APS Bridge Program: Erasing Achievement Gap in Doctoral 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.
Underrepresented Minority (URM) Physics degrees

Source: IPEDS, US Census, and APS

Only ~35 students!
Problem in all Disciplines Bridge Components can Solve

<table>
<thead>
<tr>
<th>Discipline</th>
<th>BS</th>
<th>PhD</th>
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<tbody>
<tr>
<td>Comp. Sci.</td>
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<td>Bio. Sci.</td>
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<tr>
<td>Chem.</td>
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<td>6</td>
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<tr>
<td>Eng.</td>
<td>203</td>
<td>63</td>
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<tr>
<td>Math/Stat.</td>
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<td>36</td>
</tr>
<tr>
<td>Phys.</td>
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<td>6</td>
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<tr>
<td>Astro.</td>
<td>16</td>
<td>6</td>
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<tr>
<td>Geosci.</td>
<td>16</td>
<td>6</td>
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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 as the primary professional society in physics to bear on the problem
- Measurable outcomes must be immediately recognizable by an APS member as having significant value and national impact
APS Bridge Program: Key Features

- **Recruit** students through every undergrad programs in the nation (promising but uncompetitive, or unsure)  
  **AFTER April 15!**
- **Establish** Bridge Sites (6), **Vet** Partnership Departments (33):
  - Departments recruit from the APS pool of applications
  - Year 1: Advanced undergraduate or grad courses, introduction to grad-level research, active mentoring, progress monitoring, social integration into grad school
  - Year 2: Take grad courses, apply to PhD program, research underway – or – take 2\(^{nd}\) year grad courses
- **Monitor** student/site progress
- **Research**
- **Disseminate / Advocate**
Member Institutions
• 151 in 38 states

Partnership Institutions
• 39 in 18 states
  ▪ 32 PhD
  ▪ 7 MS
Bridge Program Achievements

Bridge Program
All Physics PhDs

✧ 23% Women (20%)
✧ 93% URM (6%)
  ▪ 64% Hispanic
  ▪ 24% African American
  ▪ 5% Native
✧ 87% Retention (60%)

168 Students making progress toward PhDs
(84 apps so far in 2019)

URM PhDs reach same fraction as undergrad degrees

– All traditionally excluded
Physics GRE "Correlation" with Grad GPA

$r = 0.24; \ N = 1686$

“Weak” Correlation
**IGEN: Goals**

- **Bridge**: Increase the fraction of students from underrepresented groups who complete doctoral degrees in the physical sciences to match the levels of undergraduate degrees awarded.

- **Inclusive Practices**: Catalyze the adoption of evidence-based inclusive practices, especially in graduate education, that reduce inequities in doctoral completion for underrepresented groups and benefit all students.

- **Research**: Conduct research and propagate results that distill scalable, effective practices in inclusive graduate education and institutional change within the physical sciences.

- **Transitions**: Establish sustained, cross-sector partnerships within and among critical stakeholders that support the advancement of underrepresented students from undergraduate through professional employment.
IGEN: Components

- Application aggregation expanded to all disciplines (chemistry in 2019, rest in 2020)
- Bridge Sites established in chemistry (starting 2019)
- Partnership Institutions established in other disciplines
- Establish and propagate resources and advocates to impact admissions and retention practices
- Developing mentoring materials focused on National Lab environment, but applicable in other areas
- Partnering with CIRTL for faculty development resources
- Research into critical factors impacting success
- Establishing pathways to make professional opportunities available to graduates at National Labs and industry
- Enhancing mentoring of undergraduates into graduate studies
- National advocacy through annual meetings (and other channels)
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Developing an online, actively updated resource

- Assist department chairs in program review
- 25 “Executive Summaries” of Effective Practices covering all aspects of undergraduate physics programs (e.g., UG research, lab. skills, intro. courses, DEI, physical spaces, communication skills, mentoring/advising, career prep., computational skills, Learning Assistants, adv. courses, distance learning, etc.)
- Sections informed by education research and community practice
- 150+ contributing authors and external reviewers
- Emphasizing cyclic, evidence-based program review that is context dependent (fits the size and mission of the institution/department)
- Training for external reviewers following guide principles
- “Case studies” discussing successes (and failures) planned
- Tentative rollout: spring 2020
Questions

Our first PhD: Dr. Tommy Boykin (29 March 2019)

Bridge Students:
University of Central Florida