Spelman College
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Atlanta, GA

The APS Bridge Program

Erika Brown
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Departmental Programs

• PhysTEC
• APS Bridge Program
• Conferences for Undergraduate Women in Physics (CUWiP)
• National Mentoring Community
• Best Practices in Undergraduate Physics Programs

• New Faculty Workshops
• Physics chairs meeting
• REU site leaders
• Professional skills development workshops
• Graduate education conference

• Advocating for physics education
• Childcare at meetings
• Mentoring seminar materials
• Ethics case studies
APS Conferences for Undergraduate Women in Physics (CUWiP)

- Focus on professional development, networking, understanding pathways
- Attendance more than tripled since APS became involved in 2012
- Very good URM attendance
- Departments using CUWiP as retention event for 1st year students
- Support from NSF, DOE
- 11 sites for 2018, plus 1 in Canada
- Directed research efforts to improve messaging to women sees positive changes
- National leadership group; Current chair: Pearl Sandick, Utah; Overseen by CSWP

www.aps.org/cuwig
Bachelor's Degrees in Physics

- Hispanic
- African American

URM Bachelor Degrees

Enhancing Diversity in Graduate Education
Underrepresented Minority (URM) Physics degrees

Sources: IPEDS Completion survey by race, US Census

Only ~30 students!

66 PhDs on average

Degrees Earned by URMs [%]
Bachelor and PhD STEM Degrees

<table>
<thead>
<tr>
<th>Field</th>
<th>BS</th>
<th>PhD</th>
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<tbody>
<tr>
<td>Computer Science</td>
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<td>Physics</td>
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<tr>
<td>Astronomy</td>
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8.2 JOINT DIVERSITY STATEMENT
(Adopted by Council on November 16, 2008)

To ensure a productive future for science and technology in the United States, we must make physics more inclusive. The health of physics requires talent from the broadest demographic pool. Underrepresented groups constitute a largely untapped intellectual resource and a growing segment of the U.S. population.

Therefore, we charge our membership with increasing the numbers of underrepresented minorities in physics in the pipeline and in all professional ranks, with becoming aware of barriers to implementing this change, and with taking an active role in organizational and institutional efforts to bring about such change. We call upon legislators, administrators, and managers at all levels to enact policies and promote budgets that will foster greater diversity in physics. We call upon employers to pursue recruitment, retention, and promotion of underrepresented minority physicists at all ranks and to create a work environment that encourages inclusion. We call upon the physics community as a whole to work collectively to bring greater diversity wherever physicists are educated or employed.
Bridge Program Design: Underlying Themes

• Focus on underrepresented minorities (Hispanic American, African American, Native American)
• Base components on published scholarship and operational successes of similar programs
• Design program to avoid “rearranging the deck chairs”
• Bring unique position of APS to bear on the problem
• Measurable outcomes must be immediately recognizable by an APS member as having significant value
• Must have significant national impact
APS Bridge Program: Key Features

- **Recruit** students through graduate programs (unaccepted), undergrad programs (promising but uncompetitive, or unsure)
- **Establish** Bridge Sites (6):
  - Year 1: Advanced undergraduate or grad courses, introduction to grad-level research, active mentoring, progress monitoring, social integration into grad school (Project funds)
  - Year 2: Take 1st year grad courses, apply to PhD program, research underway (Department funds)
- **Place** additional students at Partnership Institutions (26):
  - 45 graduate programs looked at “other” applications (2017), recruited additional students; No direct support, some travel
  - “COM approved” Partnership Institutions; national recognition of program
- **Monitor** student/site progress
- **Research**
- **Disseminate / Advocate**
Leadership / Oversight

**National Advisory Committee**
- Emilio Codecido (OSU, Grad student)
- J.D. Garcia (Arizona)
- Yolanda George (AAAS)
- Wendell Hill (UMCP)
- Renee Horton (NSBP)
- Anthony Johnson (Chair, UMBC)
- Ramon Lopez (UT Arlington)
- James Mathis (UM, Grad student)
- Steve McGuire (Southern University)
- Jesús Pando (NSHP)
- Ritchie Patterson (Cornell)

**Architect’s Council**
- Marcel Agüeros (Columbia)
- Ed Bertschinger (MIT)
- Andreas Bill (CSU Long Beach)
- Simon Capstick (Florida State)
- Kelly Holley-Bockelmann (Fisk/Vanderbilt)
- Cagliyan Kurdak (Michigan)
- Garrett Matthews (USF)
- Jon Pelz (Ohio State)
- Talat Rahman (UCF)
- Jon Urheim (Indiana)

**Funding**
- NSF
- APS
- Bridge sites

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Student Eligibility

• App: **Opens December 1, 2017 and Closes: March 16, 2018**

• In order to eligible to apply to the Bridge Program, students must:
  
  • Have a bachelor’s degree in physics or a closely related discipline
  • Be a U.S. citizen or permanent resident (or be part of DACA)
  • Satisfy one or more of the following criteria in the current academic year:
    • Did not apply to a physics graduate program; or
    • Applied to one or more physics graduate program, **but not accepted by any program.**
  
