

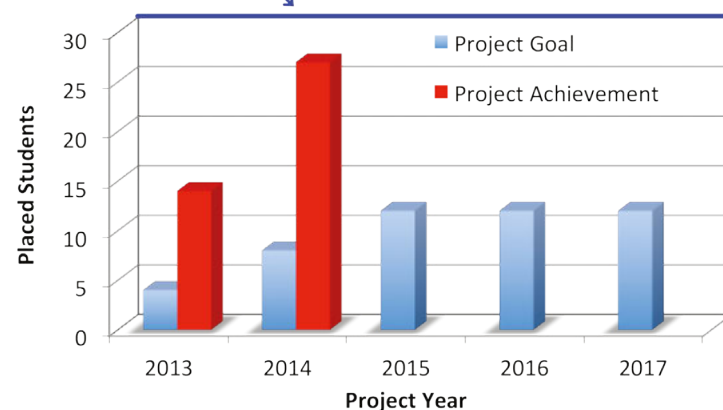
APS Bridge Program places 25 students in pipeline to PhD

The American Physical Society's (APS) Bridge Program is an NSF- and APS-funded effort to increase the number of underrepresented minorities (URM) who receive PhDs in physics. The project has established four bridge sites in Ohio, Florida, and California that provide coursework, research experiences, and substantial mentoring for students who either were not admitted through traditional graduate school admissions, or did not apply to graduate school. Faculty at bridge sites closely monitor student's progress, and provide early interventions to help students develop academically. In physics, the addition of only about 30 doctoral degrees each year will bring the fraction of URM students receiving the highest degree up to

the same fraction of these students who receive Bachelor's degrees in the discipline. Remarkably, physics departments have come forward to accept many more students than originally anticipated as can be seen in the attached graphic. This substantial magnification of impact is due largely to the centralized recruiting efforts organized by the APS – a programmatic feature that has identified many promising URM students, and matched them with universities eager to help develop these talented scholars.

In the Program's second year, 11 students were placed as Bridge Fellows at APS sites, and four were placed into non-APS bridge programs; an additional 10 underrepresented minority students, from those who initially didn't gain spots in graduate school,

National Achievement Gap



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 WHO RECEIVE BACHELOR'S DEGREES. THE PROGRAM HAS SURPASSED ITS EXPECTATIONS AND IS WELL ON THE WAY TO ACHIEVING THAT GOAL.

have now entered physics graduate programs. Theodore Hodapp, Director of APS Education & Diversity and of the Bridge Program, commented,

"The Bridge Program is on the verge of helping erase, in only its second year, the gap in URM participation in graduate education in physics."

APS Bridge Program Annual Conference

By Bushraa Khatib

The APS Bridge Program held its Annual Conference from June 25-27, 2014 at the American Center for Physics in College Park, MD. Sixty-eight people attended the Conference, including representatives from APS, the American Institute of Physics, bridge programs, and colleges and universities across the US. Representatives from the newly selected Bridge Sites – California State University Long Beach and Florida State University – as well as currently funded sites – University of South Florida and The Ohio State University – came to the Conference to explore issues and network with recently selected Bridge Fellows.

This year's Conference focused on the role of the master's degree in advancing URM students in physics. Anthony Johnson, University of Maryland Baltimore County, and Edward Helm, Louisiana State University, began the Conference with plenary talks addressing the history of APS involvement in improving diversity in physics and the use of

nontraditional variables in graduate admissions processes, respectively.

In her plenary talk, Sheila Lange, University of Washington, discussed results from an analysis of the Survey of Earned Doctorates that indicates URM students take very different pathways to doctoral degrees compared to white and Asian American students. The survey looked at a random sample of doctorates earned in science and engineering fields from 1998-2001. The analysis showed that URM students are significantly more likely to earn a master's degree en route to the doctorate, and earn BS, MS, and PhD degrees at three different institutions. The APS Bridge Program is now planning to help connect underrepresented minority students who have received a master's degree to find a good match with a doctoral program.

