Diversity, Equity, and Inclusion in Physics

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Overview

• The Numbers
• Definitions
• Specific Suggested Actions
• Student Voices
The Physics Bachelor’s Degree Landscape

Number of Bachelor’s Degrees Earned in Physics, Classes 1981 through 2017.

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Women Physics Bachelors

Percent of Physics Bachelors and PhDs Earned by Women, Classes of 1977 through 2017

Source: AIP Statistical Research Center, Enrollments and Degrees Survey.
African Americans and Hispanics Among Physics Bachelor’s Degrees


The Proportion of Physics Bachelor's Degrees Awarded to African-Americans and Hispanics.

Source: NCES IPEDS Completions Survey

Source: AIP Statistical Research Center

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Mission
To examine and assess the reasons for the persistent underrepresentation of African Americans in physics and astronomy at the bachelor’s level.

Task Force Activities
• Survey and interview African American undergraduates about their experiences
• Conduct site visits to higher-producing physics and astronomy programs
• Engage partner departments to inform and pilot Task Force recommendations
• Curate prior relevant research and initiatives to provide resources for broad-based community efforts
• Produce a detailed report of our findings and evidence-based recommendations for broad dissemination

To learn more contact TEAMUP Project Manager, Arlene Modeste Knowles, (aknowles@aip.org) or visit our website: www.aip.org/TEAMUP
PhDs in Physics

Number of Doctorates Earned in Physics, Classes 1972 through 2017.

Number of Physics Doctorates Earned by African-Americans and Hispanic-Americans, Classes 1997 through 2016.

AIP Statistics

aip.org/statistics

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PhDs over time: Another perspective

- Physics degrees earned in physics since 1973 demonstrate the point...
- PhD Degrees earned by men and women of color are orders of magnitudes below those of white men and women

### Women who earned physics doctorates (1973-2015)

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic</td>
<td>211</td>
</tr>
<tr>
<td>Am. Indian/Alaska Native</td>
<td>4</td>
</tr>
<tr>
<td>Asian</td>
<td>2,581</td>
</tr>
<tr>
<td>Black</td>
<td>59</td>
</tr>
<tr>
<td>White</td>
<td>3,582</td>
</tr>
<tr>
<td>Two or more races</td>
<td>21</td>
</tr>
<tr>
<td>Other or race not reported</td>
<td>65</td>
</tr>
<tr>
<td>Ethnicity not reported</td>
<td>475</td>
</tr>
</tbody>
</table>

### Men who earned physics doctorates (1973-2015)

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Degrees</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hispanic</td>
<td>1,411</td>
</tr>
<tr>
<td>Am. Indian/Alaska Native</td>
<td>42</td>
</tr>
<tr>
<td>Asian</td>
<td>12,848</td>
</tr>
<tr>
<td>Black</td>
<td>420</td>
</tr>
<tr>
<td>White</td>
<td>29,018</td>
</tr>
<tr>
<td>Two or more races</td>
<td>103</td>
</tr>
<tr>
<td>Other or race not reported</td>
<td>505</td>
</tr>
<tr>
<td>Ethnicity not reported</td>
<td>3,920</td>
</tr>
</tbody>
</table>
**High Energy PhDs Earned By Race- 2016**

<table>
<thead>
<tr>
<th>Race Category</th>
<th>ALL DOCTORATE RECIPIENTS</th>
<th>TEMPORARY VISA HOLDERS</th>
<th>TOTAL</th>
<th>HISPANIC OR LATINO</th>
<th>AMERICAN INDIAN OR ALASKA NATIVE</th>
<th>ASIAN</th>
<th>BLACK OR AFRICAN AMERICAN</th>
<th>WHITE</th>
<th>MORE THAN ONE RACE</th>
<th>OTHER RACE NOT REPORTED</th>
<th>ETHNICITY NOT REPORTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>US Citizens or Permanent Residents</td>
<td>231</td>
<td>92</td>
<td>57</td>
<td>18.2% Women</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>112</td>
<td>5</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>85</td>
<td>145</td>
<td>18.8% Women</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>50</td>
<td>3</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**(NSF Survey of Earned Doctorates - 2016)**
## Presence of URM Faculty

**Number of Physics Departments with African-American and Hispanic Faculty by Highest Degree Awarded, 2016**

<table>
<thead>
<tr>
<th>Number of Departments that have ...</th>
<th>PhD</th>
<th>Master's</th>
<th>Bachelor's</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Both African-American and Hispanic Faculty</td>
<td>25</td>
<td>7</td>
<td>3</td>
<td>45</td>
</tr>
<tr>
<td>African-American Faculty and no Hispanic Faculty</td>
<td>25</td>
<td>8</td>
<td>53</td>
<td>86</td>
</tr>
<tr>
<td>Hispanic Faculty and no African-American Faculty</td>
<td>75</td>
<td>20</td>
<td>61</td>
<td>156</td>
</tr>
<tr>
<td>Neither African-American nor Hispanic Faculty</td>
<td>76</td>
<td>22</td>
<td>365</td>
<td>463</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>202</strong></td>
<td><strong>56</strong></td>
<td><strong>492</strong></td>
<td><strong>750</strong></td>
</tr>
</tbody>
</table>
A physics meeting in 2015
DEI - Some Definitions

Diversity
All the ways in which people are different. Bringing together people of diverse identities and abilities along multiple axes.

