



Navigating the job market as a physics and STEM degree holder (in the era of COVID)

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Goals for today:

- 1) Provide a big picture of the career paths for physics (and STEM) degree holders
- 2) Provide tips and next steps for the job search market

Entrance Poll

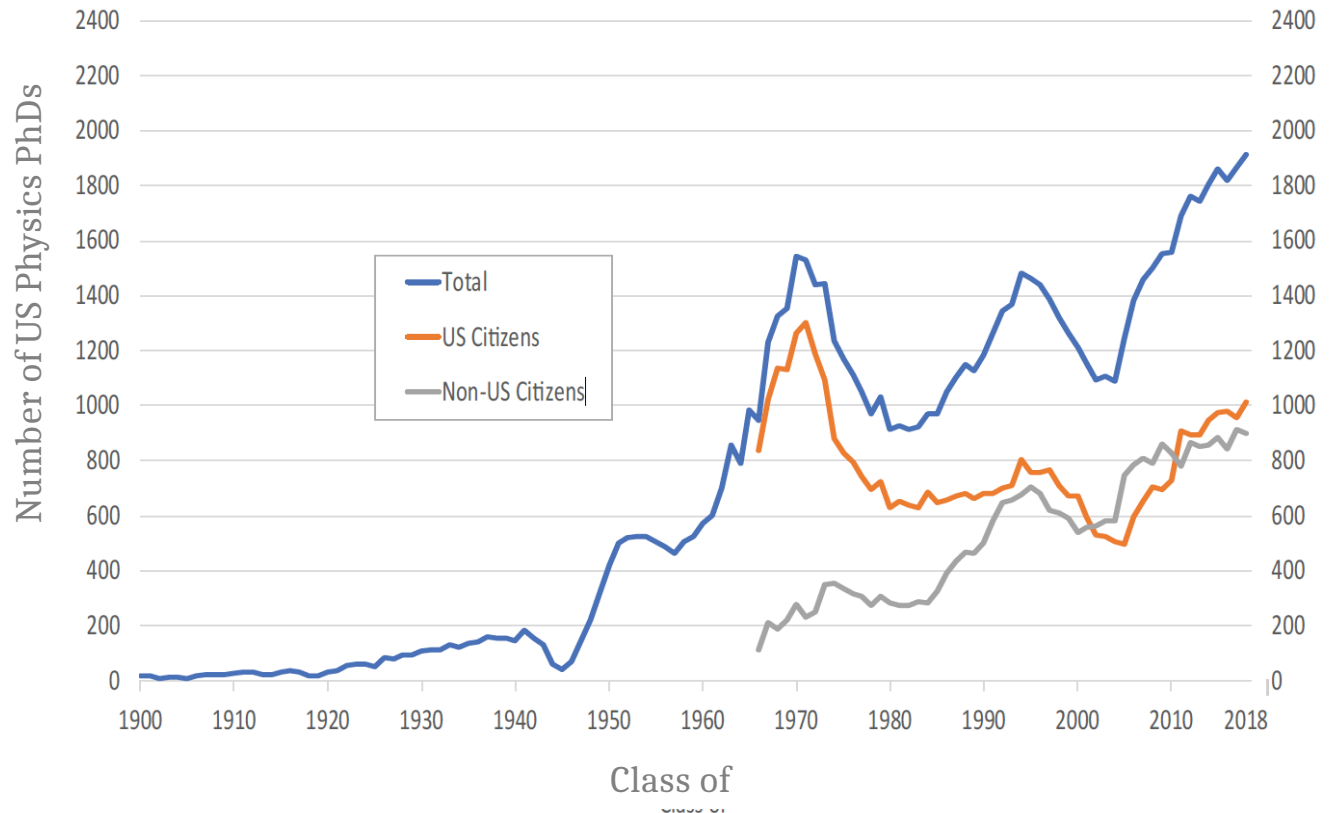
<https://tinyurl.com/y5foruyz>



How many PhDs are there?

