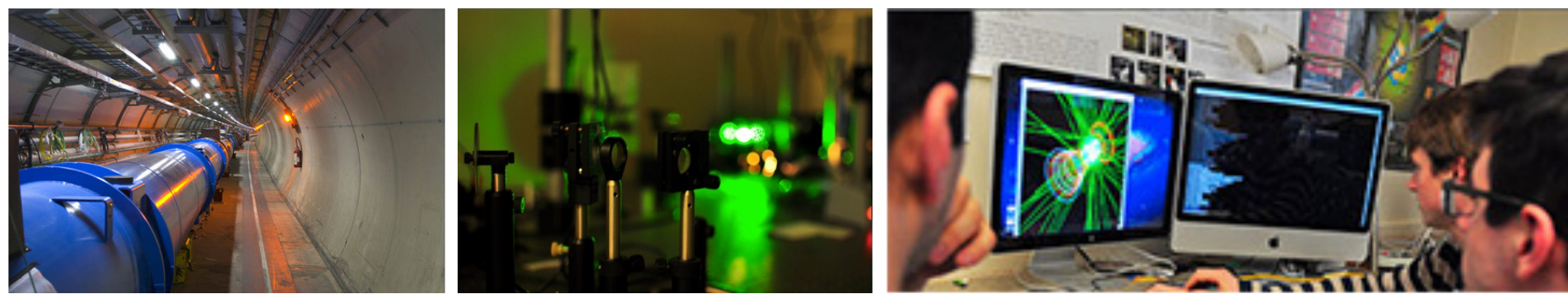


So... What *can* you do with a physics degree?



Matt Beekman (he/him/his)

Department of Physics

California Polytechnic State University

San Luis Obispo, CA

Goals for this talk:

- Overview of which job sectors physics graduates work in
- A few specific examples of successful physics career profiles
- Provide some resources for further exploration

But first...

thank you

What do physicists do?



physicist



Dictionary

Definitions from [Oxford Languages](#) · [Learn more](#)



phys·i·cist

noun

an expert in or student of physics.

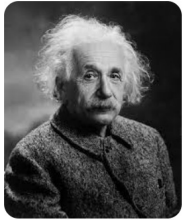


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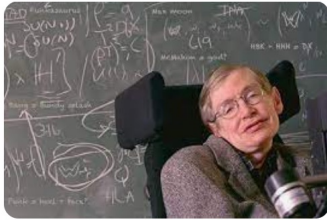
What do physicists do?



physicist



Wikipedia
Physicist - Wikipedia



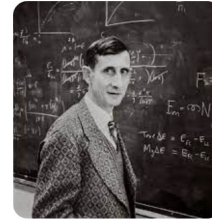
www.chieftain.com
Theoretical physicist Stephen Hawking ...



The Guardian
Physicist Sabine Hossenfeld...



Science | HowStuffWorks
Physicists | HowStuffWorks



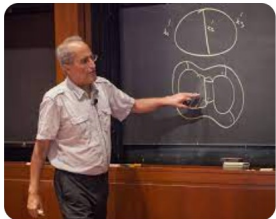
National Geographic
Freeman Dyson, legendary t...



USC News - Universi...
The Physicist Who Hel...



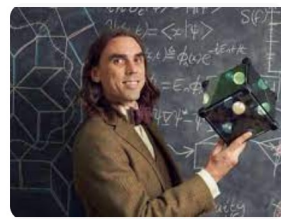
Your Free Career Test
What does a Physicist Do, Job ...



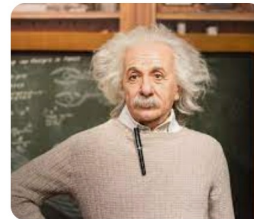
Scientific American Blogs
World's Smartest Physicist Thinks ...



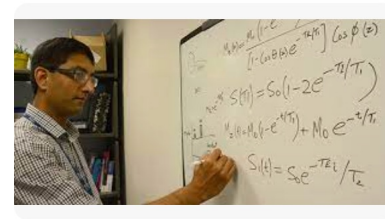
Interesting Engineering
An AI-driven physicist may have ...



The Guardian
Physicist Sabine Hossenfelder: 'There ...



OwlGuru.com
What Do Physicists Do (including T...



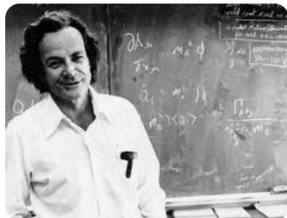
Cincinnati Children's Blog - Cincinnati Children's Ho...
What is a Physicist doing in MRI ...



Stanford News - Stanford University
theoretical physicist ...



Facebook
Greatest Physicists ...



Business Insider
Faster With Famous Physicist's Study T...



Careers in the Military
Physicists | Careers in the Military



On This Day
Famous Physicists - On This Day



Physics Today - Scitation
Q&A series: Black voices in physics



ScienceAlert
20 Physicists Who Revolutionised Our...



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What are they doing (Bachelor's)?

