

# Establishing Community: Research as a Broader Impact

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# Overarching Scientific Questions

How can we broaden participation in plasma physics?

What defines the identity of a physicist?

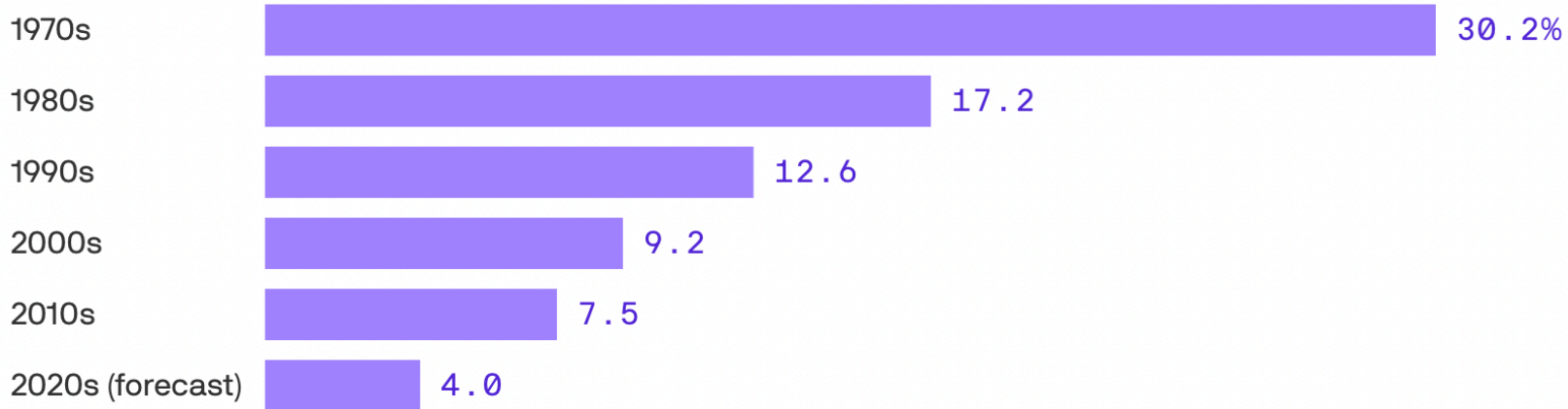
Who gets to establish values and norms?



# Broader Scientific and Societal Context

## Labor force growth by decade

1970s to 2020s

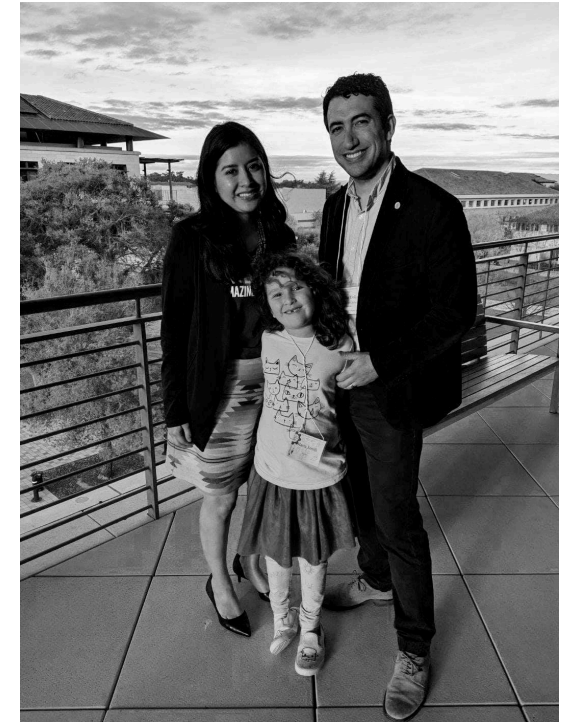


Data: Bureau of Labor Statistics, Congressional Budget Office; Chart: Axios Visuals

U.S. labor force will grow ~0.2% annually from 2024 to 2031 (US CBO)



# About me



**ECLIPSE**

Ecosystem for Collaborative Leadership and Inclusive innovation in Plasma Science and Engineering  
March 2022