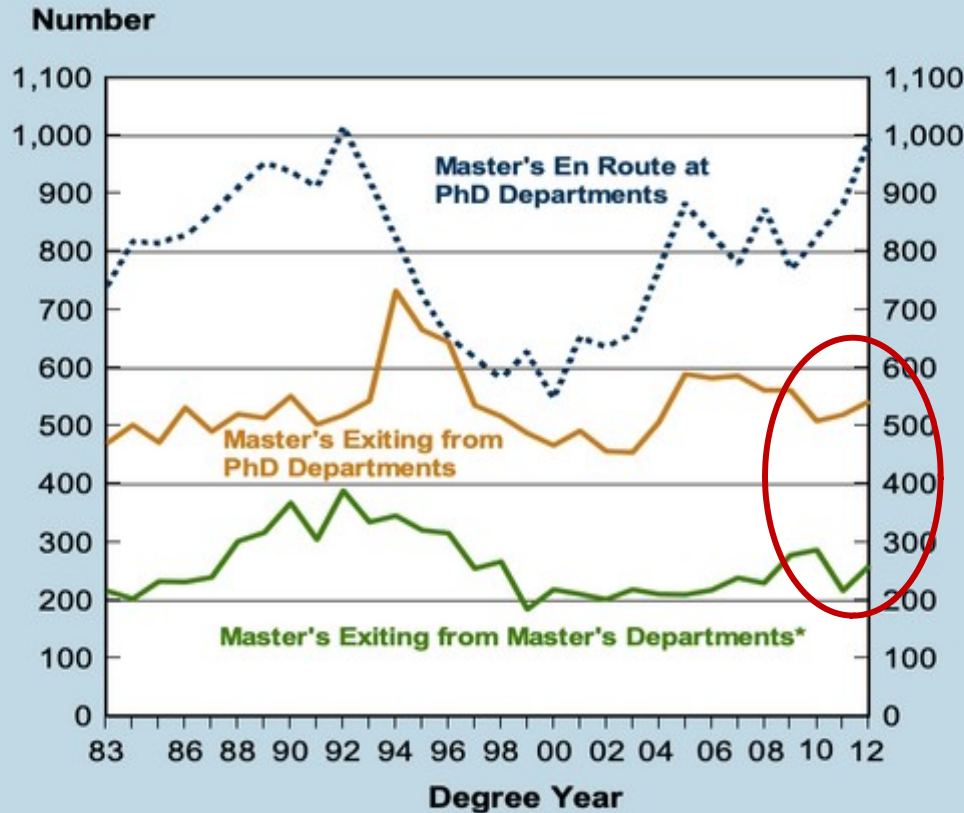
The number of Physics PhDs granted in the U.S. has almost doubled over the last two decades!

About **1600** physics PhDs go into the U.S. job market every year.



Sources: ACE (1900-1919), NAS (1920-1961), AIP (1962-2018)

How many MS holders are there?

