Indiana University

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The APS Bridge Program: Changing the Face of Physics Graduate Education

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8.2 JOINT DIVERSITY STATEMENT
(Adopted by Council on November 16, 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.
Hispanic American Bachelor Degrees

Sources: IPEDS Completion survey by race, US Census
African American Bachelor Degrees

Sources: IPEDS Completion survey by race, US Census
Underrepresented Minority (URM) Physics degrees

Sources: IPEDS Completion survey by race, US Census

US College-age minority population

Degrees Earned by URMs [%]

- Bachelor's
- PhD

Only ~30 students!

66 PhDs on average

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Bachelor and PhD STEM Degrees

Percentage of URM

- Computer Science: BS 22%, PhD 78
- Biological Sciences: BS 18%, PhD 639
- Chemistry: BS 16%, PhD 161
- Engineering: BS 38%, PhD 386
- Mathematics and Statistics: BS 14%, PhD 61
- Physics: BS 16%, PhD 63
- Astronomy: BS 4%, PhD 6

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Leadership / Oversight

National Advisory Committee
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• Yolanda George (AAAS)
• Wendell Hill (UMCP)
• Renee Horton (NSBP)
• Anthony Johnson (Chair, UMBC)
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• James Mathis (UM, Grad student)
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• Garrett Matthews (USF)
• Jon Pelz (Ohio State)
• Talat Rahman (UCF)
• Jon Urheim (Indiana)

Research / Assessment
• Deepa Chari (FIU-Postdoctoral Assoc.)
• Geoff Potvin (FIU-Research advisor)
• Rachel Scherr (SPU-Project evaluator)

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Bridge Program Design: Underlying Themes

- Focus on underrepresented minorities (Hispanic American, African American, Native American)
- Base components on published scholarship and operational successes of similar programs
- Design program to avoid “rearranging the deck chairs”
- Bring unique position of APS to bear on the problem
- Measurable outcomes must be immediately recognizable by an APS member as having significant value
- Must have significant national impact
APS Bridge Program: Key Features

- **Recruit** students through graduate programs (unaccepted), undergrad programs (promising but uncompetitive, or unsure)
- **Establish** Bridge Sites (6):
  - Year 1: Advanced undergraduate or grad courses, introduction to grad-level research, active mentoring, progress monitoring, social integration into grad school *(Project funds)*
  - Year 2: Take 1st year grad courses, apply to PhD program, research underway *(Department funds)*
- **Place** additional students at Partnership Institutions (21):
  - 44 graduate programs looked at “other” applications (2016), recruited additional students; No direct support, some travel
  - “COM approved” Partnership Institutions; national recognition of program
- **Monitor** student/site progress
- **Research**
- **Disseminate / Advocate**
Student Eligibility

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

We review applications AFTER April 15
Bridge/Partnership Programs in Physics

APS Sites:
- Cal State Long Beach*
- Florida State University
- Indiana University
- Ohio State University
- University of Central Florida
- University of South Florida

Non-APS Sites:
- Bowling Green State University*
- Cal State Los Angeles*
- Columbia University
- Delaware State University
- DePaul University*
- Embry-Riddle Aeronautical University
- Fisk-Vanderbilt
- Florida International University
- MIT
- North Dakota State University
- Princeton University
- Texas State University*
- University of Chicago
- University of Cincinnati
- University of Connecticut
- University of Hawai‘i at Manoa
- University of Houston, Clear Lake*
- University of Michigan
- University of N. Carolina, Chapel Hill
- University of Rochester
- University of Texas, Arlington

*Master’s degree is highest awarded
Institutional Members

• Member Institutions
  • 112 in 36 states
• Partnership Institutions
  • 27 in 16 states
Bridge Sites and Partnership Institutions

- Admission decisions ("holistic" criteria)
- Financial support (timing)
- Coursework (induction advising critical, allow advanced undergrad courses, alternative plan)
- Progress monitoring (timing, tutors if needed)
- Multiple mentors (intervention, peer involvement)
- Research (appropriate match)
Bridge Program Achievements

**Bridge Program**

**Physics PhDs**

- 23% Women (20%)
- 93% URM (6%)
  - 64% Hispanic
  - 24% African American
  - 5% Native
- 88% Retention (60%)

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**National Achievement Gap**

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<th>Students</th>
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What we didn’t know…

1. Aggregating applications is a powerful tool
2. Graduate programs very supportive
3. Admissions data are not what they seem (GRE is a big factor)
4. Applications are expensive
5. Importance of graduate student groups
Some reasons students are not admitted

**Students:**
- Low physics GRE score
- Apply to too few or wrong places
- “Feel” unprepared (self-esteem)
- Inadequate preparation: will fail in grad courses
- Application materials do not tell a predictive story
- Life intervenes

**Admissions Committees:**
- Members overwhelmed
- Members unaware of admissions research findings
Research Efforts

- Graduate admissions study
  - Doctoral institutions
  - Master’s institutions
- **GRE (and other) admissions data:** Correlations with student success; impact on diversity
- **Holistic admissions practices:** practical use of non-cognitive measures or other practical techniques for use by physics graduate admissions faculty (parallel effort by CGS)
- Student perspective on admissions
Physics GRE: Impact of Cutoff Scores

[Graph showing the impact of cutoff scores on different ethnic groups, with fractions marked for Black (0.09), Hispanic (0.34), White (0.44), and Asian (0.61).]
Next Steps…

• Partnership Institutions / INCLUDES: Broader implementation of advances made by Bridge Program (admissions, induction, 1st year support, peer and faculty mentoring)

• Interface with APS National Mentoring Community (www.aps.org/nmc)

• Better understand graduate admissions

• Spawning related research efforts in graduate education

• Joint Bridge Program / Graduate Education in Physics Meeting: 10-12 February 2017

Happy Physicists ⇒ Great Physics
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