PHY-1753165, DMR-1548924



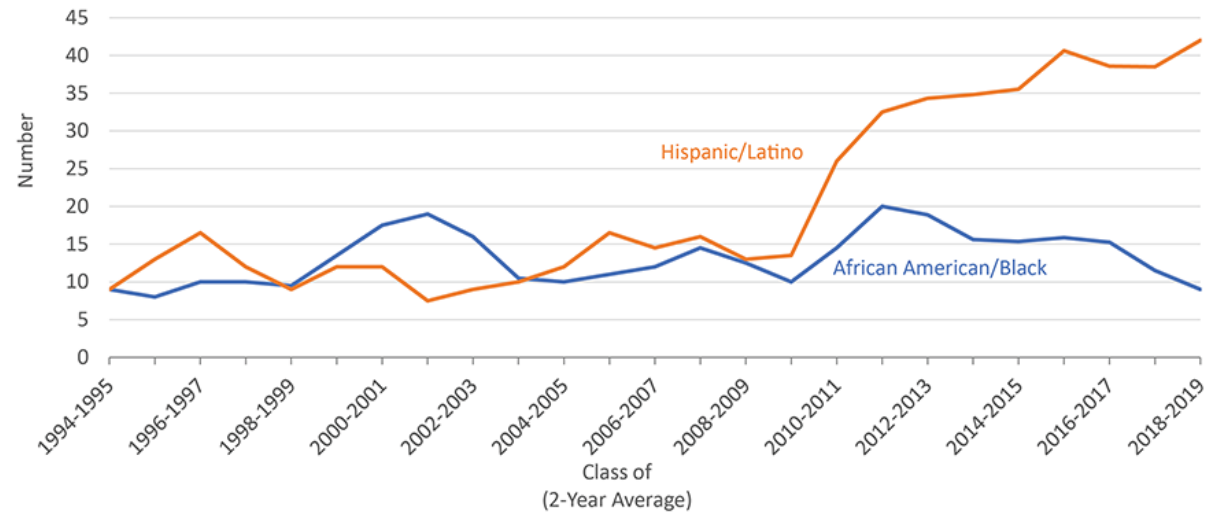
# Broader Scientific and Societal Context

## Physics annual phd production

In 2020, 2,241 degrees produced

- <21% were female
- 2 were American Indian/Alaskan Native
- 21 were Black or African American

Number of African American and Hispanic People Earning a Physics Doctorate, Classes of 1994 through 2019



