Increasing participation of underrepresented minorities:
Building effective “bridge” programs

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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.
Quiz

Which group is more underrepresented in physics

a) African Americans
b) Hispanic Americans
c) Native Americans
d) Pacific Islanders
e) Women
Undergraduate Physics Major by percentage of population

- Asian
- White, non-Hispanic
- Native American
- Hispanic
- Black, non-Hispanic
- Women

Data points:
- 1995: 105, 13, 675, 172, 0
- 2000: 149, 1198, 274, 149, 0
- 2005: 214, 3998, 351, 39, 0
- 2010: 3004, 3998, 351, 39, 0
US Demographics

Source: US Census
African American Physics Majors

Percentage of College-Age Black, Non-Hispanics in US Population

Source: IPEDS, US Census
Hispanic Undergraduate Majors

US College-Age Hispanic Population

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

1995 2000 2005 2010

0% 5% 10% 15% 20%

105 273

www.APSBridgeProgram.org

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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
Leadership / Oversight

National Advisory Committee
- J.D. Garcia (Arizona)
- Yolanda George (AAAS)
- Wendell Hill (UMCP)
- Anthony Johnson (UMBC)
- Ramon Lopez (UT Arlington)
- Steve McGuire (Southern University)
- Cherry Murray, chair (Harvard, APS President 2009)
- Luz Martinez-Miranda (President, NSHP)
- Paul Gueye (President, NSBP)
- Bernadette Cogswell (Grad Student)
- Ximena Fernández (Grad Student)

Architect’s Council
- Marcel Agüeros (Columbia)
- Ed Bertschinger (MIT)
- Andreas Bill (CSU Long Beach)
- Simon Capstick (Florida State)
- Cagliyan Kurdak (Michigan)
- Casey Miller (USF)
- Jon Pelz (Ohio State)
- Keivan Stassun (Fisk/Vanderbilt)

Project Leadership
- Brian Beckford (APS, Project Mgr.)
- Theodore Hodapp (APS, Project Dir.)
- Bushraa Khatib (APS, Project Coord.)
- Arlene Modeste Knowles (APS)
- Geoff Potvin (FIU-Research advisor)
- Monica Plisch (APS)
- Rachel Scherr (SPU-Project evaluator)
• Recruiting through graduate programs across the US (now 115+ institutions, representing 73% of all doctoral students)

• **Bridge Sites:**
  • Year 1: Advanced undergraduate courses, introduction to grad-level research, active mentoring, progress monitoring, social integration into grad school (APS funds)
  • Year 2: Take 1st year grad courses, apply to PhD program, research underway (Department funds)

• **Ancillary Students (Partnership Institutions):**
  • 69 graduate programs look at “other” applications, expect additional 10+ offers to these students (2014)
  • Become APS “COM approved” Partnership Institutions; national recognition of program
  • No direct support for students, some travel support possible

• APS monitors progress of all students
Bridge Sites and Partnership Institutions

- Admission decisions (criteria, process)
- Financial support (timing, amount)
- Coursework (induction advising critical)
- Multiple Mentoring (timing, intervention)
- Progress monitoring (coursework, tutors if needed, research “fit”)
- Community (induction, socialization)
- Research (appropriate match)
Bridge Programs in Physics

Existing Sites:
- Fisk / Vanderbilt
- Columbia University
- MIT
- University of Michigan

APS Sites:
- Cal State Long Beach
- Florida State
- Ohio State
- South Florida

APS will add 2 more in AY2014
Project Progress

• Bridge Site Selection
  • Selected two sites in 2013; two sites in 2014
  • 2 additional sites will be awarded in 2015

• Student Recruitment
  • 73% of grad programs recruiting for the program
  • Many undergraduate programs also helping
  • 29 applicants in 2013 (18% female, 93% URM)
  • 44 applicants in 2014 (29% female, 93% URM)

• Summer Meeting (25-27 June 2014)

• Admissions Study
  • Doctoral data being analyzed
  • Masters data just in

• Physics GRE prep course in development (summer 2014)
Admissions Decisions

- Each bridge site uses their own criteria (APS only checks for eligibility)
- We only support students from our pool (insures we increase the number of URM students)
- Physics GRE not used
- Increasing use of “non-cognitive” assessments (explored through Skype or in-person interviews)
  - Self-concept
  - Realistic self-appraisal
  - Long-range goals

Significant interest in “non-cognitive” measures
~30 “solves” the national problem
• White papers on graduate admissions practices (looking to promote transparency in graduate admissions)
  • 89% response rate from doctoral institutions
  • 75% response rate from Master’s institutions
• Paper on using cutoff scores from the physics GRE to reduce admissions pool
• Understanding modes of failure in graduate school – differentiated by race/ethnicity
• Developing practical tools to bring non-cognitive variables into graduate admissions
• Student interpretation of admissions process
Physics GRE: Impact of Cutoff Scores

- Fraction (White): 0.44 (White)
- Fraction (Hispanic): 0.34 (Hispanic)
- Fraction (Black): 0.09 (Black)
- Fraction (Asian): 0.61 (Asian)
GRE Physics Scores: Impact of Cutoff Scores

Source: ETS

- 0.25 (F)
- 0.46 (M)
- 650
Admissions Bias?

Source: PhD Recipients from Oregon State University
Getting Involved

• **Member Institution** (any institution)
  Free; receive information / updates; reduced fees for APS-BP conferences (69 institutions)

• **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

www.APSBridgeProgram.org
Selected Project Findings

- Students either don’t apply or apply to too few places to be successful
- There are departments who are very willing to work with students who lie outside of the standard acceptance criteria
- Sites admit students for 2-year program (APS covers about half of the direct costs)
- Some students offered direct admission to PhD program
- Sites plan on admitting students to their own doctoral program
- Students take mostly advanced undergraduate courses in first year
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.