

APS March Meeting

7 March 2018

Los Angeles, CA

The APS Bridge Program: Changing the Face of Graduate Education

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Director of Project Development

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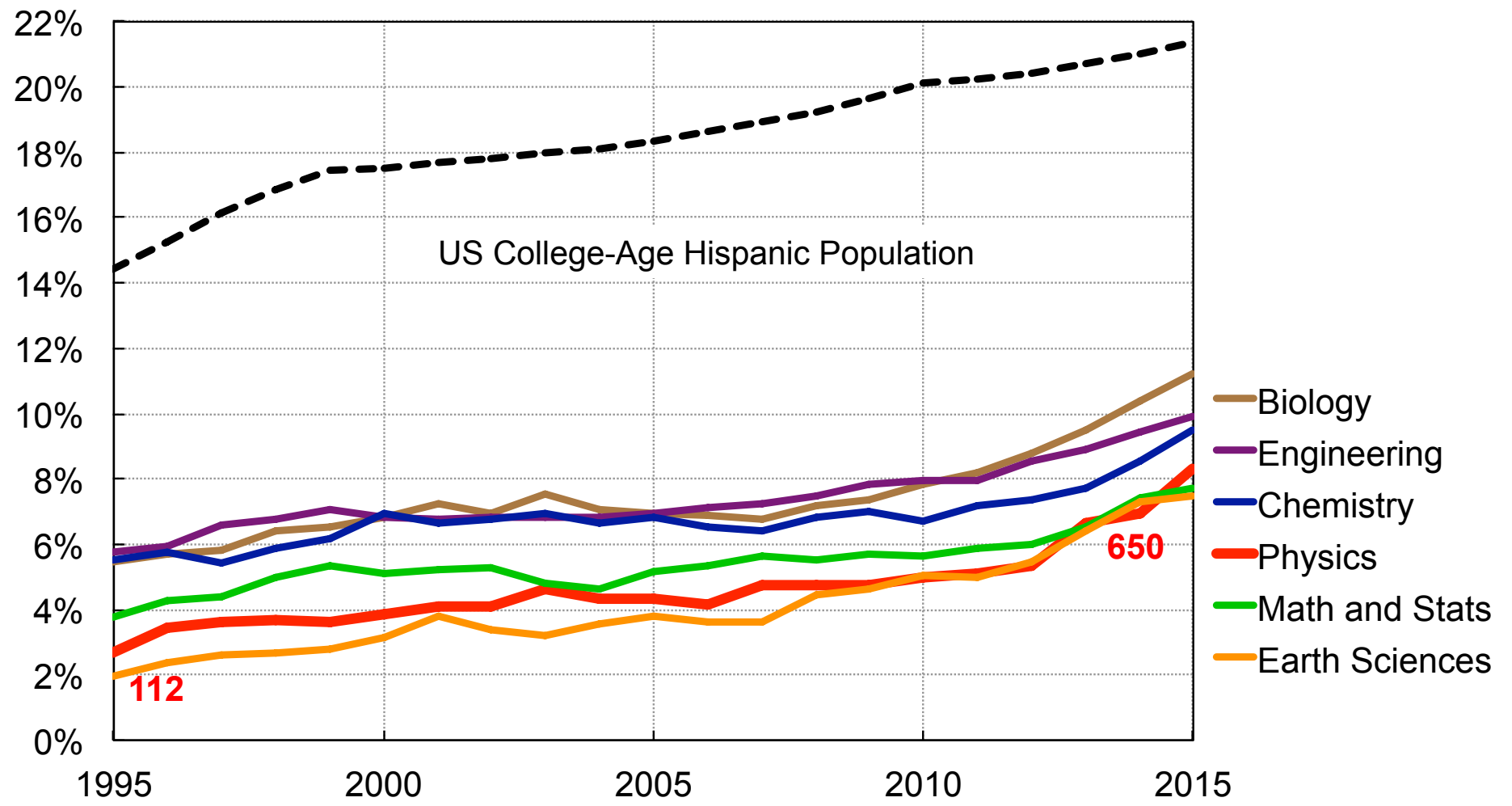
8.2 JOINT DIVERSITY STATEMENT

(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.