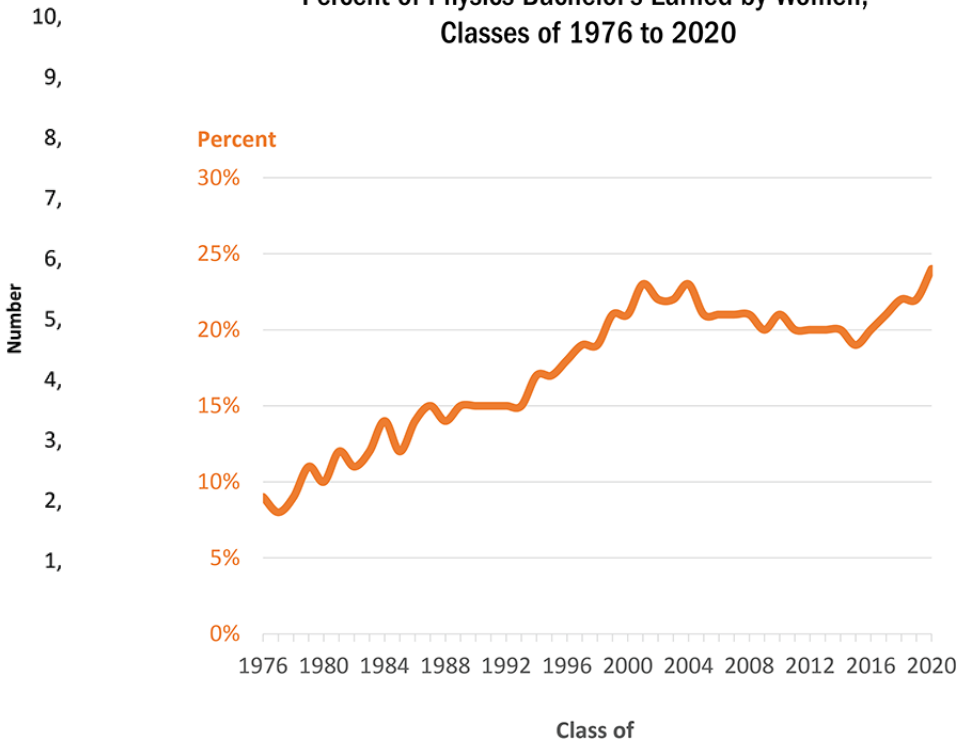
AIP | Statistics

[aip.org/statistics](http://aip.org/statistics)

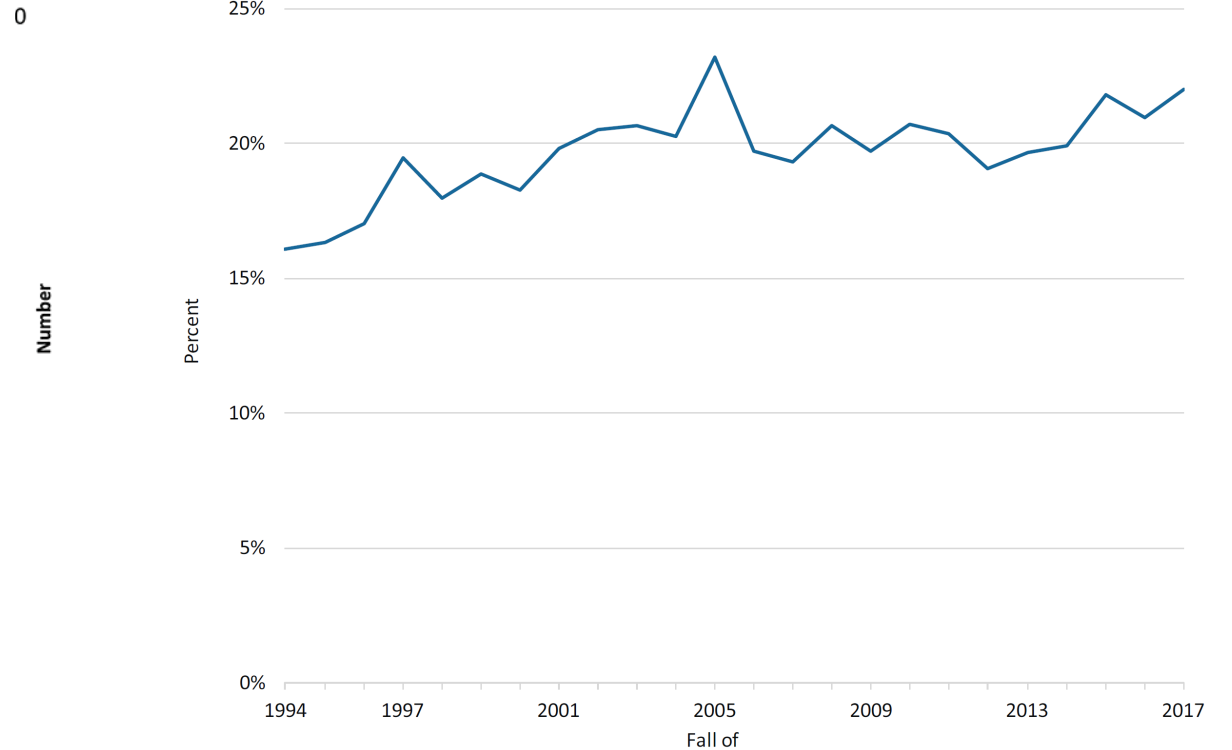


# Trends in Physics

Percent of Physics Bachelor's Earned by Women, Classes of 1976 to 2020



Percent of Women among First-year Graduate Physics Students at PhD Granting Physics Departments, Fall of 1994 through 2017



Source: AIP Statistical Research Center, Enrollments and Degrees Survey.