To bring a broad perspective of scholarship to improving degree attainment, this year's Conference featured David Meketon, University of Pennsylvania, as a plenary speaker to address "The Psychology of Achieve-

CONFERENCE CONTINUED ON PAGE 3

APS Bridge Program Selects New Sites



By Bushraa Khatib

The APS Bridge Program began funding California State University, Long Beach (CSULB) and Florida State University (FSU) in summer 2014 to develop bridge programs designed to increase the number of underrepresented minority (URM) students receiving a PhD in physics. This was the APS Bridge Program's second round of site selection since the program launched in 2012. The program is currently in the process of selecting its third round of new Bridge Sites.

Newly selected sites joined The Ohio State University and the University of South Florida, the first two funded sites. URM students, including African Americans, Hispanic Americans and Native Americans, currently receive only about five to six percent of all physics PhDs



STUDENTS BEGIN PROGRAMS AT APS BRIDGE PROGRAM SITES.

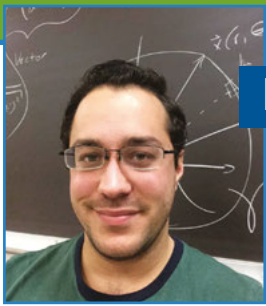
given to US citizens, a number the program is working to increase.

Students selected as APS Bridge Fellows receive stipends while participating in programs at the bridge sites. APS-BP funds two new students at each of its four sites, with the possibility of placing more if bridge sites are able to secure their own funding.

CSULB is the largest master's-granting physics department in the US and has an established track record

NEW SITES CONTINUED ON PAGE 4

STUDENT PROFILES



Pierre Avila

Pierre Avila graduated with a bachelor's degree in physics from Florida International University (FIU) in May 2014, and with help from the APS Bridge Program, enrolled in a master's program at University of Houston Clear Lake.

Avila attended Southwest Senior High in Miami, and then started off as a biology major at FIU. He participated in biology research, but soon realized that this wasn't the field for him after all. This prompted him to take a few different classes, including Caroline Simpson's solar astronomy course. After class, Avila would ply Dr. Simpson with questions about class material until she was prompted to ask why he did not major in physics. Avila had never been positively exposed to physics until this interaction, and so credits Dr. Simpson with turning him towards physics.

Avila has done research with Dr. Werner Boeglin, an FIU professor with whom he took a course on plasma

physics. Avila became a McNair scholar and had the opportunity to go to England to collect data. During his senior year, he had already applied to graduate programs, but he wanted to broaden his horizons and increase his chances of getting into graduate school. To this end, he applied to the APS Bridge Program and was very pleased with the results. Avila moved to Houston and began his master's program last fall. He is currently doing well in the program.

After he earns a master's degree at UHCL, Avila is aiming to obtain a PhD in applied physics. He is interested in continuing to work on research in aerospace technologies and related fields. He is also considering the possibility of a AAAS fellowship after completing doctoral studies in order to hone skills with public media.

Avila says that it was serendipitous that UHCL called and that if it weren't for the APS Bridge Program, the university would not have been on his radar. He is enthusiastic about the plasma research at UHCL and its potential applications. "The university is my top choice. It's the perfect program."



Dylan Smith

One of the hallmarks of the APS Bridge Program is its role in matching senior physics undergraduate students with graduate programs that have available slots in research areas of interest to students. Dylan Smith is one such student who was matched to a great research program through the efforts of the APS-BP.

Smith majored in Astrogeophysics at Colgate University in Hamilton, New York and graduated in May 2014. He applied to five PhD programs and was rejected from all of them. His mentor, Professor Beth Parks, suggested that the APS-BP might be able to find a program that would be a great fit for him, and after doing some research, Smith realized it could bolster his chances of continuing his physics education. Smith applied and gained admission to the master's program at DePaul University.

"Without the Bridge Program, I would not be enrolled in gradu-

ate school right now, and I'm very grateful to have been informed about the program," Smith said.

The program at DePaul University is small – there are only six students in this year's class including Smith, but he is happy to be part of a small cohort because it means individual attention from professors and personalized mentoring similar to his academic experience at Colgate University. Smith is also excited to live in Chicago and work as a teaching assistant.