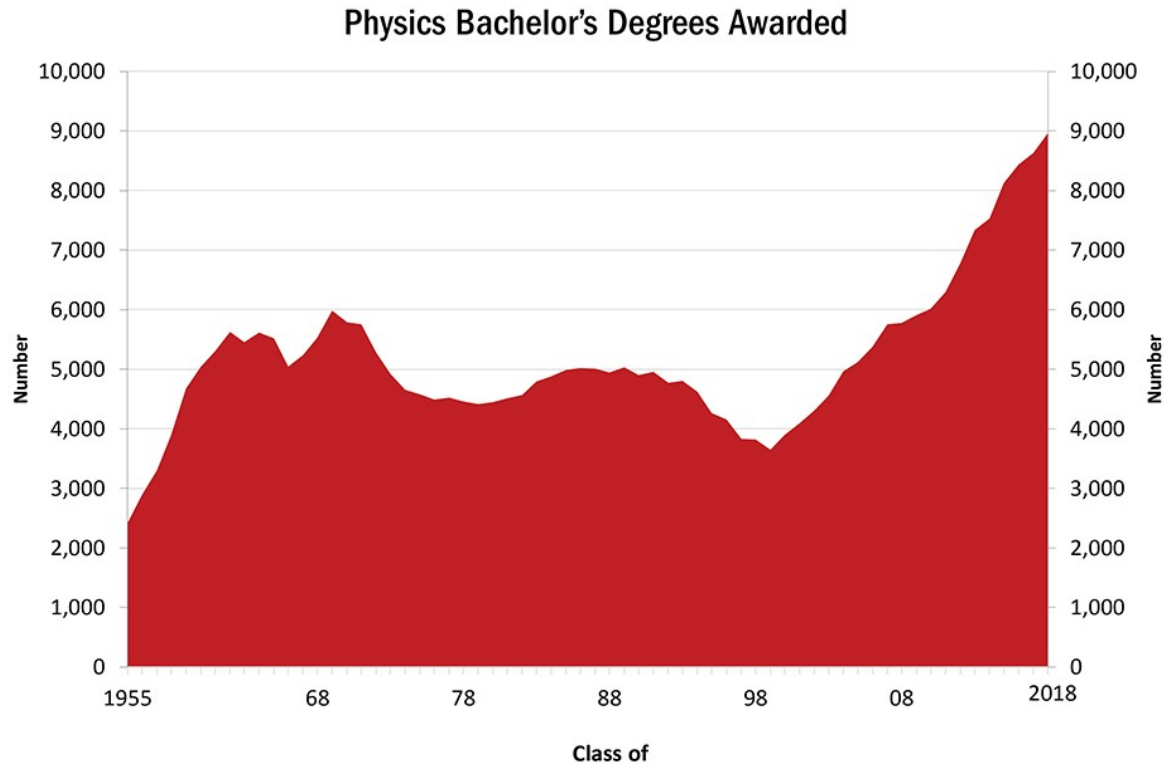


Additionally, of ~700 new Physics Master's holders, >300 also look for jobs (or continue employment) every year.

*These departments offer a master's as their highest physics degree.

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

How many Bachelor's are there?



>8500 Physics Bachelor's degrees are awarded annually

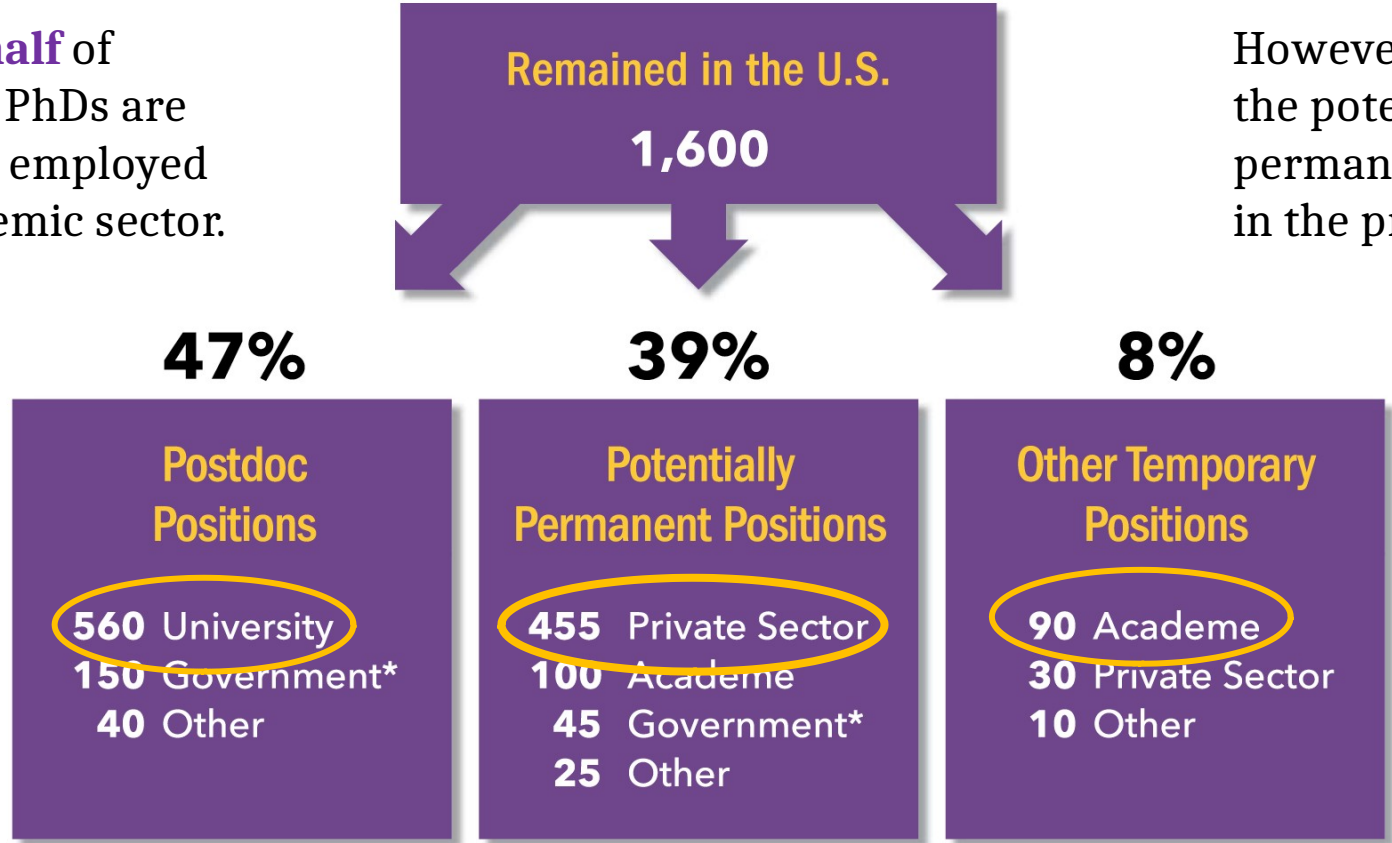
About **half** go straight into the workforce

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.