AIP | American Institute of Physics

[aip.org/statistics](http://aip.org/statistics)



AIP | Statistics

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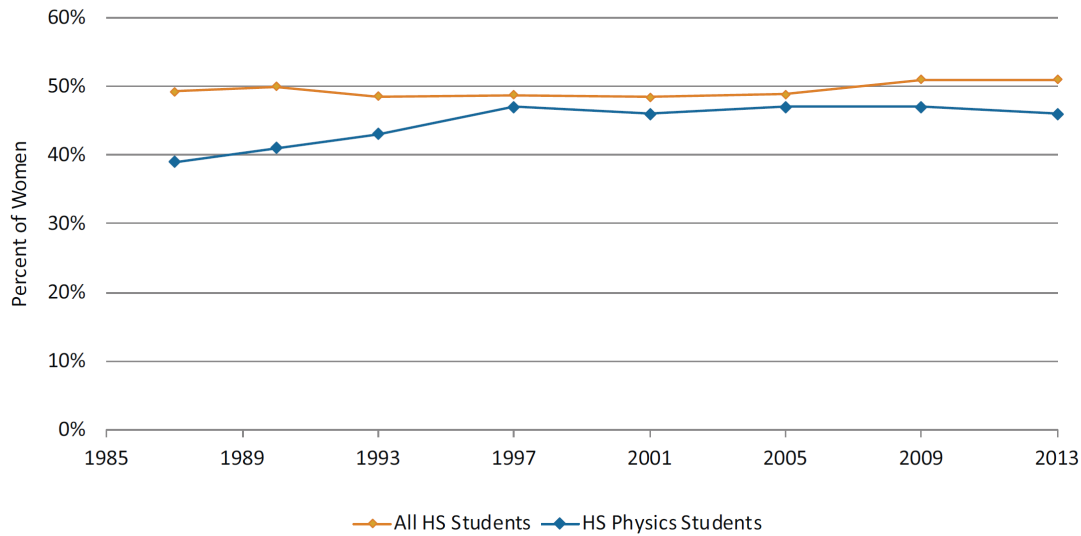


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# The pipeline

Percent of Young Women Enrolled in High School Physics, 1987-2013

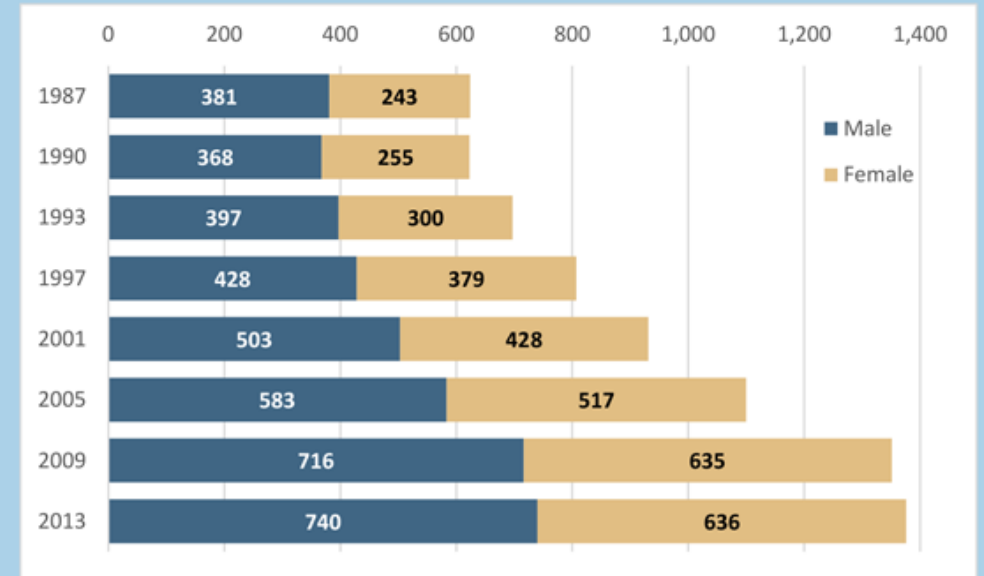


Source: AIP Statistical Research Center, Nationwide Survey of High School Physics Teachers

AIP | Statistics

[aip.org/statistics](http://www.aip.org/statistics)