The Master's program at DePaul is aimed to help students figure out what area of physics to specialize in and pursue in the future. After earning his Master's degree, Smith plans to continue onto the PhD, or pursue employment in the federal government or at a private research lab. "As one of my physics professors back at Colgate told me, I can do almost anything with a graduate degree in physics, and I'm excited to see where it takes me," Smith said. His research interests include renewable energy technology, astrophysics, and medical physics.

APS Approving Partnership Institutions

By Theodore Hodapp

Since APS began the Bridge program, we have been delighted by the willingness of physics faculty to work closely with students to help them achieve their academic and personal goals. In 2014 we were able to place 25 students into graduate programs, eighteen of whom were accepted into bridge programs. The additional seven students entered graduate studies at a variety of both masters and doctoral institutions. We understand that the long term success of helping students will be to ensure that every individual we place will enter a program that actively mentors students, pays close attention to their progress, and offers students opportunities to thrive as a researcher. Since it is our hope that we will eventually serve 30-50 physics students annually, many of these students will enter graduate programs outside of established bridging programs due to limitations in available resources. In addition, some students will transfer to new institutions following their masters degree, some because the highest

degree awarded in physics at their institution is the masters, some because their research interests may not fit well with their original program, and others because a variety of factors lead them to study at another institution.

Regardless of the reason, it is our intent to make sure that when they arrive at the new institution, they will have the same attention paid to them that they receive at bridge programs. In addition, APS will use this understanding with institutions as a way to inform the broader student population of institutions that conform to good induction and mentoring practices. To achieve this goal, the APS Committee on Minorities has established an approval process to recognize departments that follow good practices established at bridge sites. These *Partnership Institutions*, as they are being called, apply to be recognized by APS and undergo a vetting process to establish their adherence to established principles. In return, Partnership Institutions receive recognition by APS, preferential access to applications solicited by the APS Bridge Program, and preferential

PARTNERSHIP CONTINUED ON PAGE 4

Profile Series - Fisk-Vanderbilt Bridge Program

Q&A SESSION WITH DR. DINA MYERS STROUD



Dr. Dina Myers Stroud is the Executive Director of the Fisk-Vanderbilt Master's to PhD Bridge Program and Research Assistant Professor of Physics and Medicine at Vanderbilt University. Dr. Stroud provides considerable student mentoring support, oversees the day-to-day operations of the Fisk-Vanderbilt Bridge Program and maintains an active research program. She joined the Fisk-Vanderbilt executive team in 2012.

How did the Fisk-Vanderbilt bridge program start?

Dr. David Ernst at Vanderbilt and Dr. Eugene Collins at Fisk first put the notion of the program together in 2002. When Dr. Ernst met and recruited Dr. Keivan Stassun for

a position at Vanderbilt they began to formalize the program and Dr. Stassun and Dr. Arnold Burger at Fisk were named Co-Directors. The Fisk-Vanderbilt Master's to PhD Bridge Program (FVBP) took its first student in September 2004.

The FVBP program focuses on recognizing passion and grit during its admissions process. What does this entail in the admissions process? How does one spot grit?

The first part is a careful reading of the letters of recommendation and personal statements, looking for examples of leadership, technical skills, self-motivation, persistence and passion for science. Once we have selected a set of students to interview, we have a set of questions that probe students on how they have overcome obstacles in the past, who is part of their support network, their research experience, and motivations. Their answers can be very revealing about their ability to deal with failure and evidence of long-term goals – strong evidence of grit.

How does your program make a difference in physics?

We have produced 13 PhD grad-

FISK-VANDERBILT CONTINUED ON PAGE 4

The APS-BP Doctoral Admissions Survey: Assessing Graduate Admissions Practices

By Geoff Potvin

As many physicists are aware, physics has lagged behind several other sciences in the recruitment and retention of students from traditionally-marginalized backgrounds, including women and students who identify as Hispanic American, Native American and African American. While this is true at virtually every educational level, it is especially apparent at the graduate and post-graduate stages, where the number of such individuals barely registers. There are many social, cultural, and economic reasons that result in a dearth of diversity in many STEM fields; however, there are certain elements which apparently leave physics with less diversity than most.