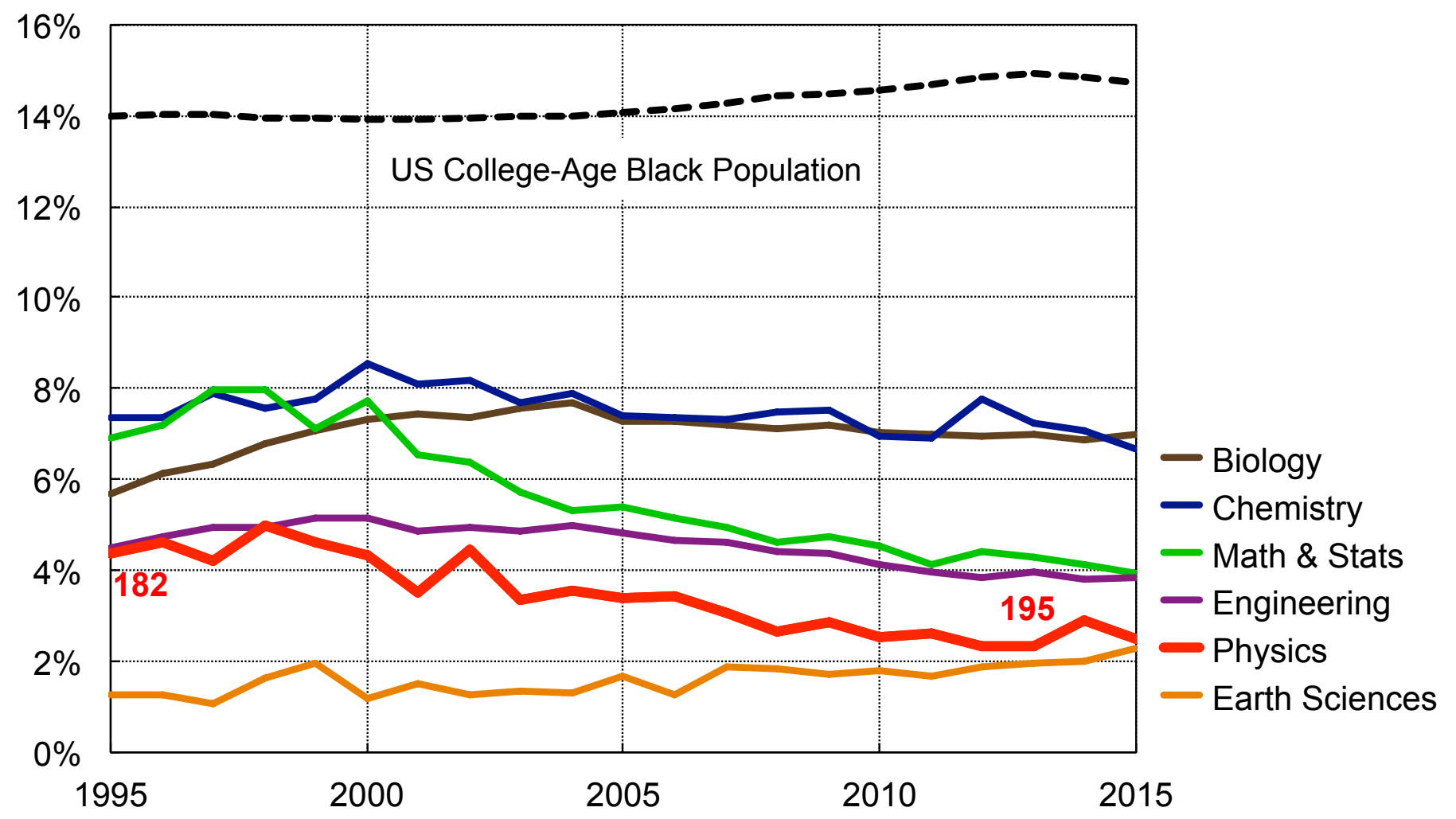
Therefore, we charge our membership with increasing the numbers of underrepresented minorities in physics in the pipeline and in all professional ranks, with becoming aware of barriers to implementing this change, and with taking an active role in organizational and institutional efforts to bring about 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



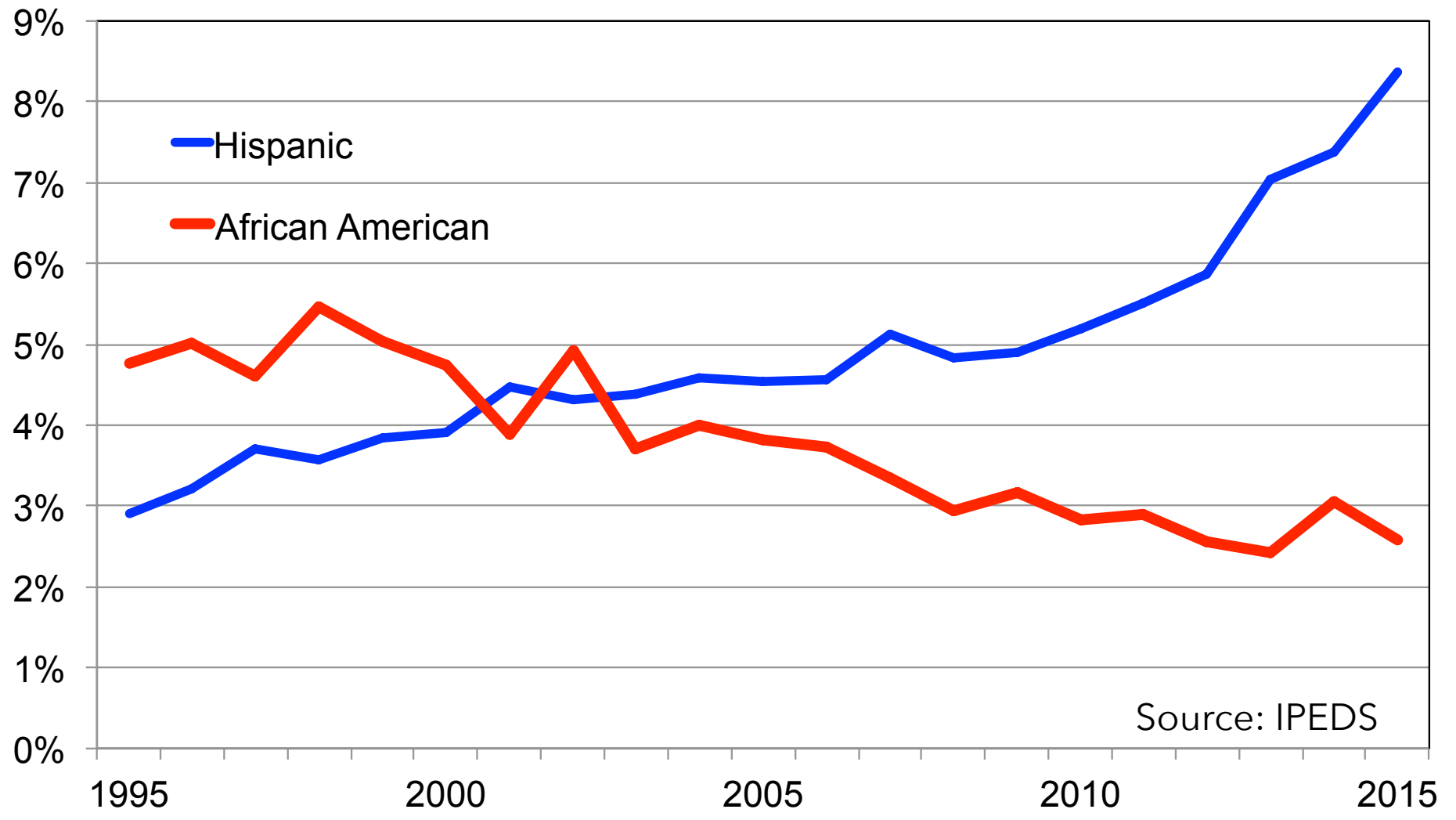
Source: National Center for Education Statistics, US Census, and APS