Number of Male and Female Physics Students  
All US High Schools



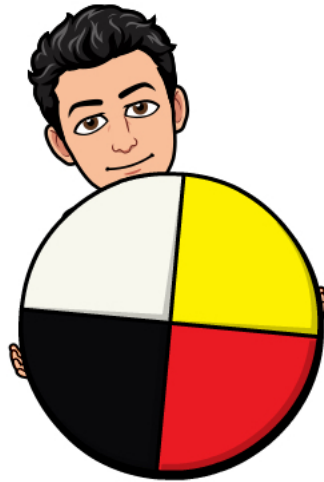
Numbers in thousands

<http://www.aip.org/statistics>

Women make up  
~54% of all  
undergrad  
students



# Dry Creek Band of Pomo Indians



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# Land-grab universities

Expropriated Indigenous land is the foundation of the land-grant university system.

Robert Lee and  
Tristan Ahtone

Image credit: Kelen Goodlock/High Country News  
March 20, 2020 | From the print edition

245

TRIBAL  
NATIONS  
AFFECTED

10.7 million

ACRES GRANTED

52

UNIVERSITIES  
BENEFITING

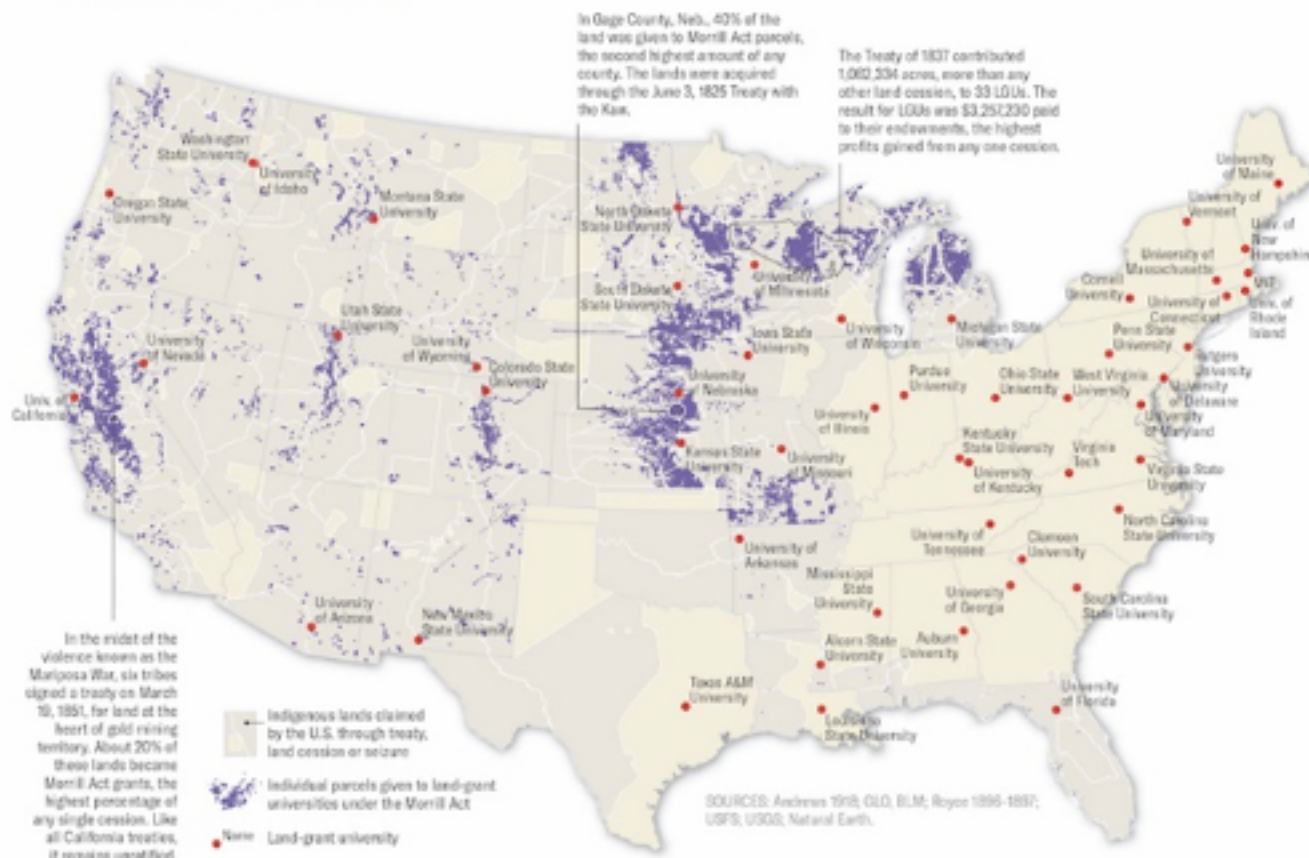
79,410

PARCELS  
DISTRIBUTED

\$495 million

ENDOWMENTS  
RAISED, 2020  
DOLLARS

The Morrill Act gave 79,461 parcels of Indigenous lands, totaling about 10,700,000 acres, to 52 land-grant universities (LGUs) to fund their endowments.



- The Morrill Act worked by turning land taken from tribal nations into seed money for higher education.
- Land-grant universities were built not just *on* Indigenous land, but *with* Indigenous land.

<https://www.hcn.org/issues/52.4/indigenous-affairs-education-land-grab-universities>

Database: <https://www.landgrabu.org>



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# A different approach

- We discuss participation as if it is inherent that people should want to be here