One place where questions of diversity become especially poignant is in the graduate admissions process. Graduate admissions processes play a critical role in determining not only who is allowed to begin graduate studies but they can also influence the potential applicants – students who feel they have little or no chance of being accepted to graduate programs may be less likely to make the attempt, which involves a significant effort, time commitment, and cost (application and GRE fees).

In 2013, in parallel with the APS Bridge Program's efforts to establish its new Bridge Sites, we conducted a national survey of graduate admissions directors (and related faculty) of all departments granting doctorates

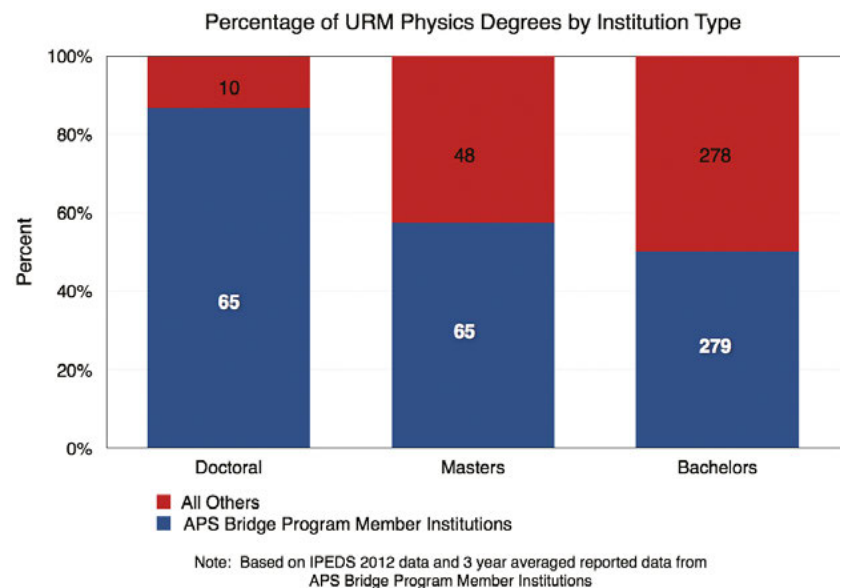
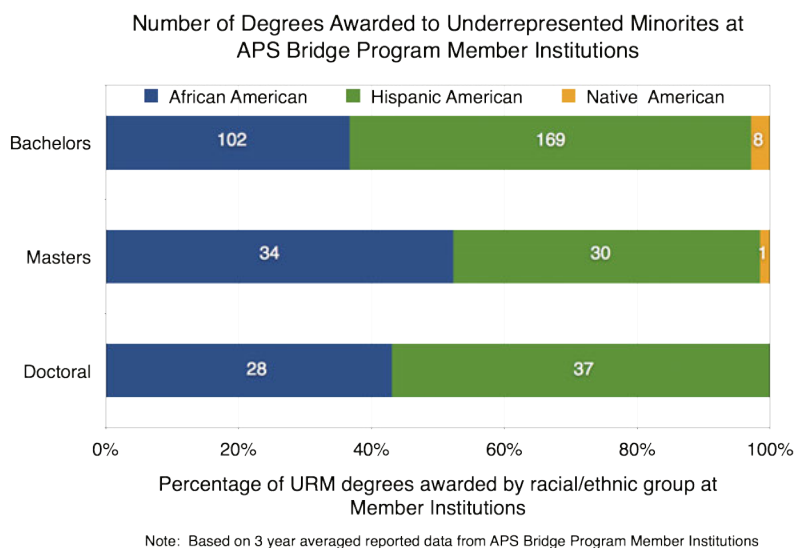
in the United States (approximately 185 departments have active PhD programs in any given year). The focus of the survey was on doctoral admissions practices, including the importance of a wide variety of student criteria in determining admission (each on a scale from "Least important" to "Most important"), how student representation considerations are incorporated into admissions decisions (if at all), and the various recruiting and processing mechanisms through which graduate applicants flow. Between August and November 2013, we received responses from more than 75% of the departments we solicited, which included a few schools that did not fit our criteria (e.g. having an active doctoral pro-

gram in the U.S.). Specifically, we received survey data from 170 individuals from 153 different institutions.