  • Be committed to improving diversity in physics
  • Meet an additional requirements that individual bridge sites may have, including minimum GPA.
Bridge/Partnership Programs in Physics

**APS Sites:**
- Cal State Long Beach*
- Florida State University
- Indiana University
- Ohio State University
- University of Central Florida
- University of South Florida

**Non-APS Sites:**
- Bowling Green State University*
- Cal State Los Angeles*
- Columbia University
- Delaware State University
- DePaul University*
- Embry-Riddle Aeronautical University
- Fisk-Vanderbilt
- Florida International University
- Illinois Institute of Technology
- MIT
- North Dakota State University
- Princeton University
- Texas State University*
- University of Chicago
- University of Cincinnati
- University of Connecticut
- University of Hawai‘i at Manoa
- University of Houston, Clear Lake*
- University of Michigan
- University of N. Carolina, Chapel Hill
- University of Rochester
- University of Texas, Arlington
- University of Texas, San Antonio
- University of Virginia

*Master’s degree is highest awarded

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Institutional Members

Member Institutions
- 125 in 38 states

Partnership Institutions
- 32 in 18 states
- 24 PhD
- 8 MS
Bridge Sites and Partnership Institutions

- Admission decisions ("holistic" criteria)
- Financial support (timing)
- Coursework (induction advising critical, allow advanced undergrad courses, alternative plan)
- Progress monitoring (timing, tutors if needed)
- Multiple mentors (intervention, peer involvement)
- Research (appropriate match)
Bridge Program Achievements

Bridge Program Physics PhDs

- 23% Women (20%)
- 93% URM (6%)
  - 64% Hispanic
  - 24% African American
  - 5% Native
- 88% Retention (60%)
Where did the 48 students go (2017)?

- Bowling Green State University
- CSU Long Beach (2)
- CSU Los Angeles (5)
- Delaware State University (2)
- DePaul University
- Fisk-Vanderbilt University (3)
- Florida State University (6)
- Indiana University (2)
- Ohio State University (3)
- Texas A&M University, Commerce
- Texas State University
- University of Central Florida (5)
- University of Cincinnati (3)
- University of Connecticut
- University of Houston, Clear Lake (3)
- University of Kansas (2)
- University of Massachusetts Dartmouth
- University of Minnesota Duluth
- University of North Carolina, Chapel Hill
- University of Rochester
- University of South Florida (2)
- University of Virginia
Some reasons students are not admitted

Students:
• Low physics GRE score
• Apply to too few or wrong places
• “Feel” unprepared (self-esteem)
• Inadequate preparation: will fail in grad courses
• Application materials do not tell a predictive story
• Life intervenes

Admissions Committees:
• Members overwhelmed
• Members unaware of admissions research findings
Traditional Admissions Parameters Limit Access of Women, Racial Minorities, and US Citizens to US Physics PhD Programs but fail to Predict Doctoral Completion

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(Dated: March 1, 2017)

Admissions data for students entering a wide variety of physics PhD programs during 2000-2010 was collected and analyzed with respect to their ability to predict PhD completion. The data set corresponds to about 20% of students admitted to PhD programs in those years. Logistic regression analysis was conducted to determine the extent to which admission requirements, such as undergraduate grade point average and standardized tests, are predictive of PhD completion. Undergraduate GPA was the only statistically significant model, though that was limited to only males at programs with NRC rank of 20 or above; it’s practical significance is limited, though, because finishers and non-finishers have very similar GPA distributions. Notably, none of the Graduate Records Examination (GRE) tests was predictive in any combination of PhD completion. This is particularly relevant because the GRE Physics Subject test is a prominent tool used to admit students to PhD programs. Together with these results and the well documented and strong GRE score differences based on the race, gender, and citizenship of the test taker, the use of the GRE exams in physics admissions should end.
Next Steps…

• Replicate process in chemistry, math, astronomy, geosciences
• Mentoring / tracking students into careers / postdoc positions
• Broader implementation of advances made by Bridge Program (admissions, induction, 1st year support, peer and faculty mentoring)
• Spawning related research efforts in graduate education
• Interface with APS National Mentoring Community (www.aps.org/nmc)
  • New fund for emergency aid to NMC undergrads (BEAM: Bringing Emergency Aid to Mentees)
• Planning joint Bridge Program / National Mentoring Community Meeting: Fall 2018
Thanks!

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Website: Apsbridgeprogram.org

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Hispanic American Bachelor Degrees

US Population Fraction 18-24 year olds

Sources: IPEDS Completion survey by race, US Census

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African American Bachelor Degrees

US Population Fraction 18-24 year olds

Sources: IPEDS Completion survey by race, US Census

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Percentage of Women in Physics

Source: IPEDS
What we didn’t know...

1. Aggregating applications is a powerful tool
2. Admissions data are not what they seem
   a. GRE is a big factor
   b. Students’ perceptions are different than faculty
3. Applications are expensive
4. Importance of graduate student groups