African American Bachelor Degrees



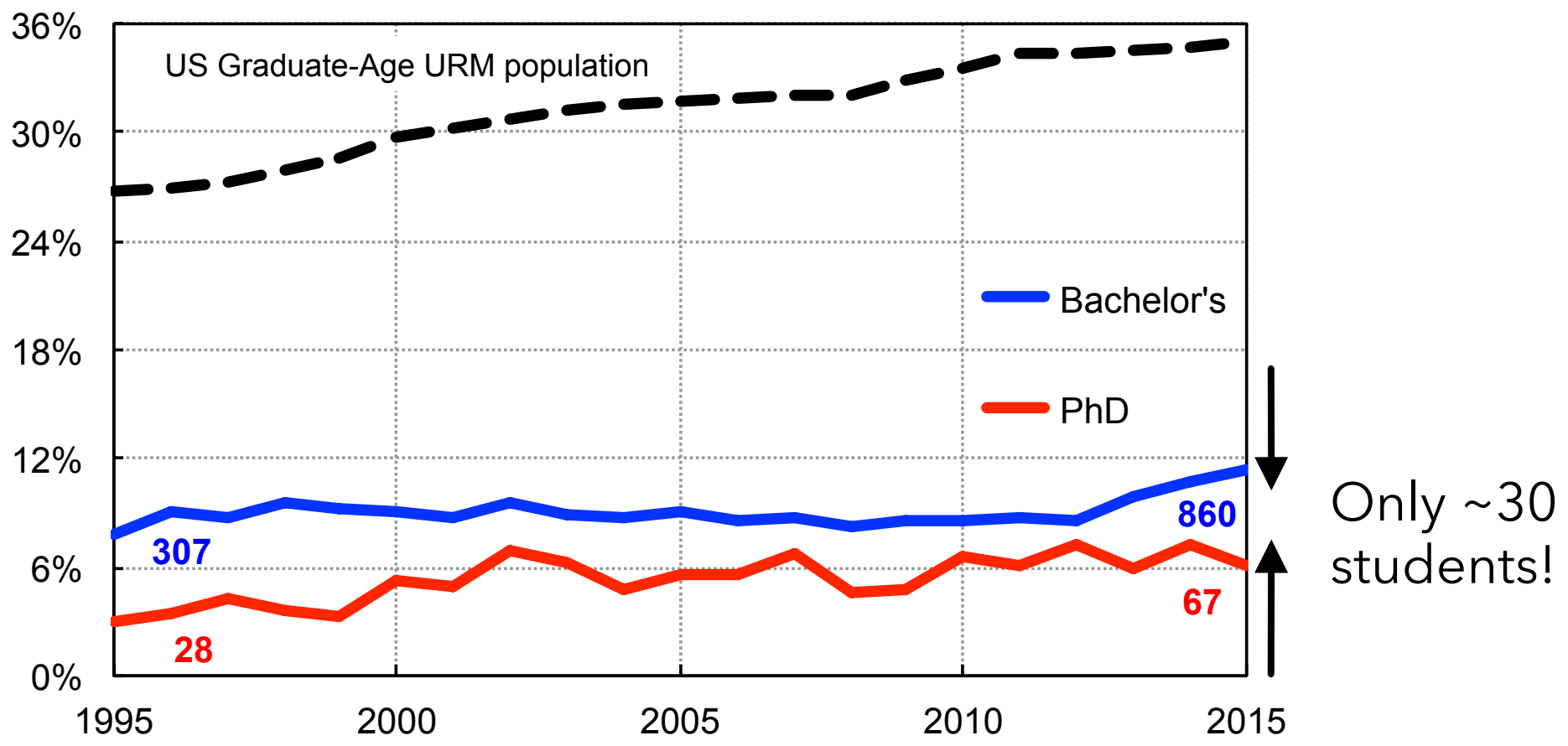
Source: National Center for Education Statistics, US Census, and APS