Analyzing the responses which report the importance of 21 different student criteria to admissions decisions, several important findings make themselves clear. On average, the most important factors, in descending order, are: "GPA/grades – physics/math", "Quality of letters of recommendation", and, in a virtual tie, "Undergraduate courses taken" and "GRE physics subject scores". Viewed through the lens of diversity, this is troubling, if not surprising. As Casey Miller has emphasized with great effectiveness ("The Back Page: Admissions Criteria and Diversity in Graduate School", APS News,

SURVEY CONTINUED ON PAGE 4

APS Bridge Program By the Numbers



A LARGE FRACTION OF UNDERREPRESENTED MINORITY PHYSICS DEGREES ARE GRANTED FROM APS BRIDGE PROGRAM MEMBER INSTITUTIONS. NEARLY ALL (87%) URM PHYSICS PhDs ARE GRANTED BY MEMBER INSTITUTIONS.

CONFERENCE CONTINUED FROM PAGE 1

ment." Meketon discussed self-control, "true grit," motivation and other psychological factors relevant to student success in physics and elsewhere.

Several panel sessions featured representatives from both master's- and PhD-granting institutions who provided varying perspectives on the role the master's degree plays in improving diversity in physics. A student panel featured physicists who followed various career and educational paths after earning their master's degrees, providing insights, advice, and reflections on what the degree enabled them to accomplish.

Parallel workshops on mentoring for students and faculty in attendance were well received by participants. Faculty participated in a brief intro-

duction to the ten-week Physics Research Mentor Training Seminar, led by Renee Michelle Goertzen, APS Education Programs Manager. The full seminar is designed to provide training to physics faculty who are in mentorship roles. Brian Beckford, APS Bridge Program Manager, and Arlene Modeste Knowles, APS Career and Diversity Administrator, facilitated the student version of this workshop to help students identify goals and expectations for the mentor-mentee relationship.

The Conference also featured speakers who discussed GRE boot-camps and cultivating relationships with other institutions. The presentations are available online: www.APSBridgeProgram.org.

PARTICIPATING BRIDGE PROGRAM INSTITUTIONS



Students were placed at Bridge and Affiliate sites. Bridge sites receive direct funding from APS. Affiliate Sites provided funding to students recruited by the APS Bridge Program. The project tracks progress of students at all sites.

February 2013), the heavy reliance on the GRE should raise concerns about the number of otherwise-qualified underrepresented students who are losing the opportunity to get PhDs because of assessment bias. Similarly, while it is clear that student undergraduate course-taking is very relevant to considerations of how prepared a student is to succeed in graduate school, many students who receive bachelor's degrees from small programs may not have the opportunity for certain, "canonical" course taking, which will henceforth limit their chances to progress in a physics research career.

At the other end of the scale, the factors rated the least important were, in ascending order, "Proximity/familiarity to department", "GRE written scores", "Prior conference presentations", and "GRE verbal scores". It is notable that two "non-quantitative" components of the GRE appear at the bottom of the list, both of

which may be relevant to producing successful future researchers. As the science enterprise becomes increasingly collaborative, entrepreneurial, and team-based, effective interpersonal and communication skills ever more critical to the professional preparation of physicists.

In a subsequent item, we asked respondents to explain how they took race/ethnicity into consideration in their application decisions (if at all). The open-ended responses were telling: about 1/3 of respondents indicated that it is not taken into account at all, while several others focused exclusively on the availability of diversity fellowships at their institutions. Of the remaining respondents, some indicated that they would be happy to accept underrepresented students to their programs "other things being equal" but lamented the lack of such students who appear in their application pool. These latter responses may be worrying because it

FSK-VANDERBILT CONTINUED FROM PAGE 3

uates in Physics, Astronomy and Materials Science, all of them with jobs prior to graduation. We are now on track to produce 3-5 PhDs a year. Fisk is the number one producer of African American earned Master's Degrees. With an 80% retention rate to the PhD and a 97% overall retention rate, the FVBP is contributing significantly to the diversity of the STEM workforce and academe.