Status of Physics Bachelors One Year After Degree,
Classes of 2019 & 2020 Combined

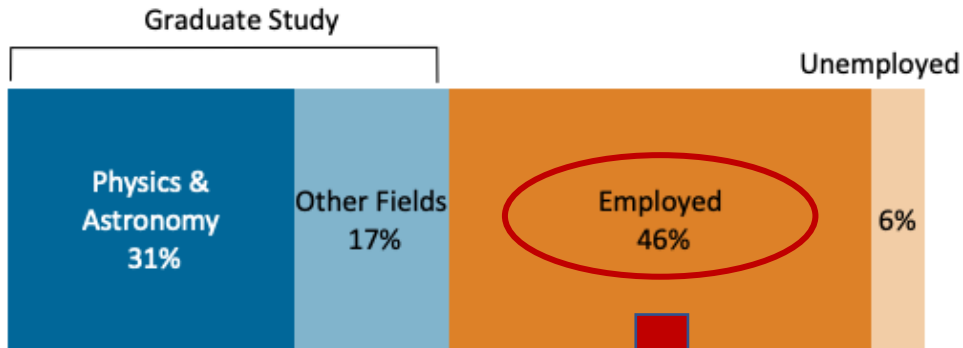


Figure based on 5764 individuals

AIP Statistics

aip.org/statistics

> **8500** Physics Bachelor's degrees are awarded annually in the U.S.

About **half** go straight into the workforce

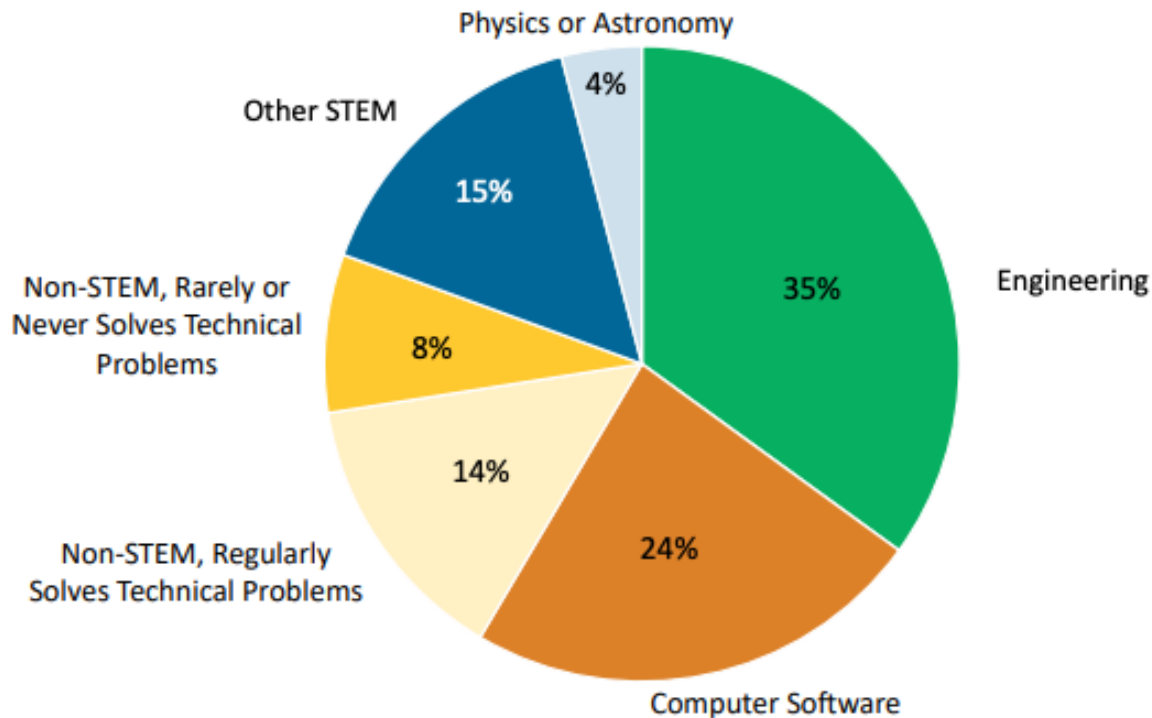
Initial Employment Sectors of New Physics Bachelors,
Classes of 2019 & 2020 Combined

| Employment Sector | % |
|-------------------------------|-----|
| Private Sector | 59% |
| College & University | 18% |
| High School | 6% |
| Civilian, Gov't, National Lab | 7% |
| Active Military | 3% |
| Other | 7% |

Largely finding employment in the private sector

What are they doing (Bachelor's)?

Field of Employment for New Physics Bachelors in the Private Sector,
Classes of 2019 & 2020 Combined



STEM refers to natural science, technology, engineering and mathematics. Regularly solving technical problems refers to respondents who selected "Daily", "Weekly", or "Monthly" on a four-point scale that also included "Rarely or Never".

AIP | Statistics

aip.org/statistics

Majority
working in
STEM jobs

These physicists
often have a job
title that is not
"physicist!"

