



Longitudinal Support for Generational Change

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**MPS-Ascend
Fellowship**



U.S. DEPARTMENT OF
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SCGSR Program

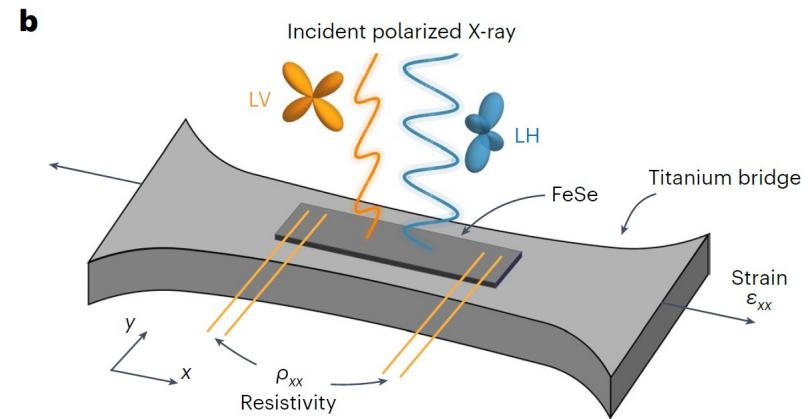
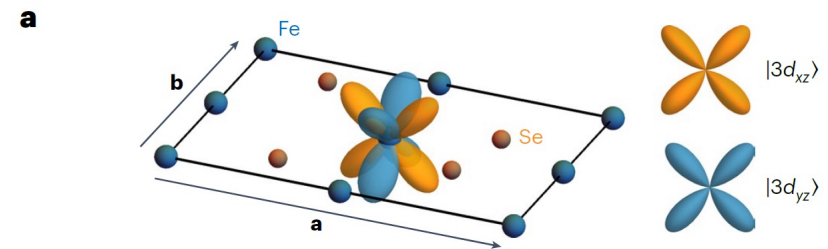


**CLEAN ENERGY
INSTITUTE**

Argonne National Laboratory



Strain + X-rays in strongly-correlated quantum materials



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DEI: Importance of directly mentoring students

9 Undergrad Lab Mentees:

- Between grad school and postdoc, I have mentored 9 undergraduates in my lab for at least 1 semester/summer and many for over a year.

Research and Mentoring Activities:

- Focus on building real skills, doing real projects.
- Crystal growth & optical characterization of quantum materials, nanofabrication (top picture)
- Group meeting talks, conference attendance, future publications, graduate program applications
- Continued mentoring relationship after our work together ends

Demographics:

- 7 students of color
- 3 male, 5 female, 1 nonbinary

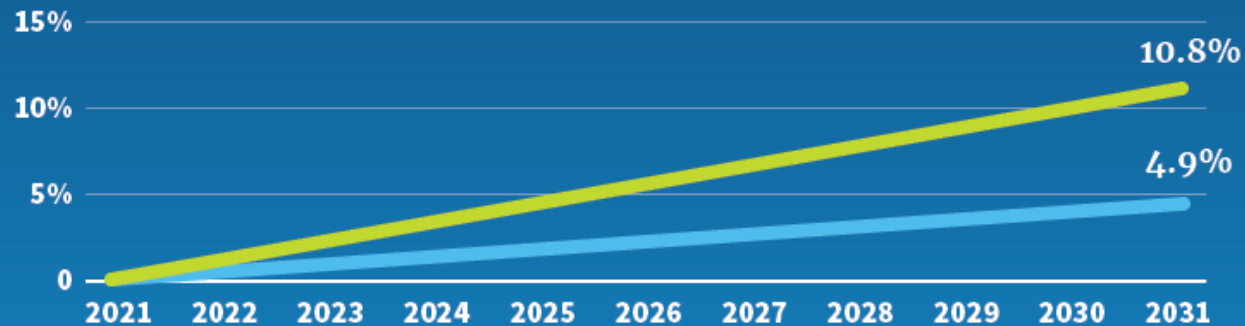
Outcomes:

- 3 Physics PhD students
- 1 Electrical Engineering PhD student
- 2 STEM Masters degree program
- 3 still undergrads



US STEM workforce growing rapidly

From 2021 to 2031,
**STEM Occupations are Projected
to Grow Faster Than Others**



Source: Bureau of Labor Statistics Employment Projections

■ STEM Occupations ■ Non-STEM Occupations

smartasset

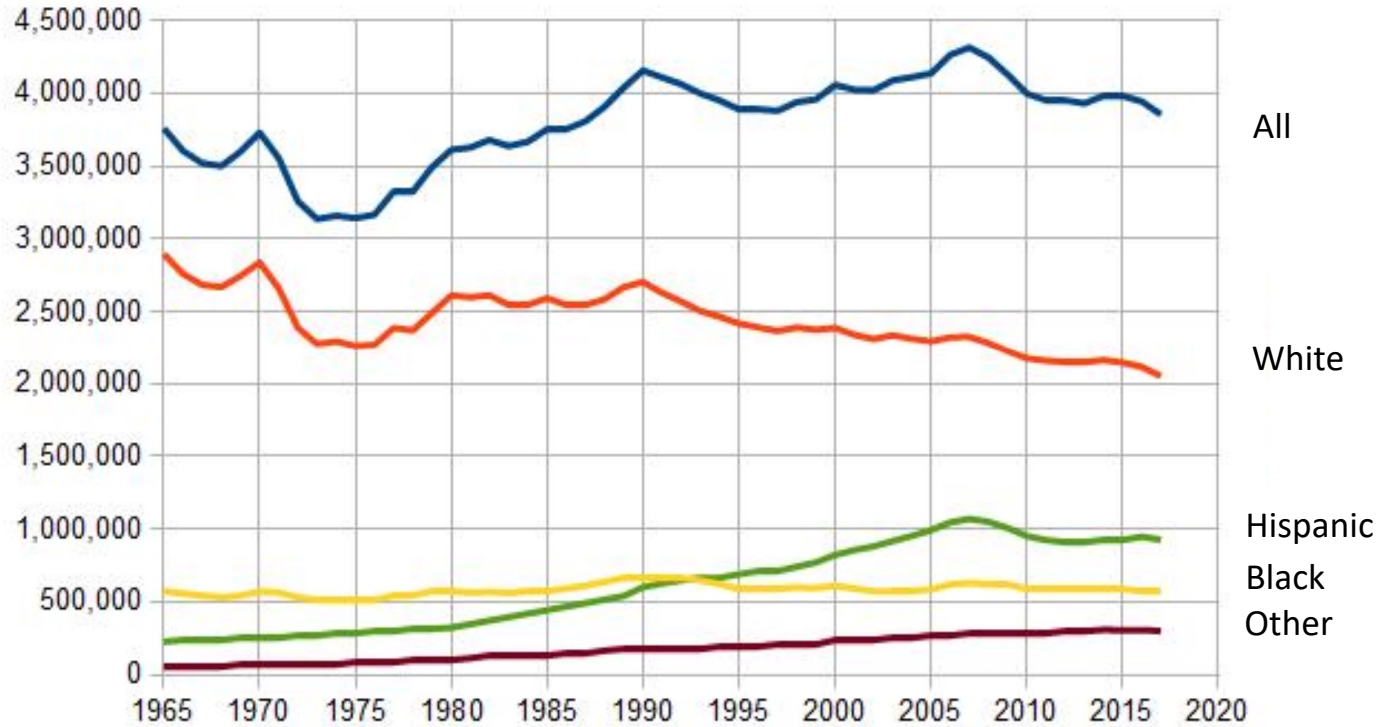
Breakdown of STEM Jobs

Category	Number of Workers		
	2014	2018	2028 Projection
Computer and Mathematical	3,619,000	4,000,890	4,552,390
Architecture and Engineering	2,211,560	2,316,240	2,420,840
Life, Physical and Social Science	968,670	990,800	1,075,200
All STEM	6,799,230	7,307,930	8,048,430

By 2032, over 50% of all 18 year olds in this country will be nonwhite.