URM Bachelor Degrees



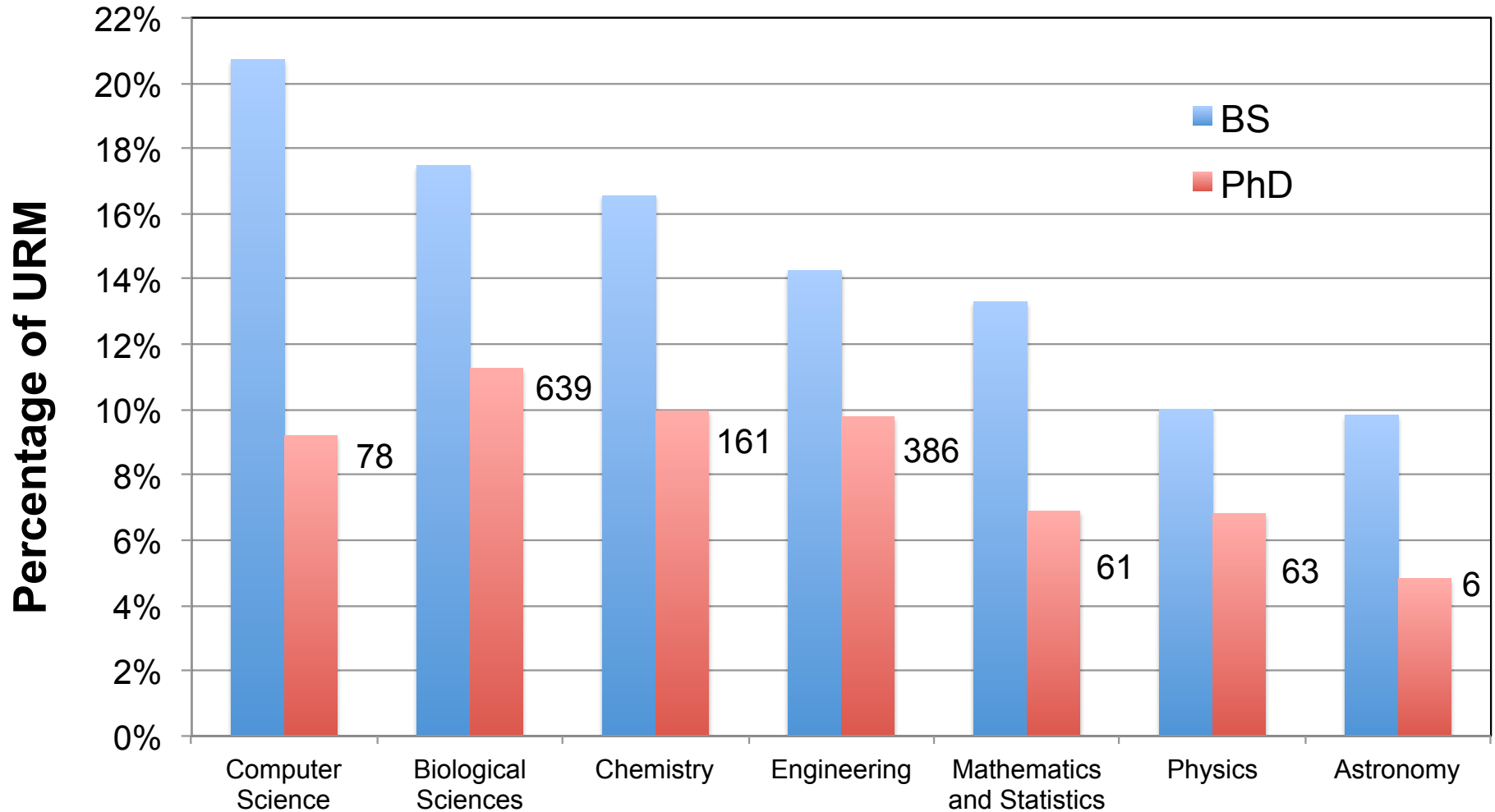
Source: IPEDS

Underrepresented Minority (URM) Physics degrees



Source: National Center for Education Statistics, US Census, and APS

Bachelor and PhD STEM Degrees



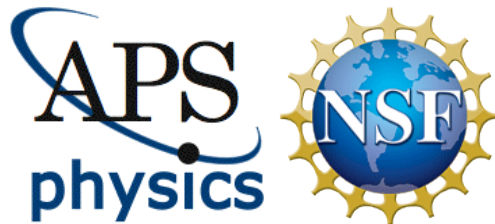
Leadership / Oversight

National Advisory Committee

- Emilio Codecido (OSU, Grad student)
- J.D. Garcia (Arizona)
- Yolanda George (AAAS)
- Wendell Hill (UMCP)
- Renee Horton (NSBP)
- Anthony Johnson (**Chair**, UMBC)
- Ramon Lopez (UT Arlington)
- James Mathis (UM, Grad student)
- Steve McGuire (Southern University)
- Jesús Pando (NSHP)
- Ritchie Patterson (Cornell)