Common Job Titles of Physics Bachelors

Engineering

Systems Engineer
Electrical Engineer
Design Engineer
Mechanical Engineer
Project Engineer
Optical Engineer
Manufacturing Technician
Associate Engineer
Application Engineer
Development Engineer
Process Engineer / Technician
Product Engineer
Product Manager
Research Engineer
Quality / Test Engineer
Technical Services Engineer
Integration Engineer
Accelerator Operator

Computer Hardware/Software

Software Engineer / Developer
Programmer
IT Consultant
Systems Analyst
Technical Support Staff
Data Analyst / Scientist

Business/Finance

Business Analyst
Consultant
Project Manager
Investment Associate / Trader

Research and Technical

Research Assistant
Research Associate
Research Technician
Lab Technician / Assistant
Scientist

Education

High School Physics Teacher
High School Science Teacher
Middle School Science Teacher
Instructor
Tutor

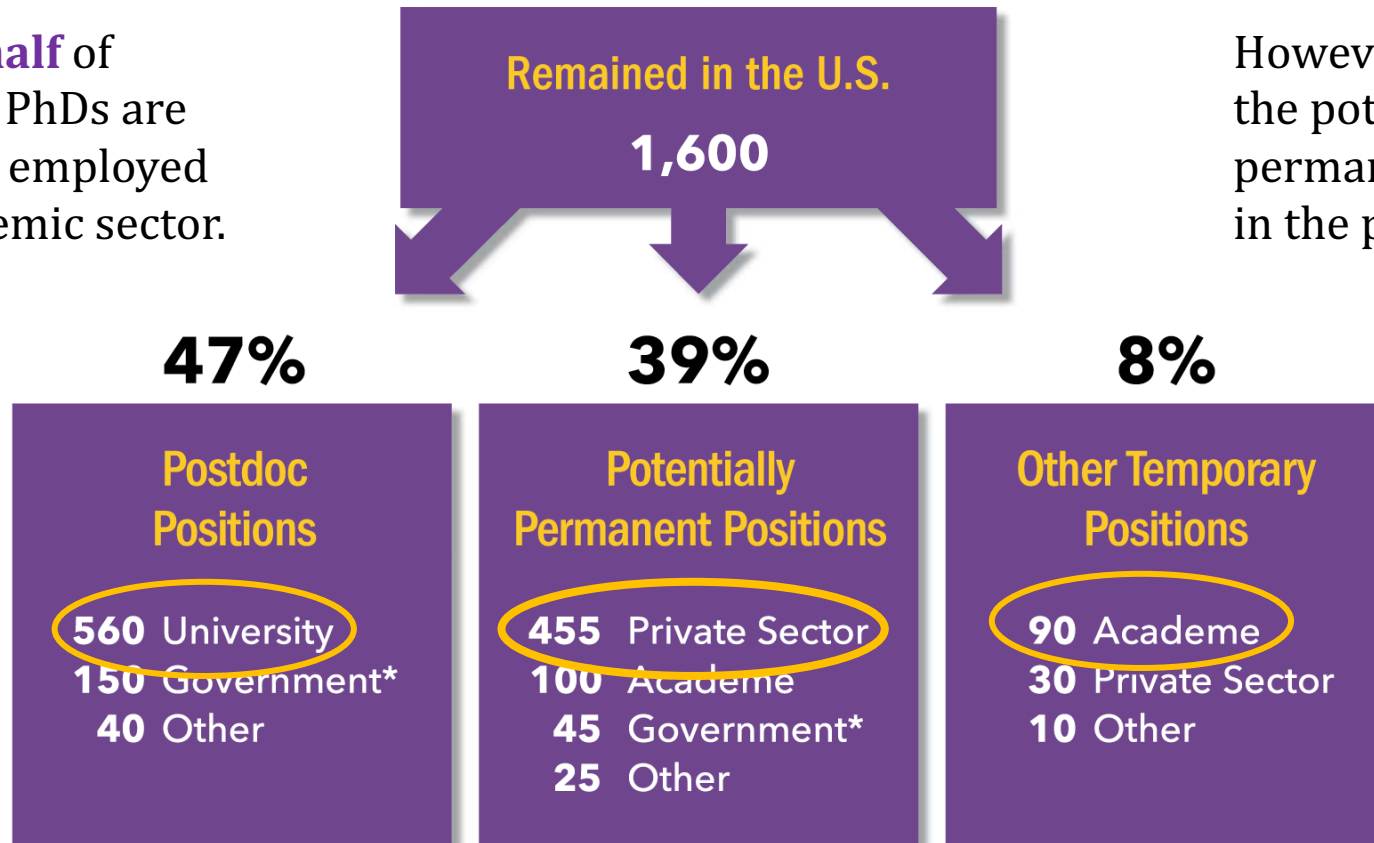
Source: AIP Follow-Up Survey of Physics Bachelors, Classes of 2017 and 2018.

What are they doing (PhDs)?

2015-2016 graduates: 1 year after PhD

About **half** of Physics PhDs are initially employed in academic sector.

However, ~**73%** of the potentially permanent jobs were in the private sector.



6% of those in the U.S. were unemployed the winter after receiving their degrees.
<1% of those in the U.S. were not employed and not seeking employment.