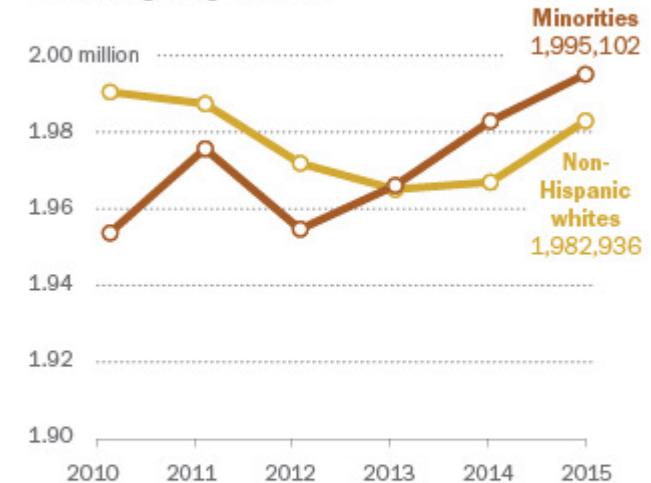
Physics has to become more diverse, or it has to become smaller.

Live births by race/ethnicity, United States, 1965-2017, estimated:



Among newborns, minorities slightly surpass non-Hispanic whites

Children younger than 1



Note: Minority includes all race and ethnic groups except single-race non-Hispanic white. Data for 2010 are as of April 1; for other years, data are as of July 1.

