Programs to Broaden Participation: Connecting your work to Successful DMR-Supported Efforts

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Percentage of Women Earning Undergraduate STEM Degrees

Source: National Center for Education Statistics and APS
Percentage of Women Earning Graduate STEM Degrees
US Population

- White (Non-Hispanic)
- Hispanic (of any race)
- Black
- Native Americans
- Asian

Source: US Census

Enhancing Diversity in Graduate Education
Hispanic American Bachelor Degrees

US Population Fraction 18-24 year olds

Sources: IPEDS Completion survey by race, US Census

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URM Bachelor Degrees

Hispanic

African American

0% 1% 2% 3% 4% 5% 6% 7% 8% 9%

Underrepresentation in Physics

- School age population
- Physics undergraduate degrees
- Physics doctoral degrees

Source: IPEDS, US Census

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Bachelor and PhD STEM Degrees

Percentage of URM

Source: IPEDS, US Census

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High school classes taught by teacher with degree in the field

Source: Schools and Staffing Survey
High School Students Studying Physics

Source: AIP Statistical Research Center
Addressing Broader Impacts

**What can you do?**

- Work with others: Tap existing resources (education or outreach that is already in place in your department or campus, or nationally)
- Work with existing programs when possible
- Treat Broader Impacts like you treat research
  - Assess results (or find people who can help you with this)
  - Gather data that will impact your future offerings, and modify your subsequent approach to reflect this
  - Ask questions that **can** be answered
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
- Site applications due 1 November for 2019 conferences
APS Conferences for Undergraduate Women in Physics (CUWiP)

2018 SITES

- Oregon
- Iowa State
- Toledo
- RIT
- Pomona/Harvey Mudd
- Arizona State
- Kansas
- North Florida
- Virginia
- George Washington
- Columbia/Barnard
- Queens (Canada)

2018 Conferences: 12-14 January 2018

aps.org/cuwip
APS Bridge Program: Project Goals

• Increase, within a decade, the number of physics PhDs awarded to underrepresented minority students to match the fraction of physics Bachelor’s degrees granted to these groups
• Develop, evaluate, and document sustainable model bridging experiences that improve the access to and culture of graduate education for all students, with emphasis on those underrepresented in doctoral programs in physics
• Promote and disseminate successful program components to the physics community
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
• **Applications:** APS recruits URM students from all 760 undergrad programs, doctoral programs unable to accept specific students – 80-90 applicants in both 2016, and 2017; no students accepted into graduate programs

• **Bridge Sites:** Built 2-year (MS) programs to allow students to take UG coursework if needed, receive intensive mentoring, close monitoring of progress, attention to integration into graduate life. Most students (2/3rds) take all grad courses

• **Partnership Institutions:** Now 24 additional programs adopting “bridge” components; “certified” by APS Committee on Minorities; get access to pool of URM students;

• **National Conference:** annual conference to share ideas on recruitment, admissions, induction, and retention of URM and other at-risk students (Next conference: October 2018)

• **APS Oversight:** monitors progress of all students; conducts research; national advocacy on issues
Bridge Sites and Partnership Institutions

• Admission decisions (criteria, process)
• Financial support (timing, amount)
• Coursework (induction advising critical, allow advanced undergrad coursework)
• Multiple Mentoring (timing, intervention)
• Progress monitoring (coursework, tutors if needed, research “fit”)
• Community (induction, socialization)
• Research (appropriate match)
Institution Involvement

• **Member Institution** (any institution, 118)
  Free; receive information / updates; reduced fees for APS-BP conferences

• **Partnership Site** (graduate only, 29)
  APS COM approval process; recommended site for Bridge Fellows (and others) to attend; demonstrate effective practices in graduate student support

• **Bridge Site** (graduate only, 6)
  Receive significant funding from APS; build sustainable program; prepare 2+ students each year for graduate study; significant institutional commitment

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**APS Bridge Partnership Sites**

- Bowling Green State University
- California State University Long Beach
- California State University, Los Angeles
- Columbia University
- Delaware State University
- DePaul University
- Embry-Riddle Aeronautical University
- Fisk-Vanderbilt
- Florida International University
- Florida State University
- Illinois Institute of Technology
- Indiana University
- MIT
- North Dakota State University
- Princeton University
- Texas State University
- The Ohio State University
- University of Central Florida
- 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 North Carolina at Chapel Hill
- University of Rochester
- University of South Florida
- University of Texas at Arlington
- University of Virginia

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Institutional Members

**Member Institutions**
- 118 in 38 states

**Partnership Institutions**
- 29 in 17 states
- 23 PhD
- 6 MS
Bridge Program Achievements

Bridge Program Physics PhDs

- 23% Women (20%)
- 93% URM (6%)
  - 64% Hispanic
  - 24% African American
  - 5% Native
- 88% Retention (60%)

National Achievement Gap

Students

- 2013
- 2014
- 2015
- 2016
- 2017

- Left Program
- Placed/Retained
- Project Funding

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Physics GRE: Impact of Cutoff Scores

Source: ETS
PhysTEC Project Outcomes

![Bar chart showing number of teachers across different sites and funding periods.](chart.png)

*Number of physics certifications averaged over 319 institutions in 15 states. Note that all PhysTEC teachers are more highly qualified than the minimum standard in most states.*
What can you do?

• Don’t work alone
• Tap existing resources
• Treat Broader Impacts like you treat research
• APS, ACS and other professional societies have resources to help (often we can connect you with projects and assessment)
• Make it meaningful
  • To you; to them
Addressing Broader Impacts

What do you need to know?

• Stereotype threat (reducingstereotypethreat.org)
• Implicit Bias (implicit.harvard.edu)
• Imposter Syndrome
• Harassment (www.aps.org/meetings/policies/code-conduct.cfm)
Thanks!

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