Industry demand



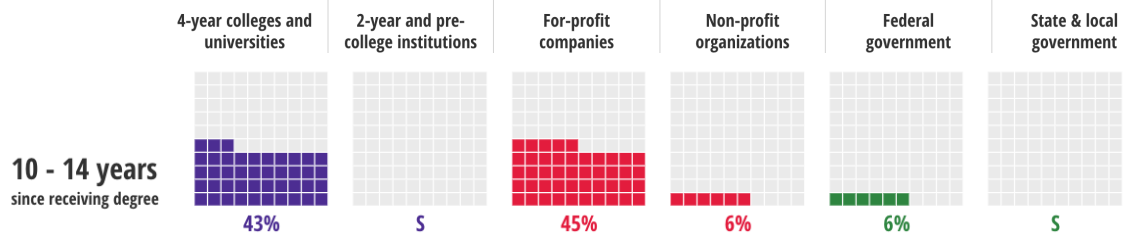
Education



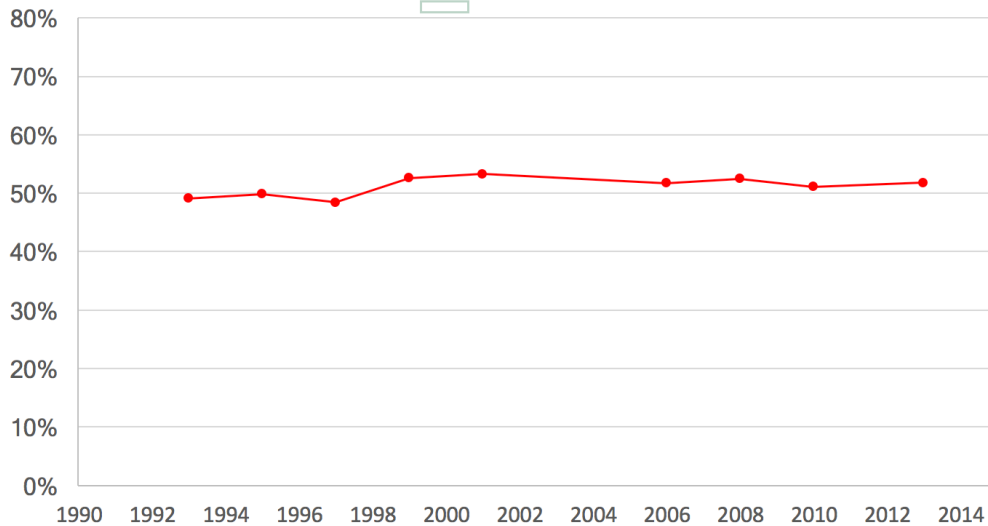
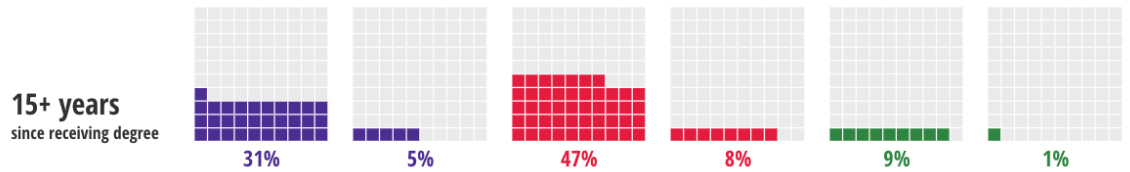
Business



Government



Percentage of Physics PhDs* Employed in the Private Sector



*Data includes PhDs employed in potentially permanent positions only. Data excludes PhDs not in the labor force. Average unemployment is 3%.

Source: NSF Survey of Doctoral Recipients, 2001 - 2013

Industry has been the largest employment base for Physics PhDs for decades.

Examples of Successful Physicists' Careers

aps.org/careers/physicists/profiles



Learn about faculty and lecturers teaching and doing research at universities and colleges

Academia & Research Universities



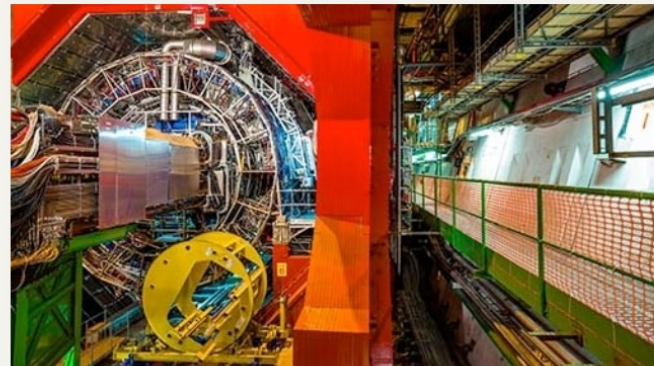
Learn about teaching physics with elementary, middle, high school, and college students

K-12 and Four-Year College Teaching



Explore the career paths of physicists in industry jobs working in R&D, consulting and more

Private Sector



Gain some insight into the role of scientists working at national labs

Government/National Lab

Physicist Profile



Zahra Hussaini, BS,
Site Reliability Engineer

Zahra switched her major to physics to seek a deeper understanding of materials science. As she worked at NIST to get a taste of research, she instead discovered her passion for computer science.

Currently, Zahra works on Google Search, debugging and fixing issues before they become visible to users.

“I think physics is an awesome degree because it teaches you a niche and a way of problem solving that is applicable to so many different fields.”

