Education and Diversity

Staff

- Monica Plisch (Assoc. Dir., PhysTEC)
- Renee Michelle Goertzen (Project Manager, PhysTEC, Research)
- Kathryn Woodle (Project Manager, NMC, Bridge Program, PhysTEC)
- <OPEN> (Project Manager, Bridge Program)
- Arlene Modeste Knowles (Diversity Liaison)
- Deanna Ratnikova (Committees, CUWiP)
- Michelle Campbell (Coord., PhysTEC)
- Asmaa Khatib (Coord., Bridge Program)
- Susan Sargent (Coord., NMC, PhysTEC)
Leadership / Oversight

National Advisory Committee
- J.D. Garcia (Arizona)
- Yolanda George (AAAS)
- Paul Gueye (NSBP)
- Wendell Hill (UMCP)
- Anthony Johnson (Chair, UMBC)
- Brittany Kamai (Grad student)
- Ramon Lopez (UT Arlington)
- Luz Martinez-Miranda (NSHP)
- James Mathis (Grad student)
- Steve McGuire (Southern University)
- Ritchie Patterson (Cornell)

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)
- Talat Rahman (UCF)
- Keivan Stassun (Fisk/Vanderbilt)
- Jon Urheim (Indiana)

Research / Assessment
- Geoff Potvin (FIU-Research advisor)
- Rachel Scherr (SPU-Project evaluator)
- Postdoc <OPEN>
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.
Physics / STEM Bachelor Degrees

Source: IPEDS Completion Survey

www.aps.org ©2015, American Physical Society; Email: hodapp@aps.org
High School Physics Enrollments

Source: AIP Statistical Research Center
Hispanic American Bachelor Degrees

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

Sources: IPEDS Completion survey by race, US Census
52 PhDs awarded to minorities in 2010

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

US College-age minority population

Only ~30 students!

Sources: IPEDS Completion survey by race, US Census
APS Bridge Program: Key Features

- **Recruit** through graduate programs (unaccepted students), undergrad programs (promising students)
- **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):
  - 46 graduate programs looked at “other” applications (2015), 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 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:
- Columbia University
- Fisk / Vanderbilt
- MIT
- Princeton University
- University of Chicago
- University of Michigan
Bridge Program Achievements

- 6 Bridge Sites (2 others self-funded)
- 95% retention rate
- 5+ institutions self-fund extra students from our pool
- Increasing by ~30/yr answers national need
- Research into admissions: how are departments using GRE and other measures, correlations with outcomes
- Lots of interest by departments and students

![National Achievement Gap Chart]

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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)
...and learning this surprised us!
1. Aggregating applications is a powerful tool
2. Graduate programs (most) want to do better
3. Admissions are not what they seem
4. Applications are expensive
5. Importance of graduate student groups
Some reasons students are not admitted

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

**Admissions Committees:**
- Members overwhelmed
- Members unaware of scholarship
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)

Considering:
- Student perspective on admissions
Physics GRE: Impact of Cutoff Scores

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

0.09 (Black)
0.34 (Hispanic)
0.44 (White)
0.61 (Asian)

650
Physics GRE: Impact of Cutoff Scores

Source: ETS
Next Steps…

• Long-term sustainability of advances made by Bridge Program
• Interface with APS National Mentoring Community
• Better understand graduate admissions and advocate for a better informed process

Happy Physicists ⇒ Great Physics
At what stage do we lose most underrepresented minorities in the physics “pipeline”?  
1. High School
2. Undergraduate
3. Graduate
4. Professoriate
Underrepresented Minorities in Higher Education

Graph showing URM (Underrepresented Minority) percentages for different stages of education and career:
- College Age Population: ~1.5M
- All Bachelor Degrees: ~200k
- Physics Bachelor Degrees: ~450
- Physics Doctoral Degrees: ~35
- Physics Faculty: ~12

Note on website: www.aps.org
Background

APS Committee on Minorities (COM) polled community leaders about barriers faced by URM students, and possible APS actions

