beyond the scope of any single program, so we are quite excited to be participating at this moment in the history of the APS. One of our principal goals is to diligently document our path forward to enable rapid, low risk replication of existing programs.”

APS BRIDGE PROGRAM Summer Meeting

June 25-27, 2014

American Center for Physics
College Park, MD



The APS Bridge Program Summer Meeting will bring together experts to discuss efforts to increase the number of underrepresented minorities (URMs) who receive PhDs in physics. This year’s conference will focus on exploring and understanding the role of the M.S. degree in promoting URMs in physics.

Workshops, panel discussions, and presentations will address topics including

- Establishing MS/PhD institutional relationships
- Role of Masters’ degrees for URM students
- Barriers to student advancement to the PhD
- Mentoring
- Non-cognitive admissions measures

Who should attend: faculty, students, and administrators interested in increasing the number of underrepresented students pursuing PhDs in physics.

www.apsbridgeprogram.com/conferences

Future of the BP

By Theodore Hodapp

It has been over five years since the American Physical Society (APS) began considering possible new actions that would change, in measurable ways, the participation of underrepresented minorities in physics. The APS Executive Board and staff leadership recognized the importance of meeting this challenge, and the result has been our efforts to begin and now build the APS Bridge Program. Now, just over a year into the program, we are excited about the progress and early results. We are also thinking about how the project can evolve and improve over the coming years given the lessons we have already learned, and the relationships we have built within the physics community and beyond.

Probably the most significant lesson we learned is the dramatic need, experienced by many capable students, who for various reasons either failed to apply or applied to very few schools and who, following rejection, gave up on the idea of completing a doctorate in physics. We have heard the story from many students that

they simply cannot afford to apply to a large number of schools. As a consequence, they fail to find a good match between their interests and those of a graduate program. The actions of the bridge program in this past year in “shopping around” the applications of a number of students resulted in many good “fits” that are now helping students pursue graduate degrees. We will certainly expand and improve this idea as we move forward, as it has the potential to reach many more students than we originally considered. In this regard, APS is uniquely suited to take on this role over the long term. Although this task will require some resources, it can ultimately pay huge dividends for physics as a discipline, and will help students who cannot afford a large number of application fees find a great place to study.

Early on in the project we got great advice from Jessie DeAro, our NSF program officer, to contact a related program in mathematics called the Math Alliance, run out of the University of Iowa by mathematics professor

Phil Kutzko. Since then, we have been engaged in an ongoing conversation with Phil and members of the Math Alliance including witnessing a powerful meeting run by the organization this past November. Their aim is similar to ours: provide every underrepresented or underserved American student with the talent and the ambition with the opportunity to earn a doctoral degree in a mathematical science. They have built a national network of more than 250 mentors to help underrepresented students navigate pathways toward achieving entry and ultimate success in doctoral programs. We are now discussing how we might replicate their efforts in physics, and more broadly consider ways to potentially integrate programmatic efforts between the two disciplines. They are also discussing how bridge programs might also be built in mathematics, bringing us together in design as well as aspirations. Stay tuned!

Finally, the project has benefited greatly from the considerable expertise of those who have developed bridge

programs at a number of institutions across the country. Establishing the APS Bridge Program Architect's Council to bring together leaders in each of the more established programs (Columbia, Fisk-Vanderbilt, MIT, and the University of Michigan) with the leaders of the new APS programs (Ohio State and University of South Florida) has enabled our programs to quickly come up to speed, and provided a forum for all of the projects to share knowledge and consider solutions to problems as they arise. Our goal as we move forward is to continue to highlight the wisdom and experience of all of these programs through the efforts of the Architect's Council so that other programs including recognized and more informal bridge efforts can benefit. We recognize that the increasing diversity of program types and implementation contexts will help efforts like these spread throughout the community. A goal that will benefit many students!



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Membership is free and open to institutions actively working to improve diversity in the physics community. Get registration discounts for program conferences, access to funding opportunities, and join a network of like-minded institutions.

Questions?

Contact bridgeprogram@aps.org

www.apsbridgeprogram.org/institutions/member

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