Learn more: aps.org/careers/physicists/profiles/hussaini.cfm

Physicist Profile



December Martin, BS
Senior Project Manager

December found a job at a biotech startup straight out of college. She traveled to several countries to teach science and English and to support humanitarian work. This fueled her passion for a career in global development with strong social responsibility.

Now, December is a project manager working on a device to treat brain aneurysms and strokes!



Learn more: [aps.org/careers/physicists/profiles/martin.cfm](https://www.aps.org/careers/physicists/profiles/martin.cfm)

Physicist Profile



Paul Markoff-Johnson, MS Director of Product Development



Paul gained an appreciation for physics when he saw its connection with math.

He switched majors from engineering to physics due to the broader scope, variety of career options, and the invaluable skill of using basic principles to solve problems.

Currently, Paul is the Director of Product Development at a company specializing in thin film technology.

“You get that ability to walk into strange situations, unfamiliar situations, and think from what I call basic principles.”

Learn more: [aps.org/careers/physicists/profiles/markoff.cfm](https://www.aps.org/careers/physicists/profiles/markoff.cfm)

Physicist Profile



Neha Pachauri, PhD,
Process Engineer



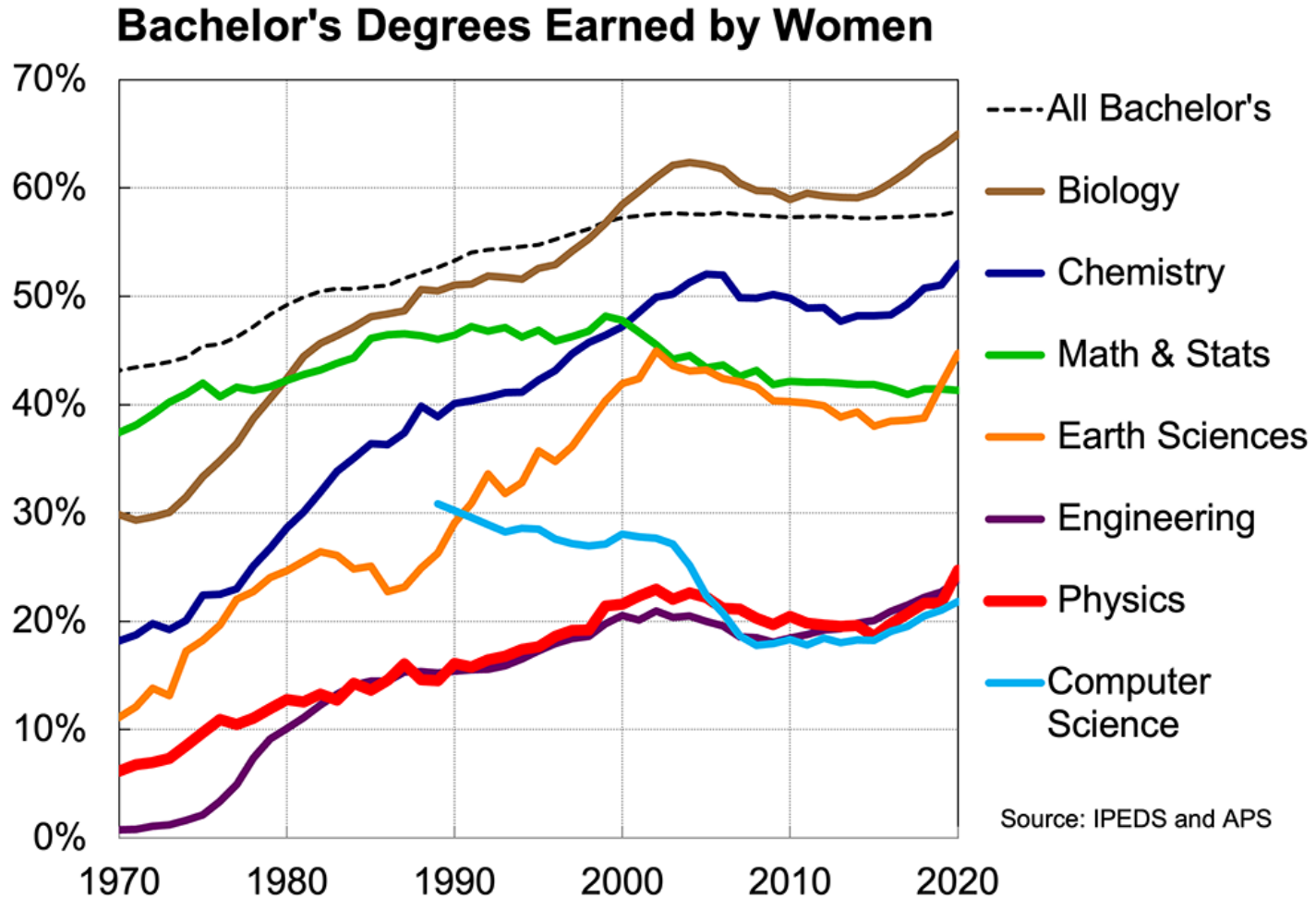
Neha first pursued science due to her natural inquisitiveness. After a Master's degree, teaching physics made her want to dig deeper and get a PhD.

Looking to apply her training to real-world applications, Neha joined Intel's fabrication facility. She found working on cutting edge technology to be intellectually stimulating.

