APS Executive Board Meeting

3 April 2014
Savannah, GA

APS Efforts to Improve Diversity in Physics

Theodore Hodapp
American Physical Society
Director of Education and Diversity
GOAL TWO: To Better Serve the Physics Community

Objective 3: Education and Diversity: Be a leading voice in physics education and diversity programs, creating and partnering in models that can be replicated by other scientific societies.

- Serve physics departments by providing access to knowledge regarding best practices for teaching and learning physics, and for ensuring strong undergraduate and graduate degree programs.

- Coordinate and lead an innovative program to increase the number of underrepresented minorities obtaining a PhD in physics.
Leverage action

- External funding
- Empower partners

Use our unique position

- Using APS “Brand” and stature
- Work in areas we can impact

Meet significant needs

- Critical issues in the physics community

Assess impact

- Meet established metrics
<table>
<thead>
<tr>
<th>Year</th>
<th>2004</th>
<th>2014</th>
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<tbody>
<tr>
<td>Staff</td>
<td>5 + 1</td>
<td>5 + 4</td>
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<tr>
<td>Overhead</td>
<td>$60,000</td>
<td>$250,000</td>
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<td>Projects</td>
<td>PhysTEC</td>
<td>PhysTEC</td>
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- **Bridge Program**
- **CUWiP**
- **Education Conferences**
- **Advocacy**
Grant Funded Projects

- PhysTEC (2001, 2008; $11.5M)
- Bridge Program (2009, 2012; $3.2M)
- Noyce Scholarships (2007; $750k)
- CUWiP (2014; $650k)
- REU Site Directors (2008; $75k)
- Gender Equity Conversations (2008; $200k)
- Education Conferences
  - Graduate Education (2008, 2013; $150k)
  - Building Thriving Programs (2012, 2015)
  - Distance Education (2013)
  - Entrepreneurial Education (2014)

+$17M in external funding
Cooperative Grants
Requested Grants

Cooperative:

• CTEC Planning (2011; with ACS)
• New Faculty Workshop (2002, 2008, 2014 [pending]; with AAPT, AAS)
• ComPADRE (2005, 2009; with AAPT)

Requested:

• REU Site Leaders
• Physics Women of Color
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.
Discussion Topic I – Increasing number of minorities in physics

(Wendell) Hill offered to work with a subcommittee of Cherry Murray, David Ernst, Baha Balantekin and Ted Hodapp to look at items mentioned in this discussion and other suggestions, and return to the Executive Board with specific proposals related to increasing the numbers of minorities in physics.
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
US Demographics

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

Source: US Census
African American Physics Majors

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

Source: IPEDS, US Census

www.APSBridgeProgram.org

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Minorities in Higher Education

- College Age Population: ~1.5M
- All Bachelor Degrees: ~200k
- Physics Bachelor Degrees: ~450
- Physics Doctoral Degrees: ~35
- Physics Faculty: ~12
Physics Degrees Awarded to Underrepresented Minorities

- Bachelor's Degrees: ~400 degrees
- Doctoral Degrees: ~30 more PhDs

Source: IPEDS, US Census
Discussions with NSF Program Officer led to invitation to submit a planning proposal
RESOLUTION: The American Physical Society recognizes the significant disparity in participation by under-represented minorities in physics at all levels, and commits to support the Minority Bridge Program that will establish a set of programs and related efforts to help under-represented minority undergraduates transition to doctoral degree-granting programs and obtain PhD degrees in physics. (Murray/Beise)

ACTION: Passed unanimously
• True or False: The majority of African American Physics majors come from HBCUs
Percentage of African American Physics Majors from HBCUs

Source: IPEDS
Bridge Program
Project Components

- Site selection
- Student recruitment
- Admissions decisions
- Student / Site progress management
- Dissemination of good practice / consciousness raising
- Oversight and management
- Research / Assessment
Site Selection

- Use an NSF-style pre-proposal/full-proposal process; external and internal readers; COM representation
- 2012/13: 24 pre-proposals (7 full)
- 2013/14: 10 pre-proposals (7 full)
- Site visits to top candidates to evaluate leadership, commitment to goals, “depth of bench”, institutional commitment
- 2012/13: Ohio State, South Florida
- 2013/14: Florida State, Cal State Long Beach
- Expect 2 additional sites in 2014/15
Student Recruitment