- Issues at pre-college level – which impact students as they begin undergraduate studies
- Physics “culture” was unsympathetic
- Lack of information on physics careers
- Obstacles faced by URM students not understood by advisors
- Lack of advice about possibility of graduate studies
• APS longstanding commitment to supporting success of underrepresented minorities in physics (~40 years) – APS Minority Scholarships

• COM Minority Scholarships reached ~20 students each year (not really at the scale that will improve representation)

• We asked scholars: What made a difference to them? Answers:
  • Local mentoring
  • APS recognition
• Through the Bridge Program we learned about the successes of the Math Alliance
  • >500 Mentors
  • 1500 Mentees, >600 Currently active
  • 110 institutions
  • Annual “Field of Dreams” meeting (325 in 2014)
  • Differing goals: Increase the number of URM students completing PhDs in Mathematical Sciences
    • 92 have graduated with PhDs
    • 157 currently making progress toward PhD
Program Components

- Approved by APS Council: November 2014
- Launched April 2015
- Goal: Increasing the number of URM students who receive undergraduate degrees in physics
- Pairing faculty and URM students
- 87 mentors; 60 mentees invited (38 paired)
- Host annual conference (21-23 October 2016) – in conjunction with REU Site Leaders meeting
- Planned scholarship funds distributed via mentors
- Planned recognition of mentoring
Next Steps…

• Enlist mentor/mentee pairs
• Get through the first year – learn what works and what doesn’t
• Refine and implement assessment plan
• Begin plans for scholarships / recognition
• Advocate to the broader community on importance of mentoring, and issues
• Listen to you!

Happy physicists ⇒ Great physics
2016 Conferences Locations

CUWiP conference site locations

1. Oregon State University
   - Oregon
   - Washington
   - Idaho
   - Northern California

2. Black Hills State University
   - South Dakota
   - North Dakota
   - Minnesota
   - Nebraska
   - Wyoming

3. University of California, San Diego
   - San Diego
   - Arizona
   - Southern California
   - Hawaii
   - Nevada
   - Utah

4. University of Texas, San Antonio/Southwest Research Institute
   - New Mexico
   - Oklahoma
   - Texas
   - Kansas
   - Louisiana
   - Missouri

5. Ohio State University
   - Illinois
   - Michigan
   - Indiana
   - Ohio
   - Kentucky
   - Wisconsin

6. Syracuse University
   - Maine
   - New Jersey
   - Vermont
   - Pennsylvania
   - New York

7. Wesleyan University
   - Connecticut
   - Massachusetts
   - New York
   - New Hampshire
   - Rhode Island

8. Old Dominion University/Jefferson Lab
   - Delaware
   - District of Columbia
   - Maryland
   - New Jersey
   - Virginia
   - West Virginia
   - New York

9. Georgia Institute of Technology
   - Alabama
   - Florida
   - Georgia
   - Mississippi
   - Puerto Rico
   - South Carolina
   - Tennessee

* Included within more than one location
CUWiP Key Aspects

- Focus on professional development, networking, understanding pathways
- Attendance **tripled** since APS became involved (nearly every female physics major will attend)
- Very good URM attendance (~50% above UG completion rate)
- Majority (>50%) of funding provided locally; 3-year grants from DOE, NSF for 2014-2016 conferences
- 9 sites for 2016
- Inspired C-CUWiP, UK-CUWiP
- Possible addition of Canadian sites in 2017
- Directed research efforts to improve messaging to women sees positive changes
- National leadership group; Current chair: Mette Gaarde, LSU; Overseen by CSWP (APS Committee on the Status of Women in Physics)
At what stage do we lose most women in the physics “pipeline”?

1. High School
2. Undergraduate
3. Graduate
4. Professoriate
Percentage of Women in Physics

Sources: NCES/IPEDS, AIP-SRC, HERI
This material is based upon work supported by the National Science Foundation under Grant No. 1143070

Enhancing Diversity in Graduate Education

Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.