Funding

- NSF
- APS
- Bridge sites



Architect's Council

- Marcel Agüeros (Columbia)
- Ed Bertschinger (MIT)
- Andreas Bill (CSU Long Beach)
- Simon Capstick (Florida State)
- Kelly Holley-Bockelmann (Fisk/Vanderbilt)
- Cagliyan Kurdak (Michigan)
- 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 (23):
 - 65 graduate programs looked at “other” applications (2017), recruited additional students; No direct support, some travel
 - “COM approved” Partnership Institutions; national recognition of program
- **Monitor** student/site progress
- **Research**
- **Disseminate / Advocate**

- 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

Institution Involvement

- **Member Institution** (any institution, 134)
Free; receive information / updates; reduced fees for APS-BP conferences
- **Partnership Site** (graduate only, 31)
APS COM approval process; recommended site for Bridge Fellows (and others) to attend; demonstrate effective practices in graduate student support
- **Bridge Site** (graduate only, 6)
Receive significant funding from APS; build sustainable program; prepare 2+ students each year for graduate study; significant institutional commitment

APS Bridge Partnership Sites

*Bowling Green State University
 *California State University Long Beach
 *California State University, Los Angeles
 Columbia University
 Delaware State University
 *DePaul University
 Embry-Riddle Aeronautical University
 Fisk-Vanderbilt
 Florida International University
 Florida State University
 Illinois Institute of Technology
 Indiana University
 MIT
 North Dakota State University
 Ohio State University
 Princeton University
 *Texas State University
 University of Central Florida
 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 North Carolina at Chapel Hill
 University of Rochester
 University of South Florida
 University of Texas at Arlington
 University of Texas, San Antonio
 University of Virginia
 *Wright State University