What are they doing (PhDs)?

A majority work in the private sector



Education



Business



Government

4-year colleges and universities

2-year and pre-college institutions

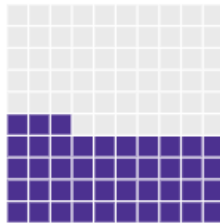
For-profit companies

Non-profit organizations

Federal government

State & local government

10 - 14 years since receiving degree



43%

5

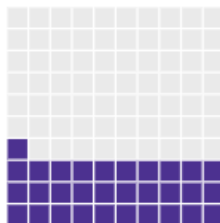
45%

6%

6%

5

15+ years since receiving degree



31%

5%

47%

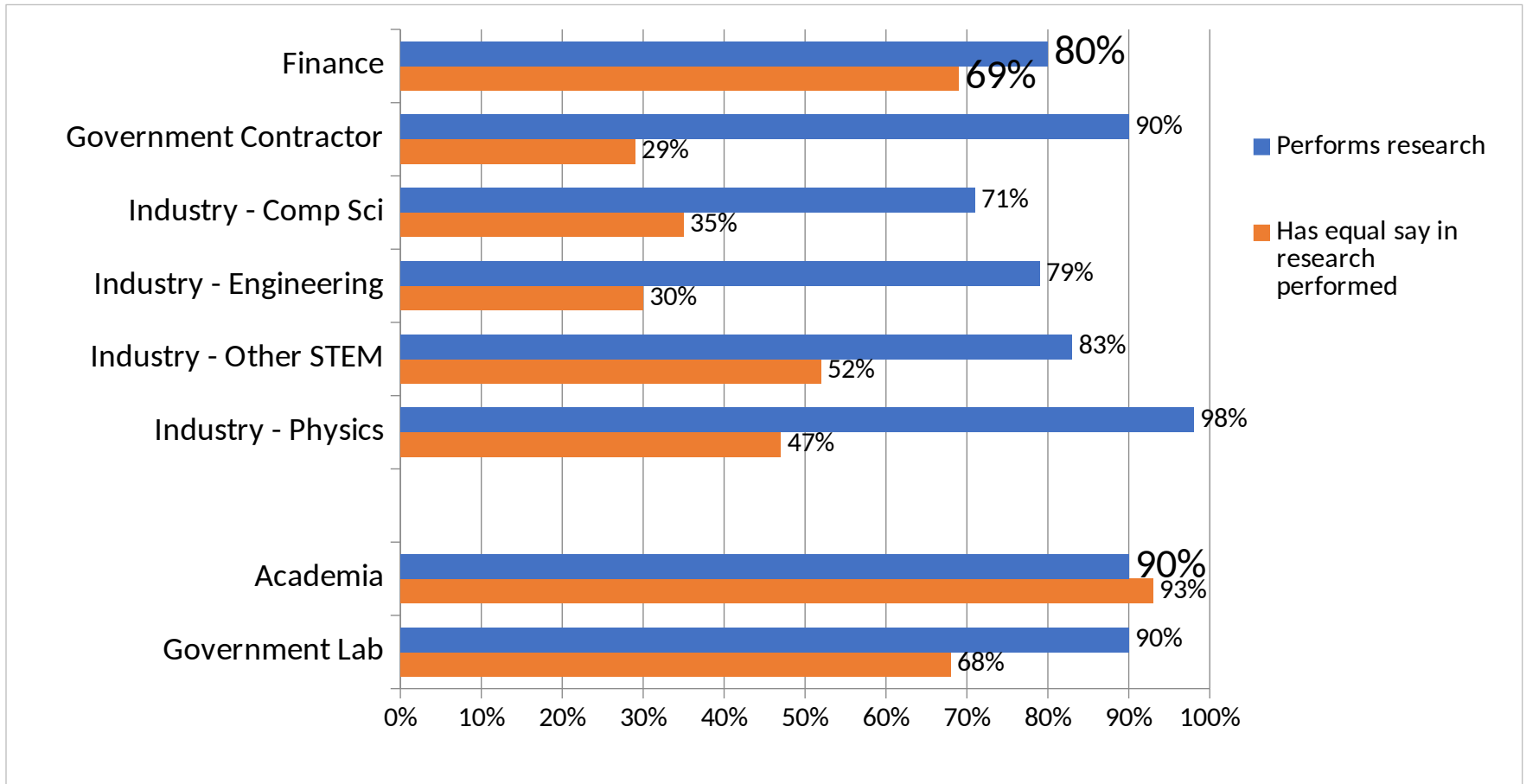
8%

9%

1%

Source: NSF Survey of Doctoral Recipients, 2001 - 2013

What are they doing (PhDs)?