Source: U.S. Census Bureau 2015 population estimates

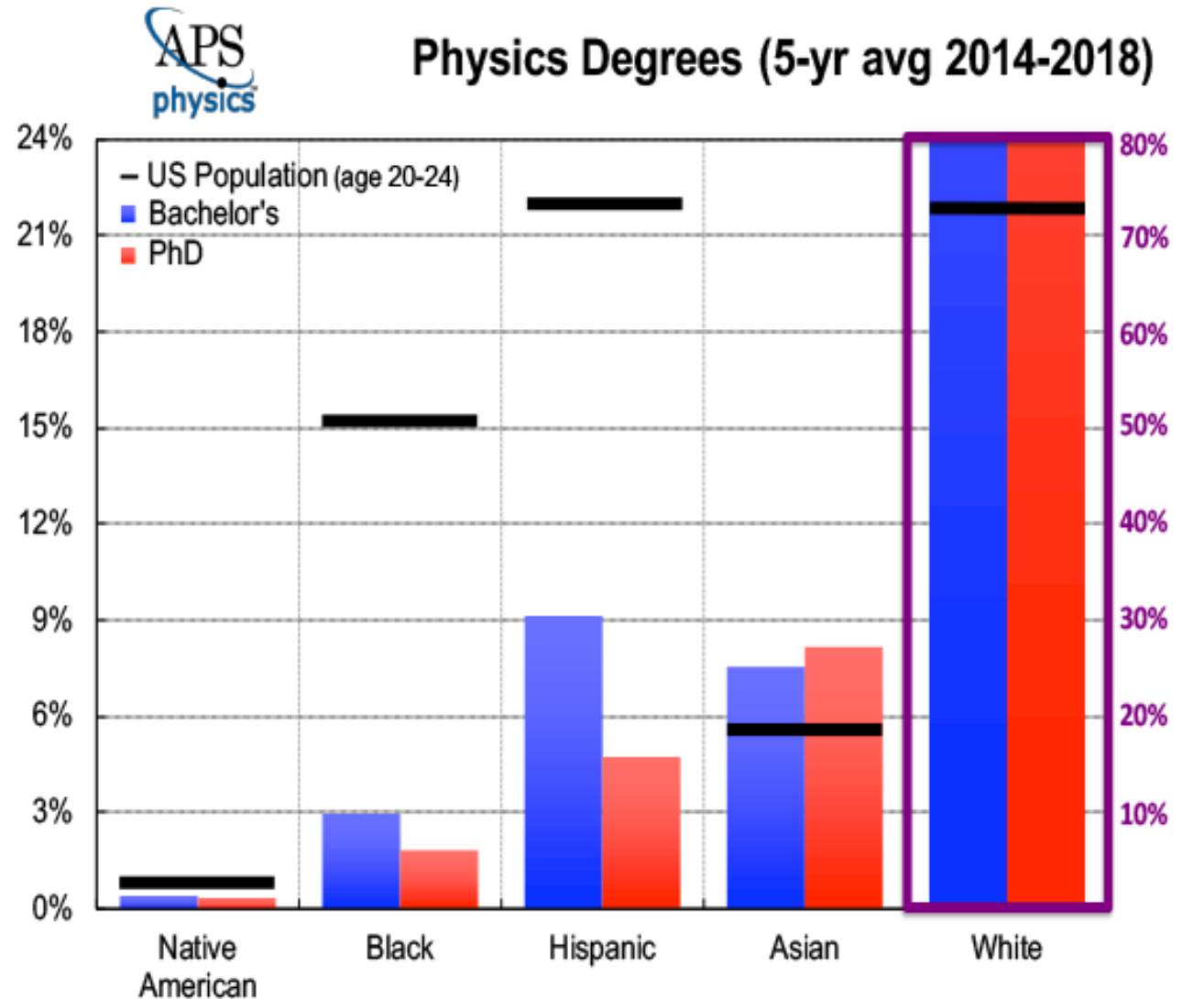
PEW RESEARCH CENTER

Racial/Ethnic Disparities in Physics

US pop. vs Physics PhD rates

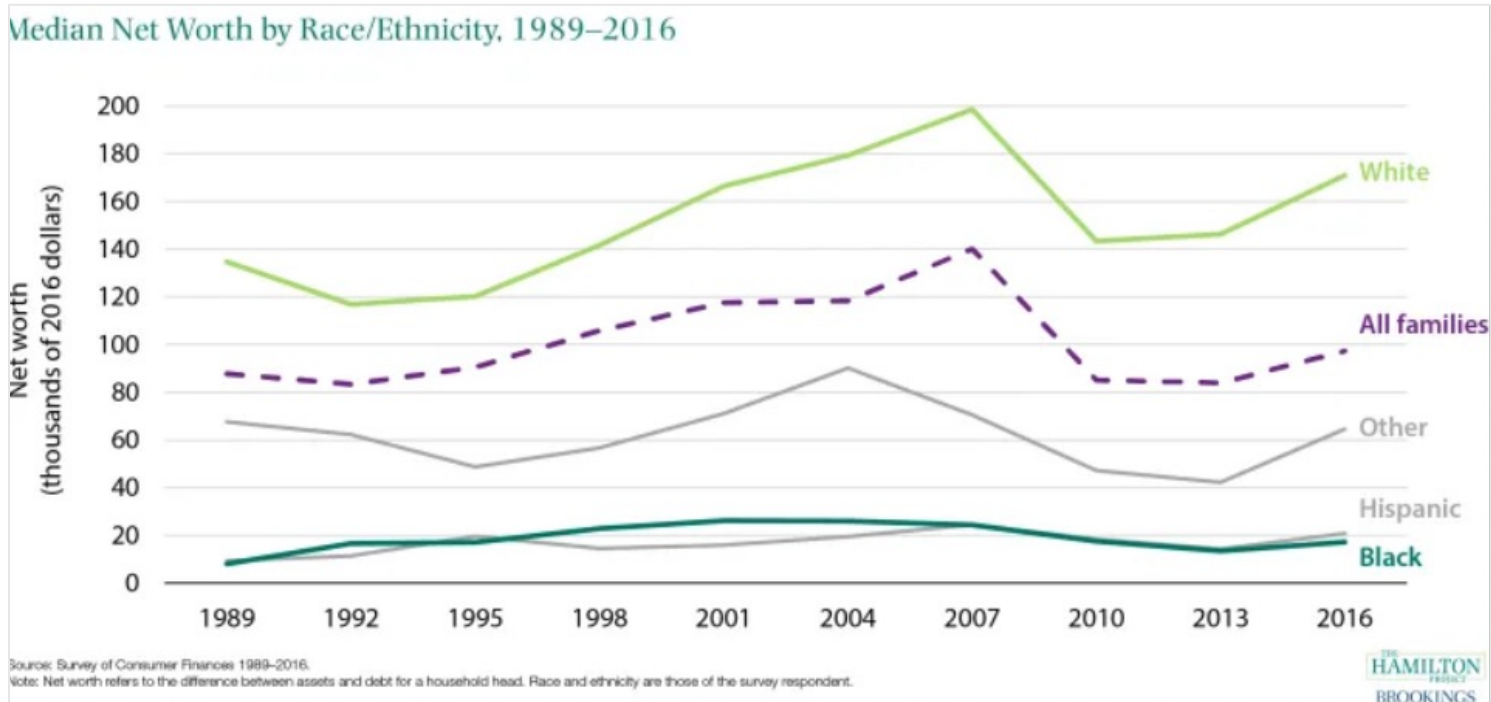
- 15% vs (2%) Black
- 21% vs (5%) Hispanic
- 72% vs (80%) White