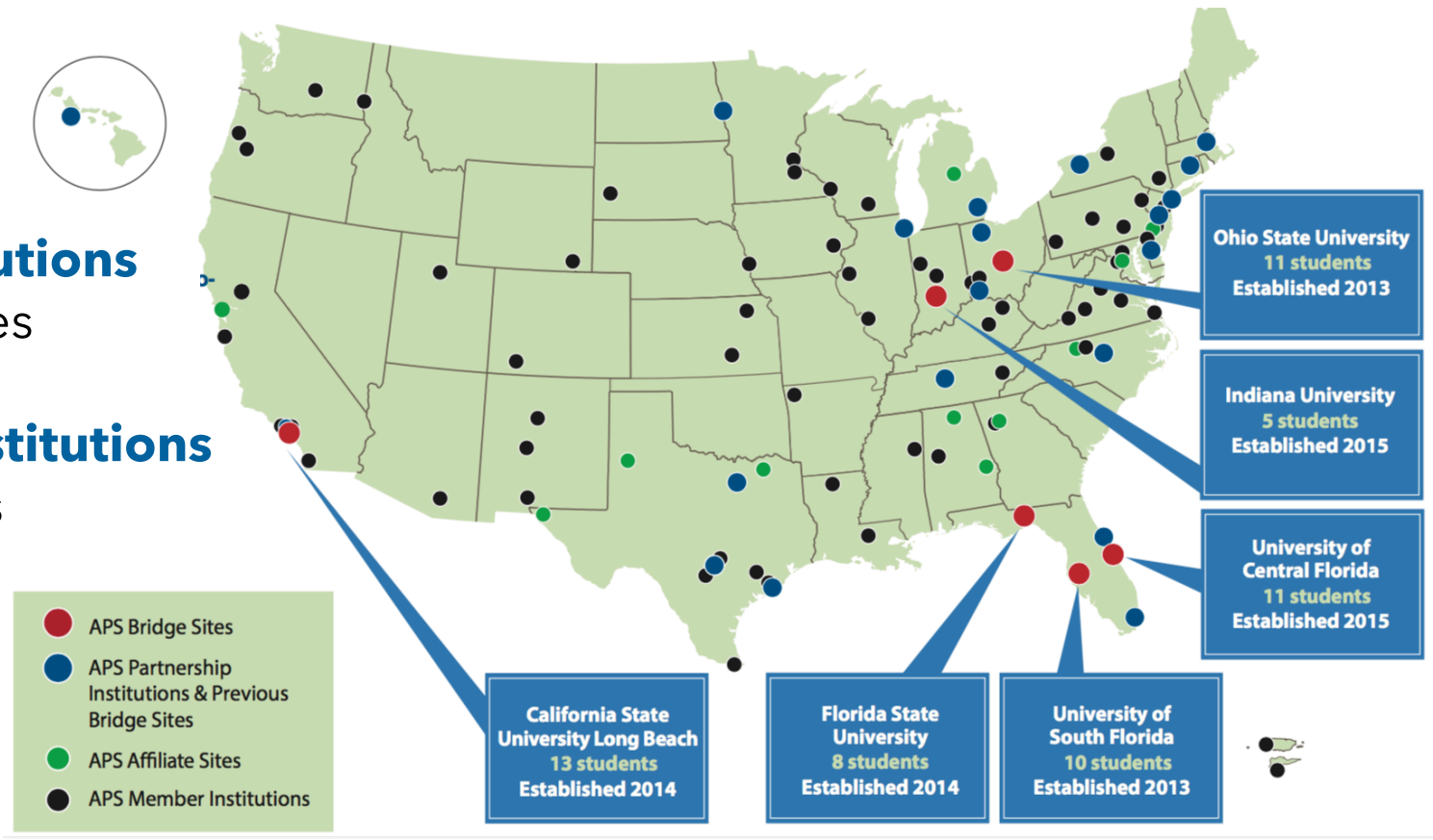
Member and Partner Institutions

Member Institutions

- 134 in 38 states

Partnership Institutions

- 31 in 18 states
 - 24 PhD
 - 7 MS



Principles for Bridge and Partnership Institutions

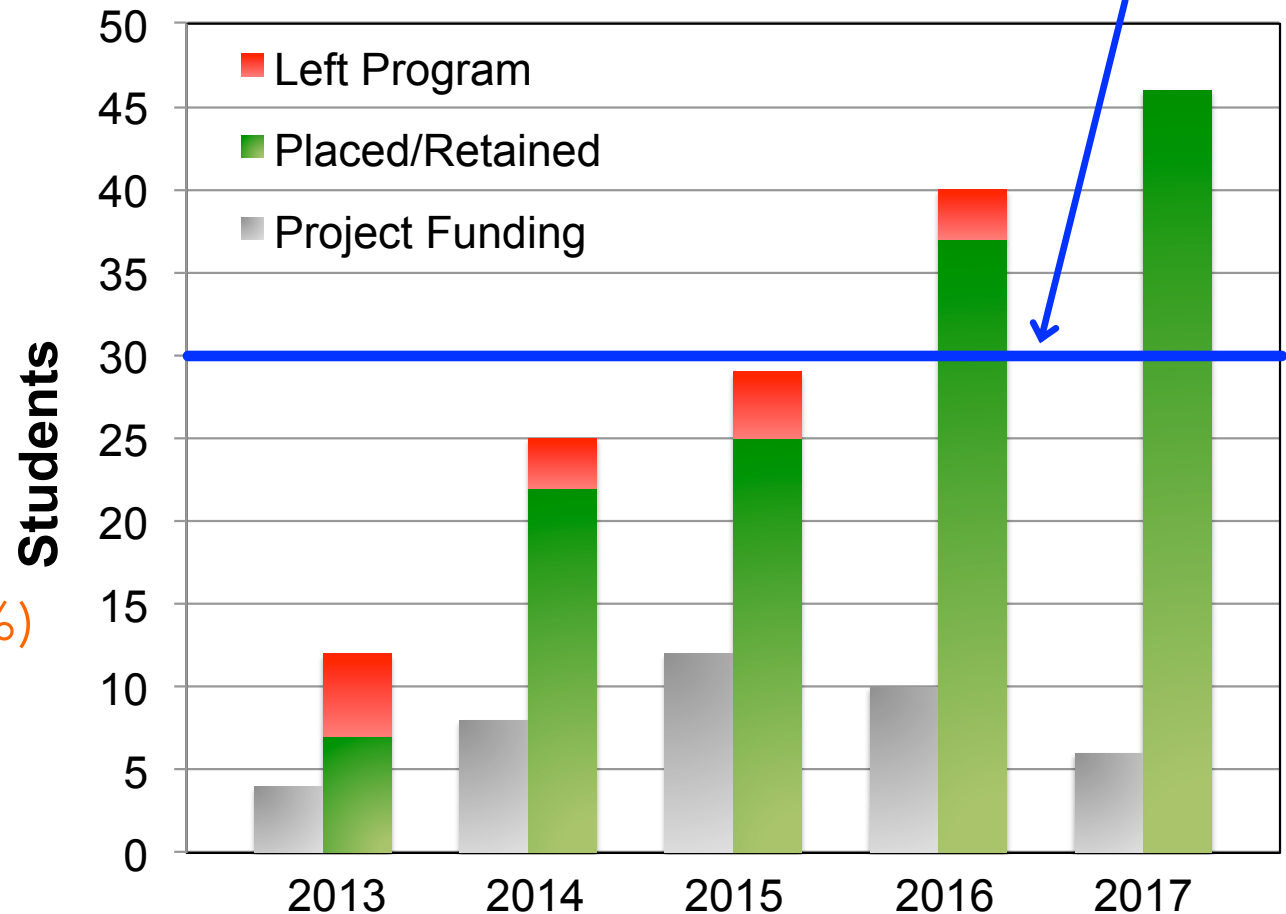
- Admission decisions (“holistic” criteria)
- Financial support (timing)
- Coursework (induction advising critical, allow advanced undergrad courses, alternative plan)
- Progress monitoring (timing, tutors if needed)
- Multiple mentors (intervention, peer involvement)
- Research (appropriate match)

Bridge Program Achievements

Bridge Program Physics PhDs

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

URM PhDs reach same fraction as undergrad degrees



Where did the 46 students go (2017)?