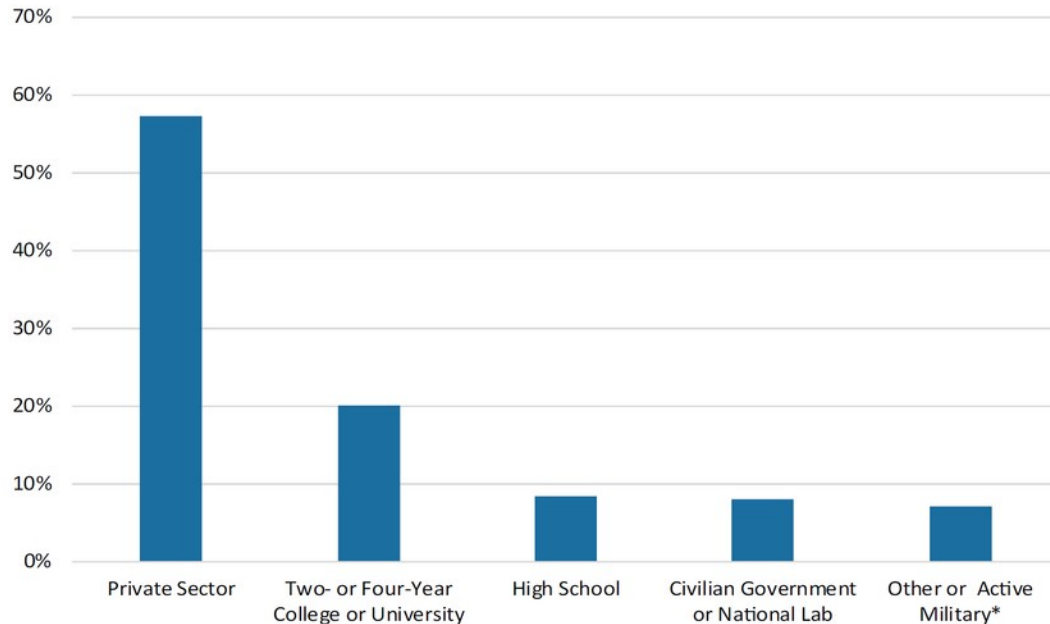


Source: AIP Statistical Research Center Report Common Careers of Physics PhDs in the Private Sector, June 2015

Most still perform research in private sector jobs!

What are they doing (Master's)?

Employment Distribution of Exiting Physics Masters One Year After Degree,
Classes of 2016, 2017, & 2018 Combined



Exiting masters are individuals who, upon receiving their master's degrees, leave their current physics departments. Figure includes US employed physics masters, including those who were employed part-time and not enrolled in a degree program and masters continuing in positions they held while pursuing their degrees. Other includes elementary and middle schools, health care facilities, and non-profit organizations. Figure based on responses from 349 individuals.
*Active military excludes masters receiving their degrees from military academies.