Equity
Recognizing that all people are not afforded the same access and opportunities as others and working to eradicate barriers to success.

Inclusion
Creating an environment where differences are welcomed valued, respected, and all are invited to fully participate.
What’s the Point of Diversity & Inclusion?

"We need to focus on diversity. Your goal is to hire people who all look different, but think just like me."

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www.glasbergen.com

Less This

More This

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So What Can You Do?
So What Can You Do to Foster Diversity

- Don’t use the Physics GRE to admit students

From: RESEARCH ARTICLE | SCIENTIFIC COMMUNITY

Typical physics Ph.D. admissions criteria limit access to underrepresented groups but fail to predict doctoral completion

Casey W. Miller1,*, Benjamin M. Zwick1, Julie R. Posselt2, Rachel T. Silvestrini1 and Theodore Hodapp1

*See all authors and affiliations

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Abstract

This study aims to understand the effectiveness of typical admissions criteria in identifying students who will complete the Physics Ph.D. Multivariate statistical analysis of roughly one in eight physics Ph.D. students from 2000 to 2010 indicates that the traditional admissions metrics of undergraduate grade point average (GPA) and the Graduate Record Examination (GRE) Quantitative, Verbal, and Physics Subject Tests do not predict completion as effectively admissions committees presume. Significant associations with completion were found for undergraduate GPA in all models and for GRE Quantitative in two of four studied models; GRE Physics and GRE Verbal were not significant in any model. It is notable that completion changed by less than 10% for U.S. physics major test takers scoring in the 10th versus 90th percentile on the Quantitative test. Aside from these limitations in predicting Ph.D. completion overall, overreliance on GRE scores in admissions processes also selects against underrepresented groups.
So What Can You Do to Foster Diversity

- Recruit far and wide
  - Attend identity or affinity based scientific conferences
  - Build relationships with faculty and researchers in other institutions including MSIs
- Check for your biases - implicit.harvard.edu
- Employ Strategies that mitigate bias in selecting students, award recipients, prospective employees, etc.
So What Can You Do to Foster Diversity

- Understand that increasing diversity DOES NOT MEAN lowering standards!!
So What Can You Do to Foster Inclusion?

• Hire researchers or admit students for the culture you wish to create

• Speak up when lewd, rude, sexist, racist, or otherwise inappropriate behavior is witnessed

• Recognize exclusionary behavior from student peers

• Get some training to become a culturally aware mentor - nrmn.wpengine.com/research-mentor-training/

• Learn about microaggressions, unconscious bias, stereotype threat, and imposter syndrome
So What Can You Do to Foster Inclusion?

• Share your struggles as a student with your students
• Acknowledge the work of others who are typically marginalized in physics spaces
• Recognize isolation in your students and colleagues and find resources to combat it
Student Voices
On attending an HBCU...

When you go to different institutions, sometimes you don't get that representation. You don't get that feeling of, "Oh yeah. This is exactly what I can do” because...sometimes the people don't look like you. Well, when they don't look like you it’s like, "All right. Well, I'm in this community and I already know I'm underrepresented.” It's sometimes overwhelming, and so I think at [HBCU], that's one of the great aspects of just being able to talk to your teachers and they're African American, being able to talk to the students and they're African American. Be able to go around and talk to people and you feel represented.
Student Voices - Isolation

I go to a predominantly white institute. I'm a junior and I've only had two other black students in my classes. [In] only two classes I have had another black student. Not the same black student. Most of my classes I'm the only black person, the only black woman and you're surrounded by a lot of white men who think they know everything, who try to argue with the teacher and so when you try to make a point it is sort of hard to have your voice out there. To them it's not intentional because they are so used to being able to have their way. To me it's sort of difficult to make your way in there. I was lucky enough to have a white friend who introduced me to them, which...I really didn't appreciate, but I [came] to appreciate in the end because they started to connect with me more. But definitely [during my] freshman year it was just really daunting, because there was not anybody else to talk to.
Student Voices – Bias Among Peers

Let's say the biggest obstacle that I had was directly after my summer REU. For context I went to [An Ivy League school]....Another student apparently who applied for the same REU...was convinced that I got in and he didn't because there was a racial bias in my favor. This student actually wasn't white, he was Indian. He wasn't the best student anyway, he even comes to me for help...So he had actively challenged me on this and that really bugged me because, for one, it's not true. Then for a couple of weeks, maybe even a couple of months after that I just started thinking. I started like really coming to terms [with what] if that were indeed the case and then I tried to make arguments in favor of and opposing that position. I think the conclusions I came to as a result, helped me more going forward.
AIP TEAM-UP Members & Staff

AIP TEAM-UP Report
Coming in January 2020!

www.aip.org/TEAMUP

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Questions?

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