  - Not viewing low participation as an indicator of lack of preparation or interest
- We neglect the history that has redefined being a physicist for the past few hundred years
  - Many cultures have strong cultural and societal ties to the study of the world with mathematics
  - Rather than defining physics as a new identity to replace your old one, we can reestablish it within these roots



# Research as a source of community

- Begin with assumption that we are all here because we want to solve problems, to make the world a better place
- How to encourage open discussion and normalize tough conversations
- Remove inequitable barriers and increase growth mindset and wellness



# 3 Programs

- PACE
- CARE-NA
- AISES Ambassador Workshops



# Institutional Alliances

>700 Minority serving institutions exist in US

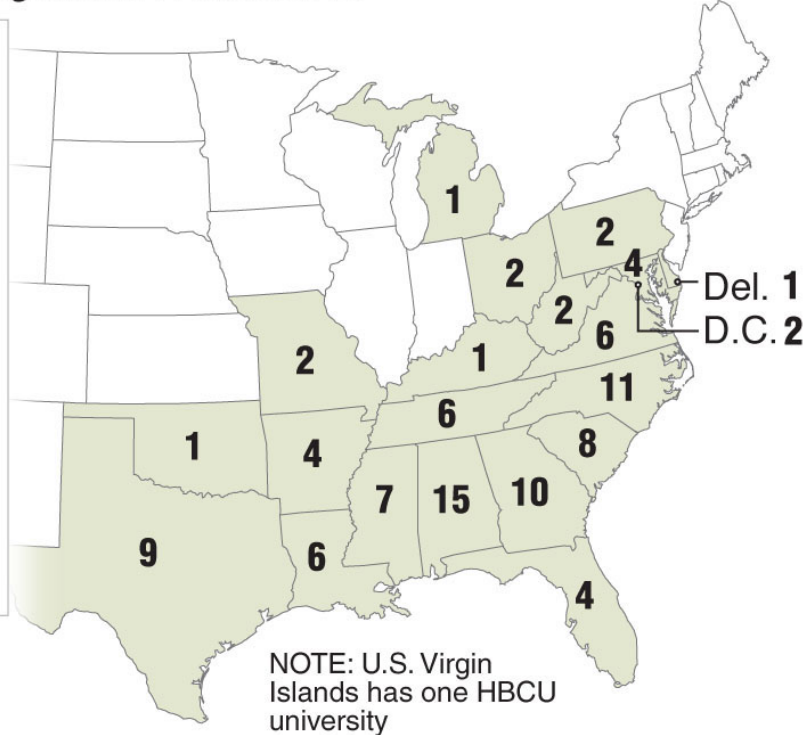
Includes HBCU's, Hispanic Serving Institutions, Tribal Colleges and Universities, and more

## Historically black colleges

States with the 105 historically black colleges and universities (HBCU) that were federally recognized, accredited and established before 1964 for the purpose of educating African-Americans:

**HBCU facts**

- Represent 3 percent of U.S. higher education institutions
- Produce 20 percent of blacks who earn undergraduate degrees
- Almost 50 percent of black school teachers, 70 percent of black dentists are HBCU grads