- Packages sent by doctoral programs to URMs not given admission
  - Participating Departments:
    2013: 106 (62%); 2014: 115 (67%)
    ➢ “Good luck with the program, we are all pulling for you.” – Meg Urry, Yale University
    ➢ “Thanks for coordinating this great program!” – Andrew Gavrin, IUPUI
    ➢ “Thank you for your important work on this issue.” – Andrew Layden, Bowling Green State University

Generating significant good will for the APS
Student Recruitment

- Packets also sent to all other physics departments:
  - BS: 500; MS: 82; PhD: 171
- Total packages sent: 725 (2013), 886 (2014)
- Advertisements (newsletters, publications, websites)
- Applicant pool shared with all physics bridge programs

Results:

2013
- 64 Started application
- 29 Completed
  - ✓ 93% URM
  - ✓ 18% Female
  - ✓ 1.7:1 Hispanic:AA

2014
- 77 Started application
- 41 Completed
  - ✓ 93% URM
  - ✓ 29% Female
  - ✓ 2:1 Hispanic:AA

APS in unique position to do this
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
Admissions Decisions

• 8 students selected in 2013 (7 matriculated)
• 2 additional students recruited (and supported) by our sites
• 12 of the remaining pool of 20 students circulated to 23 departments expressing an interest in recruiting these students
  • 11 of 12 students offered admission (5-doctoral, 6-MS)
    • Auburn University (2)
    • Texas Tech University (3)
    • Cal State Long Beach (1)

• Key APS feature
• ACS now interested in this too
Bridge Program
First Year Achievements

~30 “solves” the national problem
Student/Site Progress

- Site visits to all 4 doctoral sites that accepted students
  - Of 13: 2 students are at risk (faculty feel both students could be successful; personality issues cloud progress)
  - Establishing “Partnership Institution” status to better vet and advise programs that accept students from our pool beyond the bridge sites
  - Each site has developed a “team” to address multiple components of admissions/advising/mentoring/research
- APS Contact with students ~1/month
- Ohio State reports that URMs in their regular applicant pool went up by a factor of 7x!
Dissemination

- Annual conference (65 attendees in 2013, 68 in 2010)
- 42 Member Institutions (19 applications pending)
- 16+ talks by site leaders (OSU/USF) to outside groups
- Visits/talks with numerous physics departments over the past few years
- ACS Education leadership participated in OSU site visit
- Math Alliance leadership helped with site selection
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 (Vanderbilt Grad Student)
• Ximena Fernández (Columbia Grad Student)

Architect’s Council
• Marcel Agüeros (Columbia)
• Ed Bertschinger (MIT)
• Cagliyan Kurdak (Michigan)
• Casey Miller (USF)
• Jon Pelz (Ohio State)
• Keivan Stassun (Fisk/Vanderbilt)

Project Management
• 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)
Research

• 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) starts at 0.44 at 650 and drops to 0.09 at 1000.
- Fraction (Hispanic) starts at 0.34 at 650 and drops to 0.0 at 1000.
- Fraction (Black) starts at 0.61 at 650 and drops to 0.09 at 1000.
- Fraction (Asian) starts at 0.61 at 650 and drops to 0.34 at 1000.
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 Partnership Institutions
• Accept MS students into (separate, non-funded) applicant pool
• Research questions
• Building a better pipeline

National Mentoring Community
• Conducted a small external interview study (November 2013) of APS minority scholarship recipients
  • Prestige of APS
  • Local mentoring relationships
  • Money not a big factor
• Impact is small: money genuinely impacts perhaps 2 students/year
• Math Alliance has developed a network of 350+ mentors providing local mentoring to 600+ undergraduates
  • Goal: increasing the number of URM, 1st generation, female students to complete PhDs in mathematics
National Mentoring Community (NMC)

Plan (currently being discussed by COM):

• Convert resources from existing minority scholarship to national mentoring network
• We identify / connect mentors
• Mentors recruit mentees (locally)
• We 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 (APS recognition)
• Smaller needs-based scholarships
• Tracking student progress
Project Findings

Selected 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 admissions to PhD program (2 of 8 in 2013)
• Sites plan on admitting students to their own doctoral program
• Students take mostly advanced undergraduate courses in first year
Key Takeaways

- Program could actually “solve” the national achievement gap in physics (very rare!)
- ACS already interested in possible replication
- Key math program (Math Alliance) also interested in replication
- APS sits in unique position to advance this solution
- Significant goodwill generated by the program
- Long-term investment by APS lies in student recruiting, best-practice dissemination
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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.

June 25-27, 2014
American Center for Physics
College Park, MD

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