NOT a problem that will fix itself!



Source: IPEDS, US Census, and APS

Financial vs Cultural Origin of Disparity



Minorities vs Whites:

- lower-income background
- More student loan debt
- Primary care-taker of family member
- Less cultural familiarity with academia/research
- Brilliant minority students often pursue engineering and medicine

My success: Hard work + \$\$\$ + Mentoring

- B.S. Physics at University of Wisconsin
 - 4-year academic scholarship
 - 2-year NSF undergraduate research fellowship
- PhD at University of Washington
 - 1-year Clean Energy Institute fellowship
 - 1-year DOE fellowship.
- Postdoc at Massachusetts Institute of Technology
 - 3-year NSF fellowship (MPS-Ascend Fellow)
- Strong mentoring aspects of these fellowships!

Bridge Programs Succeed in Diversifying Physics: Opportunities + \$\$\$ + Mentoring

Table 1 | A comparison of PhD bridge programmes

Programme	Year founded	Student entry point	Number of institutions	Fields	Number of students per year	Total number of students in programme
Fisk-Vanderbilt	2004	Master's	2	Astronomy, Physics and Material Science, Biology, Chemistry	10-20	146
Columbia	2008	Post-baccalaureates	1	Multiple science and engineering fields and economics	8-10	65
APS Bridge	2013	Master's	6 out of >25 ^a	Physics (including Astronomy in Physics PhD programmes)	40	>100
Cal-Bridge	2014	Undergraduate	25	Physics and Astronomy	40	99

^aSix programmes are APS Bridge Program sites. More than 25 are APS Bridge Program partnership institutions, which do not have the same processes of vetting or expectations of programming as the original bridge sites

Proposal: Longitudinal support of undergrads

Single-Summer REU/

Single-Semester Lab Position

- Light investment in many students
- Possible limited contact after REU
- Not enough time to build strong skills or strong relationships
- No financial security over multiple years, have to think about funding constantly

Multi-summer REU/

Multi-year Lab Position

- Heavily invest in 1 student
- Support them from undergrad into grad school.
- Build stronger lab skills and mentoring relationships
- Student feels like they belong in STEM, keeps them in the field!

UW Clean Energy Institute: OUR Award



CLEAN ENERGY
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UNIVERSITY *of* WASHINGTON

- Clean Energy Bridge to Research (CEBR) Program
- Focus on women and minority students
- Outstanding Undergraduate Research (OUR) Award: New multiyear undergraduate REU award
- Allows a CEBR student to return for multiple summers to continue working in the same lab
- Build stronger skills and relationships with mentors
- Longterm financial support for a single student

What will you do to help the next generation of diverse Physicists?

