Critical Issues Facing the Physics Community: Building Programs, Engaging Students

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Critical Issues

Greater demand for science educated students

• United States: 4 jobs for each Science/Math-ready person, but 2 non-S/M people for each non-S/M job

Want to improve equality in physics

• United States: ~20% of Physics majors are women (x2.5 below population), representation by underrepresented minorities in physics is ~10% (x3.5 below population)

We want students to learn physics (not just pass tests)
Physics / STEM Bachelor Degrees

Source: IPEDS Completion Survey
Fraction of Women Earning STEM Degrees

- Biology
- Chemistry
- Math & Stats
- Earth Sciences
- Physics
- Engineering

Year:
- 1965
- 1970
- 1975
- 1980
- 1985
- 1990
- 1995
- 2000
- 2005
- 2010

Fraction:
- 0.0
- 0.1
- 0.2
- 0.3
- 0.4
- 0.5
- 0.6
- 0.7
Percentage of Women in Physics

Source: IPEDS, AIP SRC
African American Undergraduate Majors

US College-Age African American Population

- Biology
- Chemistry
- Engineering
- Math & Stats
- Physics
- Earth Sciences

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<th>Year</th>
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<th>Engineering</th>
<th>Math &amp; Stats</th>
<th>Physics</th>
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Hispanic Undergraduate Majors

US College-Age Hispanic Population

- Engineering
- Biology
- Chemistry
- Math & Stats
- Earth Science
- Physics


- 105
- 273
URM Physics PhDs to Minority Population

US College-age minority population

9-10% of BS degrees in physics are granted to underrepresented minorities

52 PhDs awarded to minorities in 2010

Sources: IPEDS Completion survey by race, US Census

www.APSBridgeProgram.org  ©2014, American Physical Society; Email: hodapp@aps.org
08.2 JOINT DIVERSITY STATEMENT
(Adopted by APS, NSBP, NSHP in 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.
Physics Degrees Awarded to Underrepresented Minorities

Source: IPEDS, US Census
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
APS Bridge Program: Key Components

- Recruiting through graduate programs across the US (now 115+ institutions, representing 73% of all doctoral students)
- Spend 1-2 years in a “Bridging program”
  - Take advanced UG or entry-level graduate coursework
  - Graduate-level research
  - Demonstrate ability to do independent research and succeed in graduate-level coursework
  - Receive coaching on preparing graduate admissions package (letters, GRE, statements)
  - Accepted into doctoral program
- Receive mentoring in doctoral program (especially in first years)
- Research into barriers; disseminate successful program elements
- Build a national coalition of departments committed to improving participation
Bridge Programs in Physics

- Fisk / Vanderbilt
- Columbia University
- University of Michigan
- MIT

APS Sites (will add 3 more):
- Ohio State
- South Florida
Bridge Sites

- Recruitment (APS, and institution)
- Admission decisions (criteria, process)
- Financial support (timing, amount)
- Multiple Mentoring (timing, intervention)
- Progress monitoring (coursework, tutors if needed, research “fit”)
- Coursework (induction advising critical)
- Community (induction, socialization)
- Research (appropriate match)
- Application coaching (GRE, statements, schools)
Student Eligibility

• Bachelor’s degree in physics or closely related discipline
• US citizen or permanent resident
• Either:
  • Did not apply to graduate program this year
  • Applied but was not accepted
• Be committed to improving diversity in physics
• Meet individual requirements of the institution

Students may not be currently enrolled or have an existing physics graduate degree
Getting Involved

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

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

• **Bridge Site** (MS or PhD granting)
  Receive significant funding from APS; build sustainable program; prepare 2+ students each year for graduate study; significant institutional commitment
Project Progress

- **Bridge Site Selection**
  - Selected two sites in 2013
  - Currently considering 7 proposals
  - 1-2 additional sites will be awarded (March)

- **Student Recruitment**
  - 50 applicants in 2013
  - Application process open for 2014 (70 start, estimate 35 complete)
  - Most (~75% of grad programs) recruiting for this
  - Many undergraduate programs also helping

- **Summer Meeting (25-27 June 2014)**

- **Admissions Study**
  - Doctoral data in
  - Gathering Masters data
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.
GRE Physics Scores: Impact of Cutoff Scores

Source: ETS

- Fraction (M): 0.46
- Fraction (F): 0.25

Score: 650
Physics GRE: Impact of Cutoff Scores

- Fraction (White)
- Fraction (Hispanic)
- Fraction (Black)
- Fraction (Asian)

- 0.09 (Black)
- 0.34 (Hispanic)
- 0.44 (White)
- 0.61 (Asian)

Graph showing the fraction of different ethnic groups as a function of test scores.
Thanks for your attention
Questions? Comments?

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