Advice for students: Try new things and make time for a hobby.

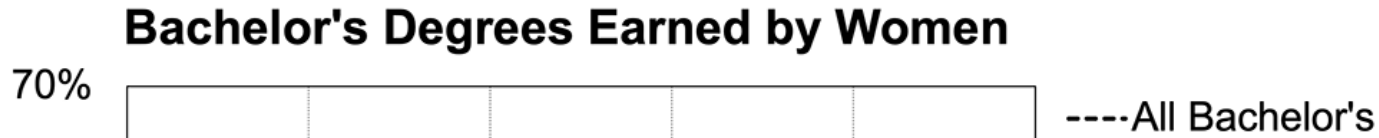
Learn more: [aps.org/careers/physicists/profiles/pachauri.cfm](https://www.aps.org/careers/physicists/profiles/pachauri.cfm)

Who can do physics? Who does physics?



<https://www.aps.org/programs/education/statistics/womenmajors.cfm>

Who can do physics? Who does physics?



Most female physics majors/physicists report becoming interested in physics as a potential career when they were in high school

Hazari, Brewe, Goertzen, and Hodapp, *The Physics Teacher* (2017).
Ivie and Guo, "Women Physicists Speak Again," AIP Pub. Number R-441 (2006).

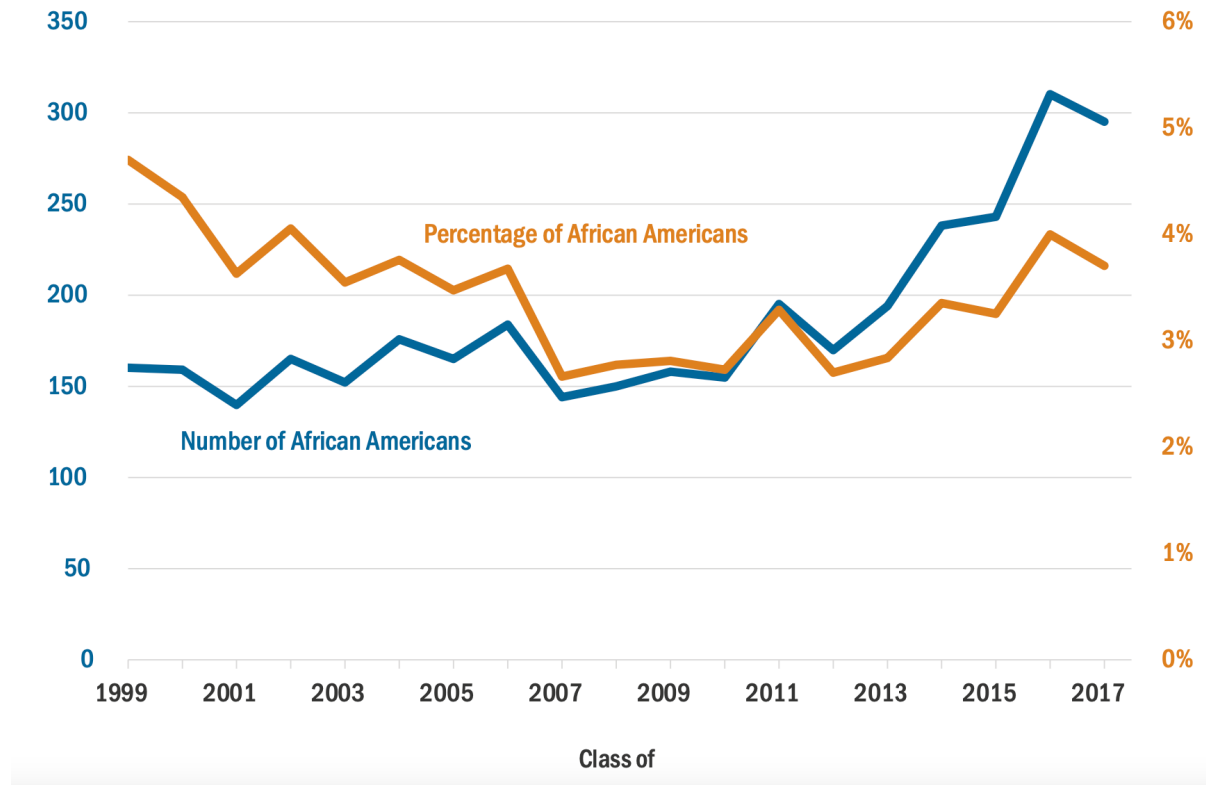
STEP UP: <https://engage.aps.org/stepup/home>

1970 1980 1990 2000 2010 2020

<https://www.aps.org/programs/education/statistics/womenmajors.cfm>

Who can do physics? Who does physics?