Majority of Master's holders also go into the private sector

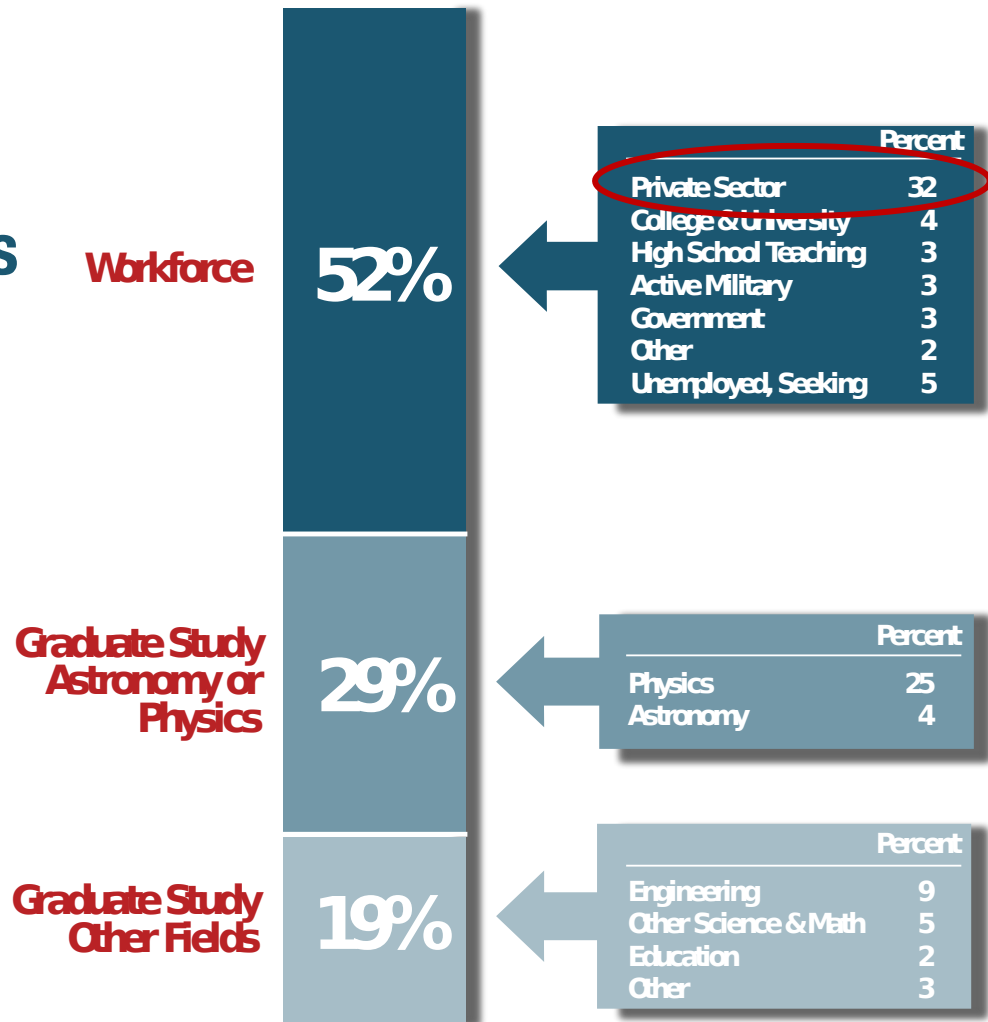
~20% find jobs at colleges or universities

What are they doing (Bachelor's)?

Physics Bachelors One Year Later

8,800 Recent Degree
Recipients
(2017 & 2018)

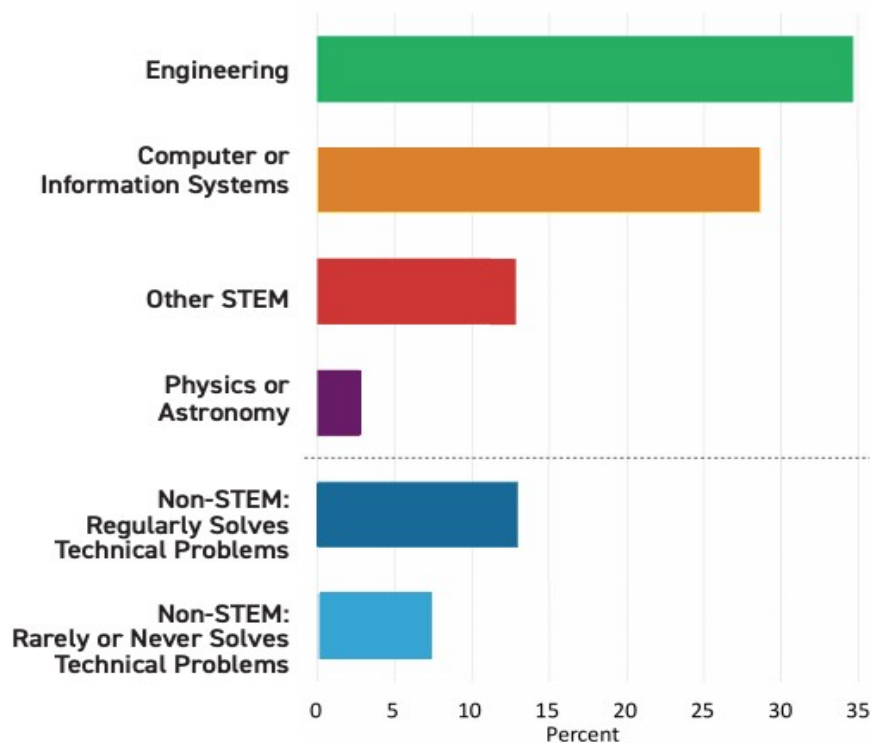
About **half** go
straight into
the workforce,
largely finding
jobs in the
private sector



aip.org/statistics

What are they doing (Bachelor's)?

