Changing the Face of Physics:
APS Bridge Program, Year 2

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Leadership / Oversight

National Advisory Committee
- J.D. Garcia (Arizona)
- Yolanda George (AAAS)
- Wendell Hill (UMCP)
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- Steve McGuire (Southern University)
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- Luz Martinez-Miranda (President, NSHP)
- Paul Gueye (President, NSBP)
- Bernadette Cogswell (Grad Student)
- Ximena Fernández (Grad Student)

Funding
- NSF (HRD, PHY, DMR)
- APS

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)
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.
African American Science/Math Majors

US College-age African American population

Sources: IPEDS Completion survey by race, US Census
Hispanic Science/Math Majors

US College-age Hispanic population

Sources: IPEDS Completion survey by race, US Census

www.APSBridgeProgram.org
URM Physics degrees to Minority Population

Sources: IPEDS Completion survey by race, US Census

US College-age minority population

- Bachelor's
- Master's
- Doctorate

0% 5% 10% 15% 20% 25% 30% 35%

1995 1997 1999 2001 2003 2005 2007 2009 2011

75
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
• RFP in early September
• Selection by March 2015
• 3-years of funding to build a sustainable bridge program
**APS Bridge Program: Key Features**

- Recruiting through graduate programs (now 115+ institutions, representing 73% of all doctoral students), undergrad programs

**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)
Project Progress

- Bridge Site Selection
  - Selected two sites in 2013; two sites in 2014
  - 2 additional sites will be awarded in 2015 (RFP in September)
- 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)
- Admissions Study
  - Doctoral data being analyzed
  - Masters data now in
- Physics GRE prep course (begins 1 July)
Admissions Decisions

- Each bridge site uses their own criteria
- Physics GRE not used
- APS provides support for students who meet our criteria – insures we increase the number of URM students
- Increasing use of “non-cognitive” assessments – explored through Skype or in-person interviews
  - Self-concept
  - Realistic self-appraisal
  - Long-range goals
• White papers on graduate admissions practices to promote transparency
  • 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 / predictive effectiveness of other measures
• 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

[Graph showing the impact of cutoff scores on different demographics.]

- White: 0.44 (at 700)
- Hispanic: 0.34 (at 650)
- Black: 0.09 (at 500)
- Asian: 0.61 (at 700)
Selected Project Findings

• Students either don’t apply or apply to too few places to be successful – many students offered direct admission to PhD program
• 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)
• Bridge sites plan on admitting students to their own doctoral program
• Students take mostly advanced undergraduate courses in first year; matching students with appropriate first courses is critical
Bridge Program Achievements

~30 “solves” the national problem
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
Concerns

• Can we attract enough African Americans to the program?
• Will students be perceived as having the same level of quality?
• How will bridge students be treated by their peers?
• How will this be sustained at bridge sites, post funding?
Next Steps

• Establish APS “COM Certified” Partnership Institutions
• Accept MS students into (separate, non-funded) applicant pool (יוןיטה)
• Add two more bridge sites
• Research questions
• Building a better pipeline

National Mentoring Community
National Mentoring Community (NMC)

Plans (currently under discussion):

- Increase URM degree completion in physics
- APS identifies / connects mentors
- Mentors recruit mentees (locally)
- Provide an annual gathering of mentors and mentees to:
  - Spread best-practices; conduct professional skills workshops; connect students and their mentors with others
- Provide merit-based honors
- Needs-based scholarship program
- Track student progress
- Math Alliance has developed a network of 350+ mentors providing local mentoring to 600+ undergraduates
Future of Physics at HBCUs

Sources: IPEDS Completion survey by race