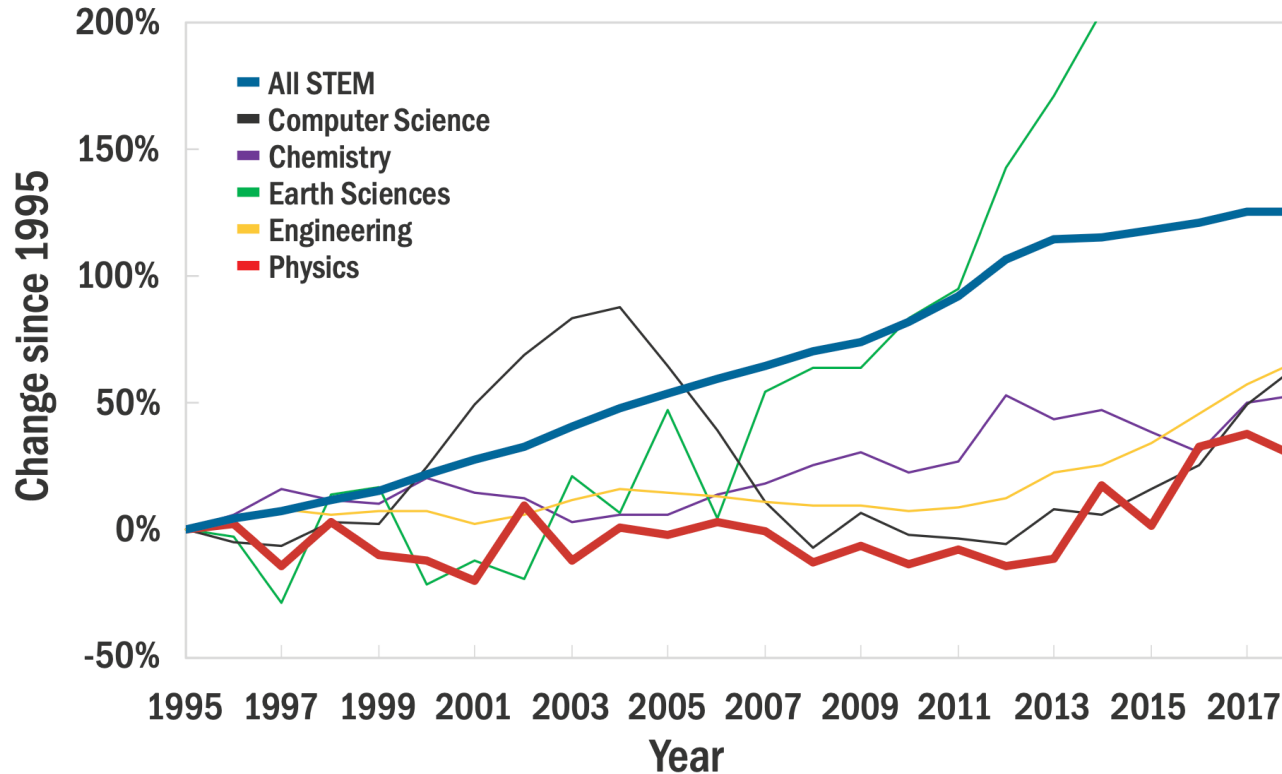
Number and Percentage of Physics Bachelor's Degrees Earned by African Americans



From the AIP TEAM UP report, *The Time Is Now: Systemic Changes to Increase African Americans with Bachelor's Degrees in Physics and Astronomy* (2020)

Who can do physics? Who does physics?

**Growth in Bachelor's Degrees Awarded to African Americans
All Colleges**



From the AIP TEAM UP report, *The Time Is Now: Systemic Changes to Increase African Americans with Bachelor's Degrees in Physics and Astronomy* (2020)

Resources (learn more)

APS Careers 2023 Guide

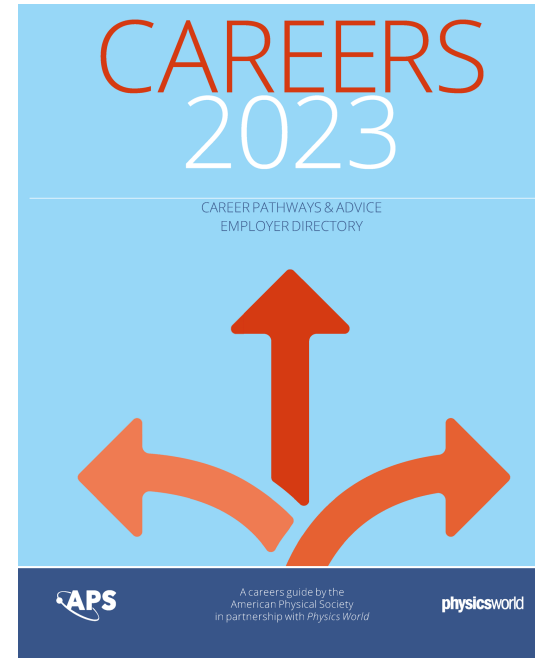
- Breadth of opportunities for physics graduates
- Advice from professionals
- List of companies hiring physicists

go.aps.org/careersguide

SPS Careers Toolbox

- Lists common job titles
- Effective job searching tips
- Resume, cover letter help
- Tips for interviewing

spsnational.org/sites/all/careerstoolbox



APS Careers Website

- APS Job Board
- Professional Guidebook
- Physicist Profiles
- Common Careers Paths

aps.org/careers

Resources (for the classroom)

