Promoting Diversity in Graduate Education: APS Bridge Program

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Director of Education and Diversity
Hispanic Science/Math Majors

US College-age Hispanic population

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

US College-age African American population

Sources: IPEDS Completion survey by race, US Census
Underrepresentation in Physics

Source: IPEDS, US Census

www.APSBridgeProgram.org
52 PhDs awarded to minorities in 2010

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

US College-age minority population

Sources: IPEDS Completion survey by race, US Census

Only ~30 students!
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
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)
- Brittany Kamai (Grad student)
- James Mathis (Grad student)

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

Architect’s Council
- Marcel Agüeros (Columbia)
- Ed Bertschinger (MIT)
- Andreas Bill (CSU Long Beach)
- Simon Capstick (Florida State)
- Cagliyan Kurdak (Michigan)
- Garrett Matthews (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)
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 1<sup>st</sup> year grad courses, apply to PhD program, research underway (Department funds)

• Ancillary Students (Partnership Institutions):
  • 69 graduate programs look at “other” applications, recruited additional 8 offers to these students (2014)
  • Beginning approval of APS “COM approved” Partnership Institutions; national recognition of program
  • No direct support for students, some travel support possible

• APS monitors progress of all students; conduct research
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)
  Free; receive information / updates; reduced fees for APS-BP conferences (~70 institutions)

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

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

61 Approved
17 Pending

www.APSBridgeProgram.org

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Partnership Institutions

- Accept students into their program (either from APS application pool, or Bridge Fellows)
- “Approved” by APS Committee on Minorities (COM)
- Advertised on APS website
- Get access to applicant pool (eventually this may be limited to Partnership Institutions)
- Follow guidelines of Bridge Programs
- “Recommended” by URM student advisors
Bridge Programs in Physics

Non-APS Sites:
• Columbia University
• Fisk / Vanderbilt
• MIT
• University of Michigan

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

APS adding 2 more in 2015
• RFP in progress
• Selection by March 2015
• 3-years of funding to build a sustainable bridge program
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
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
- 29 Completed
- 93% URM
- 18% Female

2014
- 41 Completed
- 93% URM
- 32% Female

APS in unique position to do this
## Admissions Decisions

<table>
<thead>
<tr>
<th>2013</th>
<th>2014</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>18</td>
<td>Bridge students selected</td>
</tr>
<tr>
<td>23</td>
<td>69</td>
<td>Departments expressing an interest in recruiting these students</td>
</tr>
<tr>
<td>12</td>
<td>23</td>
<td>Remaining applications circulated</td>
</tr>
<tr>
<td>5</td>
<td>9</td>
<td>Additional students recruited by “Affiliated” sites (8 matriculated in 2014)</td>
</tr>
<tr>
<td>13</td>
<td>26</td>
<td>Total number of students entering grad studies</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>Students withdrew – most with offers available</td>
</tr>
</tbody>
</table>

26 students total!

None of whom would have entered graduate studies
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
Bridge Program Achievements

National Achievement Gap

Placed Students

<table>
<thead>
<tr>
<th>Project Year</th>
<th>Project Goal</th>
<th>Project Achievement</th>
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<tbody>
<tr>
<td>2013</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td></td>
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<tr>
<td>2015</td>
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<tr>
<td>2016</td>
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<tr>
<td>2017</td>
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</tbody>
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Site Progress

- Site visits to all 4 doctoral sites that accepted students
  - Each site has developed a “team” to address multiple components of admissions/advising/mentoring/research
    - USF has change in leadership
- APS contact with students ~1/semester
- Ohio State reports that URMs in their regular applicant pool went up substantially
- Interactions continue with all sites
Annual Meeting

• 25–27 June 2014, ACP
• 68 attendees; 43 institutions
• Themes:
  • **Role of Master’s degrees in promoting URM students**
  • Mentoring
  • Non-cognitive variables
  • Building bridge programs
• Next meeting: 10-11 October 2015: **Mentoring for Success**
  • Held in conjunction with 1st meeting of National Mentoring Community (9-10 October)
Research Efforts

• Graduate admissions study
  • Doctoral institutions
  • Master’s institutions
• GRE (and other) admissions data: Correlations with student success; impact on diversity

Considering:
• Holistic admissions practices; practical use of non-cognitive measures for physics graduate admissions faculty
• Data gathering on MS programs
• Departure paths from physics graduate programs
Physics GRE: Impact of Cutoff Scores

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

- 0.09 (Black) at 650
- 0.34 (Hispanic) at 650
- 0.44 (White) at 650
- 0.61 (Asian) at 650
• 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 costs for transitional year)
• Some students offered direct admissions to PhD program (7 of 13 in 2013, 10 of 26 in 2014)
• Sites plan on admitting students to their own doctoral program
• Students take mostly advanced undergraduate courses in first year
Next Steps

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

National Mentoring Community
National Mentoring Community (NMC)

Plans (established 22 November):

- 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 (9-10 October 2015)
- 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
Key Takeaways

• Program could actually “solve” national achievement gap in physics (very rare!); APS in unique position to advance solution
• Significant goodwill generated by the program
• Now recruiting first “Partnership Institutions”
• ACS already interested in possible replication; AMS also showing interest
• Role of MS programs evolving
• Annual meeting evolving
• Long-term investment by APS lies in student recruiting, best-practice dissemination
• National Mentoring Community arising from COM
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