© 2010 MCT  
Source: U.S. Dept. of Education  
Graphic: Judy Treible



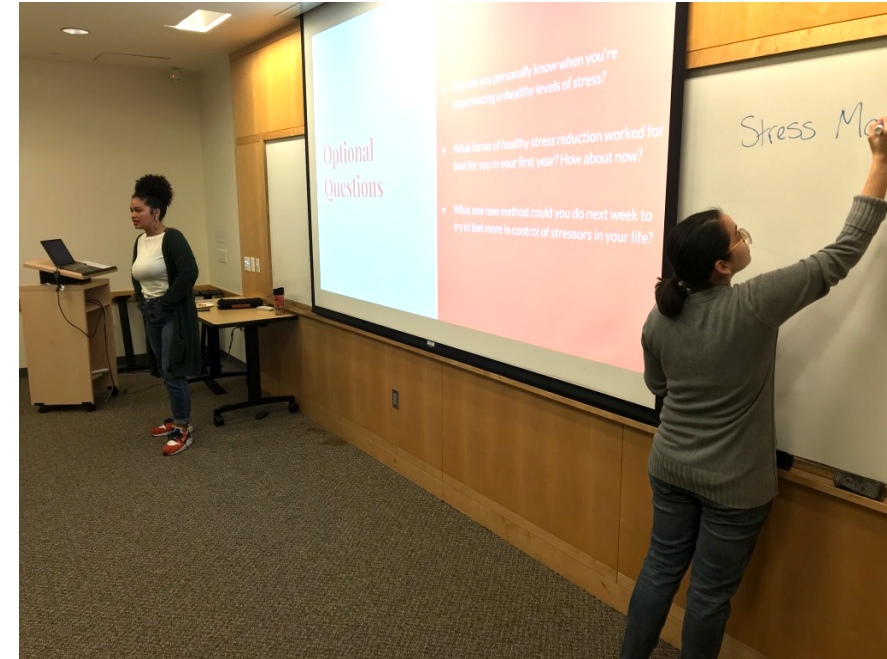
# Research as a source of community

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# PACE Peer Mentoring

- Recommendation derived from APS Report of the Site Visit 2017
- Grad student led workshops with small group discussions
- Mentors can receive training via Grad Division's Mentoring Excellence Program
- TA Training meetings prior to workshop (workshop currently once a month in pizza seminar)



# Program Impact

**↑25%** **Growth Mindset**  
Students believe in the possibility of change, self improvement, growth, creative problem solving

**↑30%** **Peer to Peer Support**  
Students feel a part of their cohort, and have a network of support among the grad community

**↑30%** **Building a Mentor Network**  
Student recognize the importance of building a mentor network, and can identify >1 faculty advisor as a mentor

## Top Sessions

- ❑ Time Management Tools
- ❑ Strategic Goal Planning
- ❑ Qual Exam Panel
- ❑ Defining Personal Health & Happiness w/ Dr. Phong Luong
- ❑ Planning for Summer Professional Development





# Testimonials

“...This was a **great and easy way to find out what you don't know**. There were a lot of topics I did not realize I should question and that I have started questioning so that I can be a better grad student...”

“...a place where you can **grow as a scientist and as an individual**. You'll gain experiences and knowledge that will help you navigate grad school as well as your own personal life...”

“...It helped me most by hearing that **my experiences are normal and manageable**.”