**Field of Employment
for New Physics Bachelors**
Employed in the Private Sector



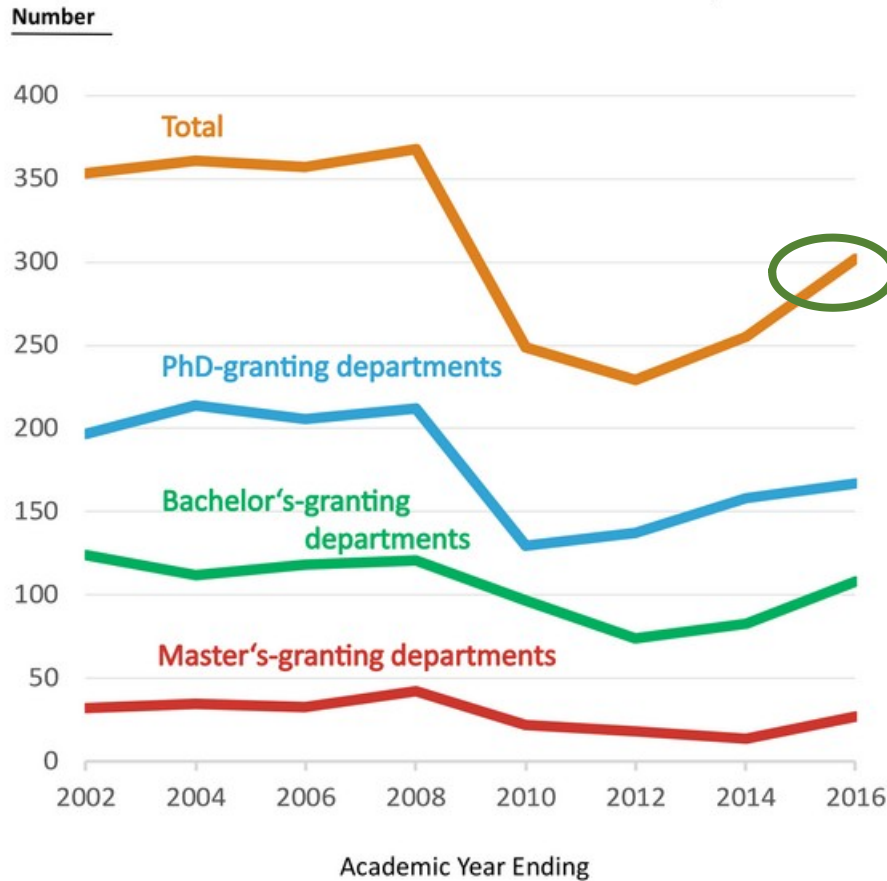
aip.org/statistics

2/3 of those who entered the workforce found jobs in the private sector

Majority working in STEM jobs

Academic sector demand

Number of Faculty Hired by Physics Departments Tenured and Tenure-Track Positions Only



About **~300** new tenure or tenure-track hires in 2016.