- Bowling Green State University
- CSU Long Beach (2)
- CSU Los Angeles (4)
- Delaware State University (2)
- DePaul University
- Fisk-Vanderbilt University (3)
- Florida State University (6)
- Indiana University (2)
- Ohio State University (3)
- Texas A&M University, Commerce
- Texas State University
- University of Central Florida (4)
- University of Cincinnati (3)
- University of Connecticut
- University of Houston, Clear Lake (3)
- University of Kansas (2)
- University of Massachusetts Dartmouth
- University of Minnesota Duluth
- University of North Carolina, Chapel Hill
- University of Rochester
- University of South Florida (2)
- University of Virginia

What we didn't know...

1. Aggregating applications is a powerful tool
2. Admissions data are not what they seem
 - a. GRE is a big factor
 - b. Students' perceptions are different than faculty
3. Applications are expensive
4. Importance of graduate student groups

Some reasons students are not admitted

Students:

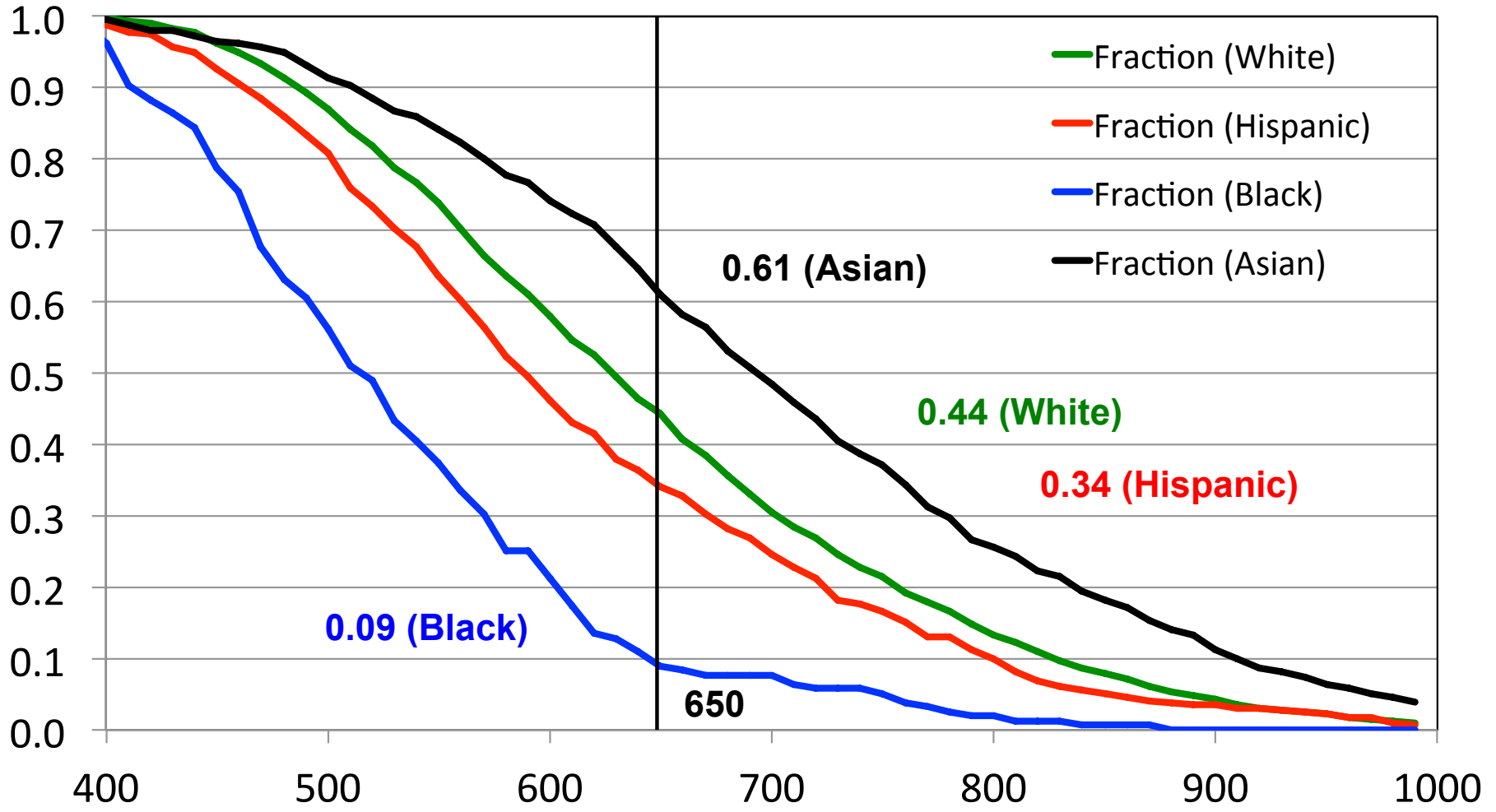
- Low physics GRE score
- Apply to too few or wrong places
- “Feel” unprepared (self-esteem)
- Inadequate preparation: will fail in grad courses
- Application materials do not tell a predictive story
- Life intervenes

Admissions Committees:

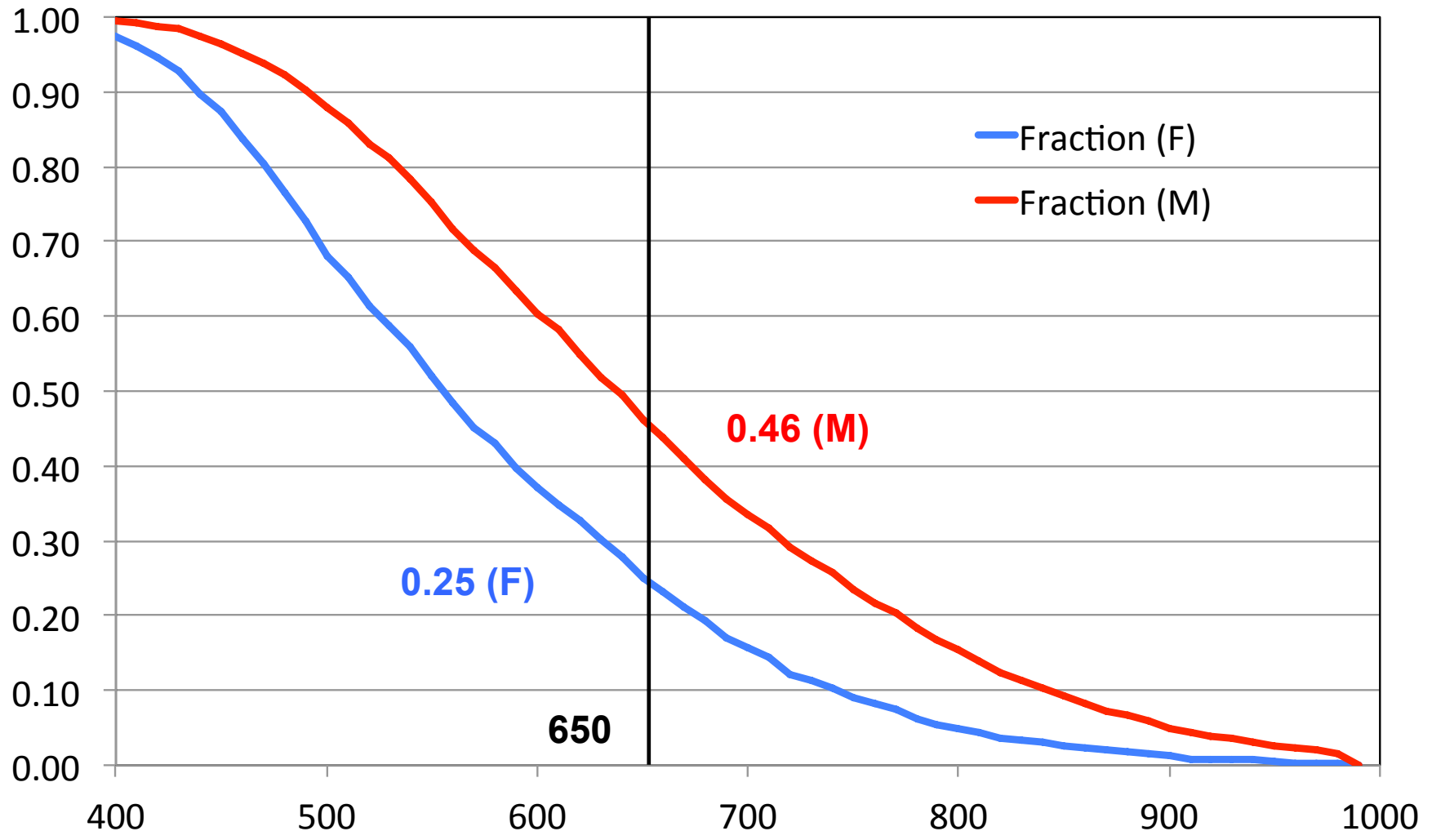
- Members overwhelmed
- Members unaware of admissions research findings

- **Graduate admissions study**
 - Doctoral institutions (Phys. Rev. Phys. Educ. Res. 13, 020142 (2017))
 - Master's institutions (in preparation)
- **GRE (and other) admissions data:** Correlations with student success; impact on diversity (submitted for publication)
- **Holistic admissions practices:** practical use of non-cognitive measures or other practical techniques for use by physics graduate admissions faculty (parallel effort by CGS) (Phys. Rev. Phys. Educ. Res. 13, 020133 (2017))
- **Student perspective on admissions** (in preparation)

Physics GRE: Impact of Cutoff Scores



GRE Physics Scores: Impact of Cutoff Scores



- Replicate process in chemistry, math, material science, astronomy, geosciences
- Mentoring / tracking students into careers / postdoc positions
- Broader implementation of advances made by Bridge Program (*admissions, induction, 1st year support, peer and faculty mentoring*)
- Spawning related research efforts in graduate education
- Interface with **APS National Mentoring Community** (www.aps.org/nmc)
 - New fund for emergency aid to NMC undergrads (**BEAM**: Bringing Emergency Aid to Mentees)
- Planning joint Bridge Program / National Mentoring Community Meeting: **16-18 November 2018: Stanford/Google**

Happy Physicists ⇒ Great Physics