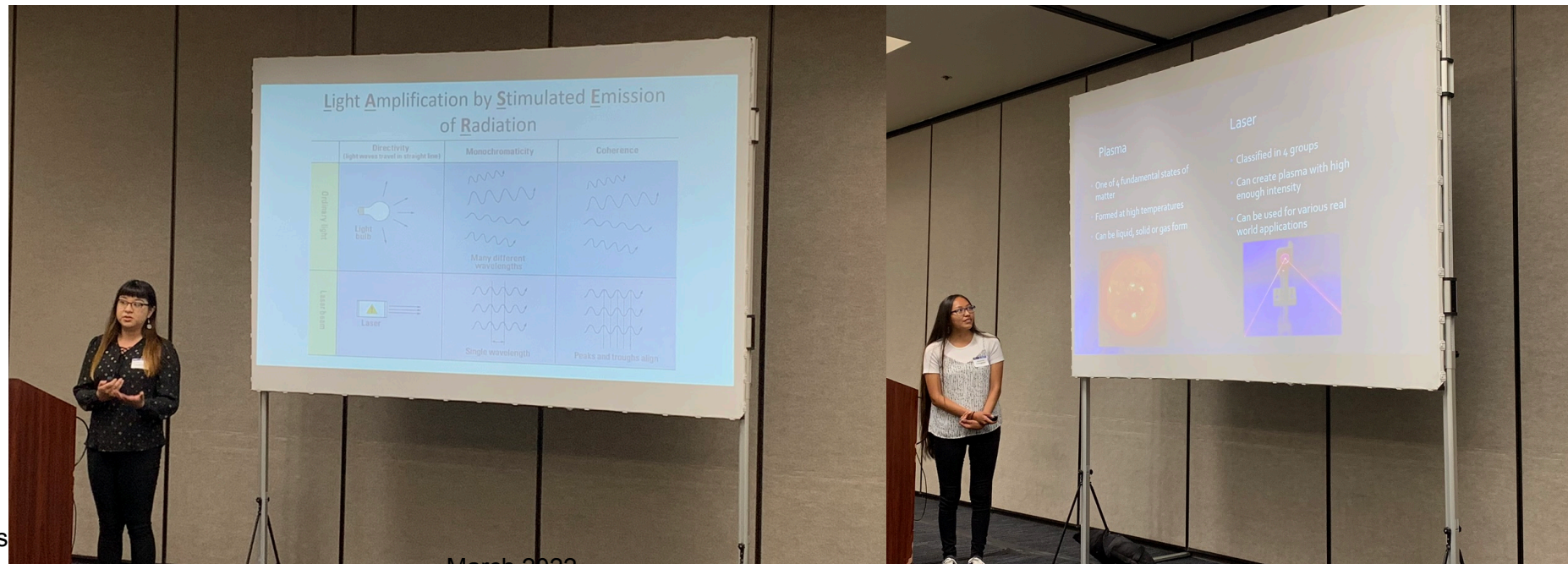
“A place to build community and get to know each other.”

“It is a **safe space** to talk about anything you might be experiencing as a grad student in the department, and I found that a lot of other students were going through similar things as me but just didn't vocalize it. This program was super helpful as it **helped me to realize that I do deserve to be here** no matter what my brain might be telling me.”



# CARE-NA

- Culturally-relevant Accelerator Research & Engineering for Native Americans (CARE-NA) Program
- Paid summer research opportunity



# Workshops

## Developing Culturally Relevant Research Proposals

Professor Franklin Dollar  
Department of Physics & Astronomy  
University of California, Irvine



## NSF Review Criteria

1. What is the potential for the proposed activity to:
  - a. advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
  - b. benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?



## Proposal 1

- Title: Mono Language Documentation Project
- PI: Dr. Kathryn Putative, University of California
- Abstract: The Mono language is a California Indigenous language which has fewer than 40 fluent speakers. It is currently listed as a critically endangered language by the United Nations and action is needed imminently. In this proposal, we will transcribe words and phrases from the mono language and tabulate them into a spreadsheet database. A graduate student researcher will be funded to perform the interviews and transcription process. An undergraduate researcher with ties to the local community will also be involved with the transcription. Both students will benefit from significant training from the PI, who is a world expert in the field. The students would also have the opportunity to share what they have learned with workshops for the tribe to promote language restoration efforts. Tribal members will have access to the results and we will work with tribal elders to determine what is appropriate for public release. Results will be published in academic journals and presented at national conferences.



G/F      G/VG      G/G  
 F/G      G/FG  
 G-VG/FG      G/VG  
 G/G      PF/F

Proposal 1 +++ urgent need - Data management  
 +++ interest in with trib = Feasibility

Click to add text

- not organized/clear
- Lack of advancement
- PI expertise/ties to community



# Open questions for the future

- How to establish meaningful partnerships that empower and respect others
- Having opportunities that leverage existing strengths
- Do we have a common set of objectives and goals
  - Do we treat those goals objectively