Careers in Physics Lesson Plan

<https://engage.aps.org/stepup/curriculum/careers>

1. Students brainstorm careers that one can have with a physics degree.

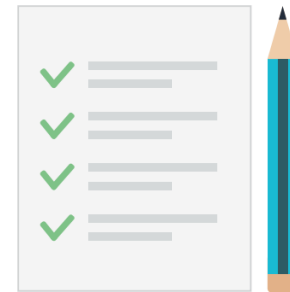


Resources (for the classroom)

Careers in Physics Lesson Plan

<https://engage.aps.org/stepup/curriculum/careers>

2. Students complete a brief survey to determine areas of interest for their future careers.

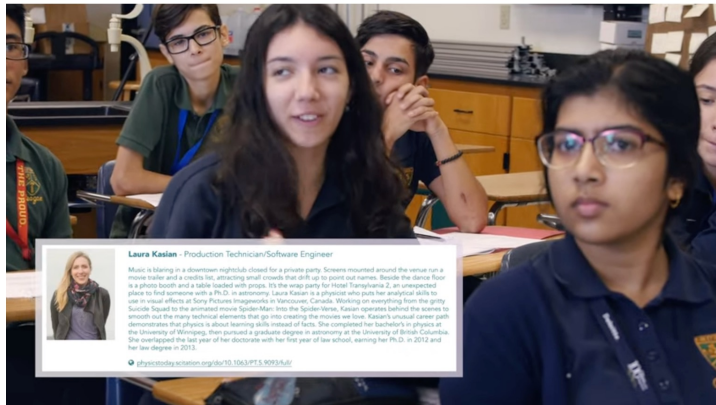
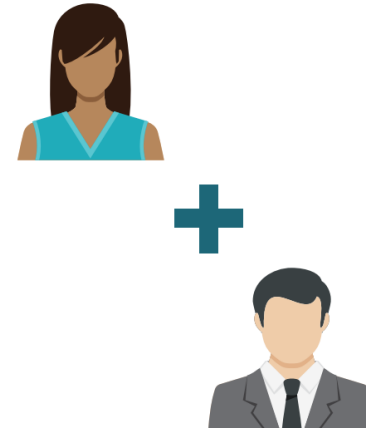


Resources (for the classroom)

Careers in Physics Lesson Plan

<https://engage.aps.org/stepup/curriculum/careers>

3. Using data from their surveys and a matrix, students are matched to relevant physicist profiles to research and discuss.



Resources (for the classroom)

Careers in Physics Lesson Plan

<https://engage.aps.org/stepup/curriculum/careers>

4. Students discuss new careers in physics they learned about, and reflect on how their perceptions of careers in physics have changed.

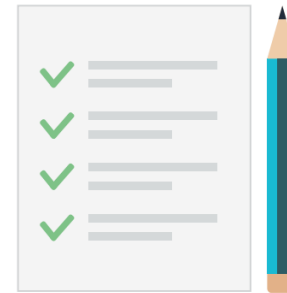


Resources (for the classroom)

Careers in Physics Lesson Plan

<https://engage.aps.org/stepup/curriculum/careers>

- 5. CRITICAL COMPONENT:**
Students complete a personal career profile in which they envision themselves as a future physicist.

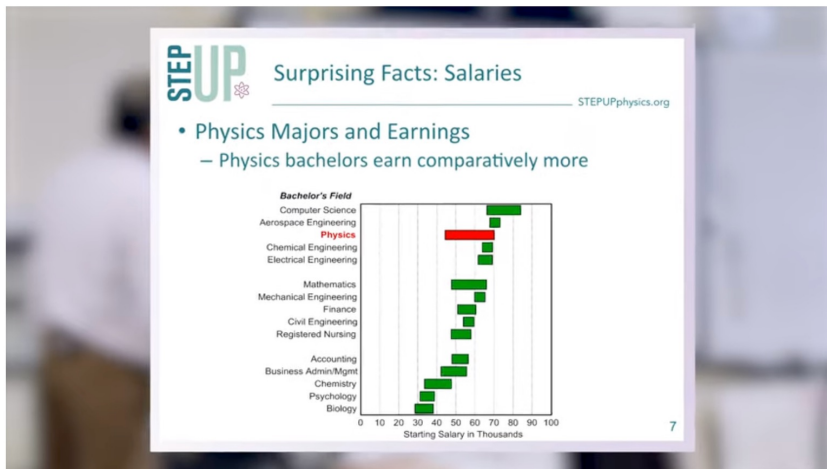


Resources (for the classroom)

Careers in Physics Lesson Plan

<https://engage.aps.org/stepup/curriculum/careers>

6. Students discuss data presented by the teacher on careers and salaries in physics.



Summary

- The careers accessible to physics graduates are very broad
- Most physics graduates work in the private sector (at all degree levels, Bachelor's to PhD), applying their physics knowledge and training in intellectually stimulating and rewarding jobs
- High school is a critical time to inspire the next generation of physicists

Acknowledgments

Many thanks to Crystal Bailey and Midhat Farooq in the APS Careers program

mbeekman@calpoly.edu

Questions? Comments? Discussion?

What do you do in your classroom to help your students understand what is like to do physics/be a physicist?

Success stories of past students who have gone on to study physics in college, and/or pursue a physics career?

What challenges, if any, have you encountered related to the ideas and topics we've discussed?