Please provide a description of how the program typically runs for the typical bridge student.

Students begin with a two-week boot camp, which includes math and programming courses, considerable time for interaction as a cohort, and our Research Celebration Day, which introduces them to the various research being done in the program, the more senior students and other Bridge faculty. Once classes start we work on connecting them with Vanderbilt. The first year is strongly centered on coursework and research and the summer is spent truly delving into their Master's research project. In the Fall of their second year, they give a short presentation to the Director of Graduate Studies for the program to which they are applying. In the Spring, we find out if they are

attending Vanderbilt or another institution and make plans for finalizing the Master's phase. Students typically complete the Master's sometime in the summer and make the transition to PhD. The students are funded with grants for the Master's phase and the institution funds the first year of PhD work if students choose to continue at Vanderbilt. The MA-PhD transition however, is not the end of our program. We continue to actively mentor, advise, promote and professionally develop our students through the completion of their PhD and beyond.

What would you describe as the program's greatest accomplishment?

Commencement is a special time for the Bridge Program because nothing compares to the moment when one of our students comes on the stage for a PhD hooding. The success of our students and that we have developed a nationally recognized model of increasing minority representation in STEM are the Fisk-Vanderbilt Bridge Program's greatest accomplishments.

For more information on the Fisk-Vanderbilt program, visit www.vanderbilt.edu/gradschool/bridge/ or contact Dina Stroud at dina.m.stroud@vanderbilt.edu.

suggests a lack of recruitment efforts on the part of graduate departments; after all, the fraction of underrepresented students who complete bachelor's degrees in physics is much higher than the fraction of such students who go to graduate school, so there is a potential opportunity to recruit those who fail to persist.

The findings of the graduate admissions survey provide an important opportunity for the physics community to "know itself" – many of the details of graduate physics programs and practices have never been assessed at a national scale, nor have they been developed from a coherent, explicit design principle. By understanding which admissions practices are typical as well as which are associated to successfully improving diversity, we can bring effective change to graduate programs, which will have many long-term impacts on our community as a new, more diverse body of physics PhDs moves into research careers.

NEW SITES CONTINUED FROM PAGE 1

for transitioning students into doctoral programs. Through the Bridge Program, CSULB admits students as Bridge Fellows into its master's program, where they receive mentoring, take courses, engage in research, and receive application coaching in order to apply to doctoral programs. Andreas Bill, site leader at CSULB, said, "To become an APS Bridge Site is a great opportunity to reach out to underrepresented minorities in physics in the diverse urban environment."

FSU enrolled two URM students into the Bridge Program, and will ultimately bridge them to a PhD program at FSU or elsewhere. Bridge Fellows begin the program as research interns at the National High Magnetic Field Laboratory in Tallahassee in the summer prior to enrollment. In the first academic year, students take advanced undergraduate courses before enrolling in and core graduate courses. After a second summer of research, students pursue graduate courses and MS thesis credit, qualifying for a thesis-based MS degree by the end of their second year. Students receive full stipend and tuition support, and do not have teaching assistant responsibilities until year two.

advising recommendations by bridge programs when students are seeking a supportive graduate program.

To apply to become a Partnership Institution, visit the Bridge Program website, APSBridgeProgram.org and complete the information requested. A short proposal is required that includes a program description along with demographic and contact information. The APS Committee on Minorities will review proposals on a rolling basis with quarterly deadlines. Deadlines for 2015 are March 2, June 1, September 1, December 1.

Save the Date

The APS Bridge Program Annual Meeting will be held October 10-11, 2015 at Florida International University in Miami, FL. The meeting theme is mentoring, and will be held in conjunction with the first meeting of the APS National Mentoring Community.

More information will be available at

www.APSBridgeProgram.org

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 20, 2015

JOIN AS A MEMBER INSTITUTION

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?
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