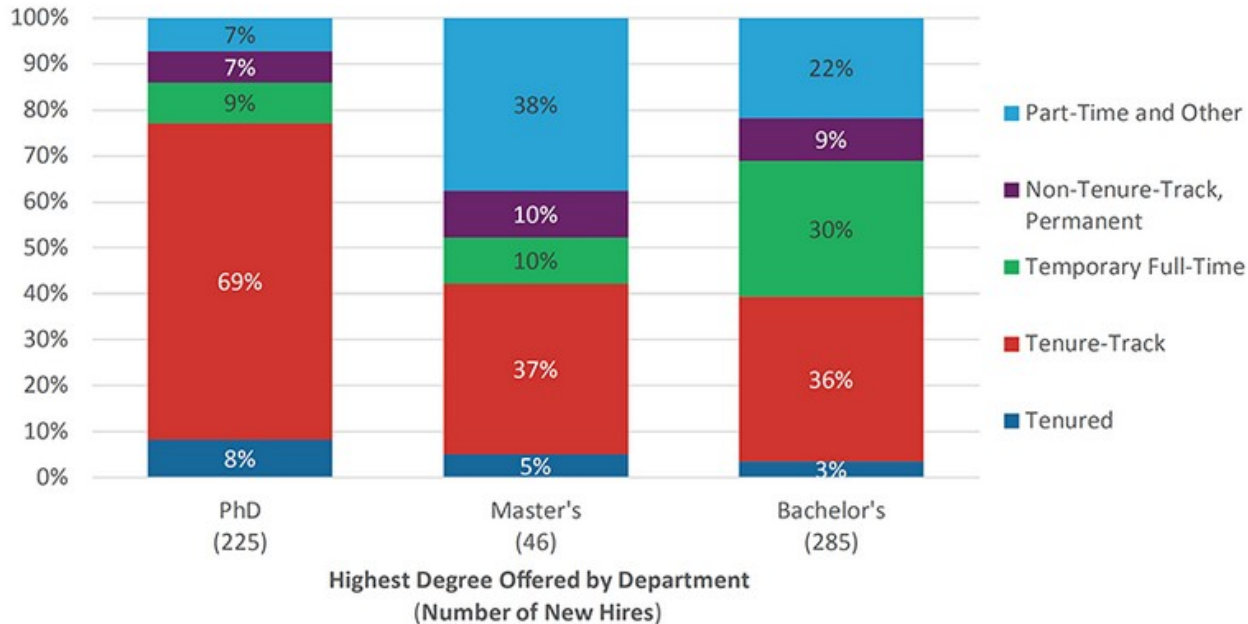
Recall: ~1600 PhDs looking for jobs yearly

- The noticeable drop from 2008 to 2010 is likely due to the 2008 recession.

aip.org/statistics

Academic sector demand

Position Status of New Faculty Members Hired, 2017-18 Academic Year



Faculty position types vary widely by institution.

Total of 556 new faculty hires (including all position types).

Given that we are graduating over 1,600 PhDs/yr, with half of them going into postdocs with an intention of continuing as physics faculty, supply will continue to outweigh demand for the academic career path.

Industry demand



Education



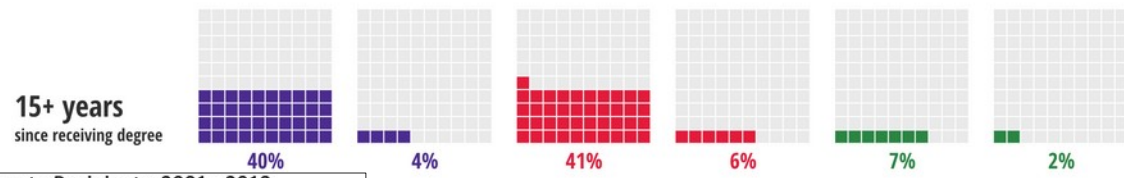
Business



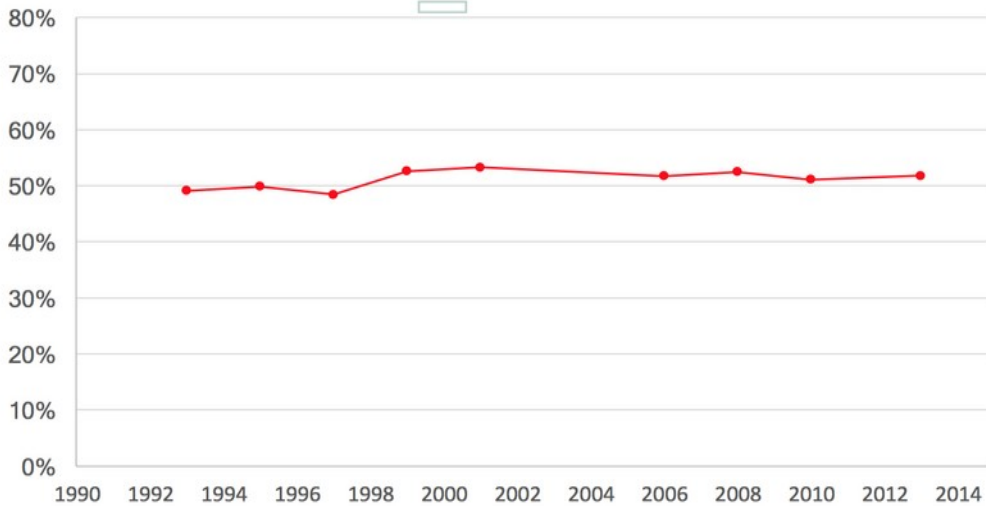
Government



Percentage of Physics PhDs* Employed in the Private Sector



Sources: NSF Integrated Survey Data, 1993 - 1999; Survey of Doctorate Recipients, 2001 - 2013

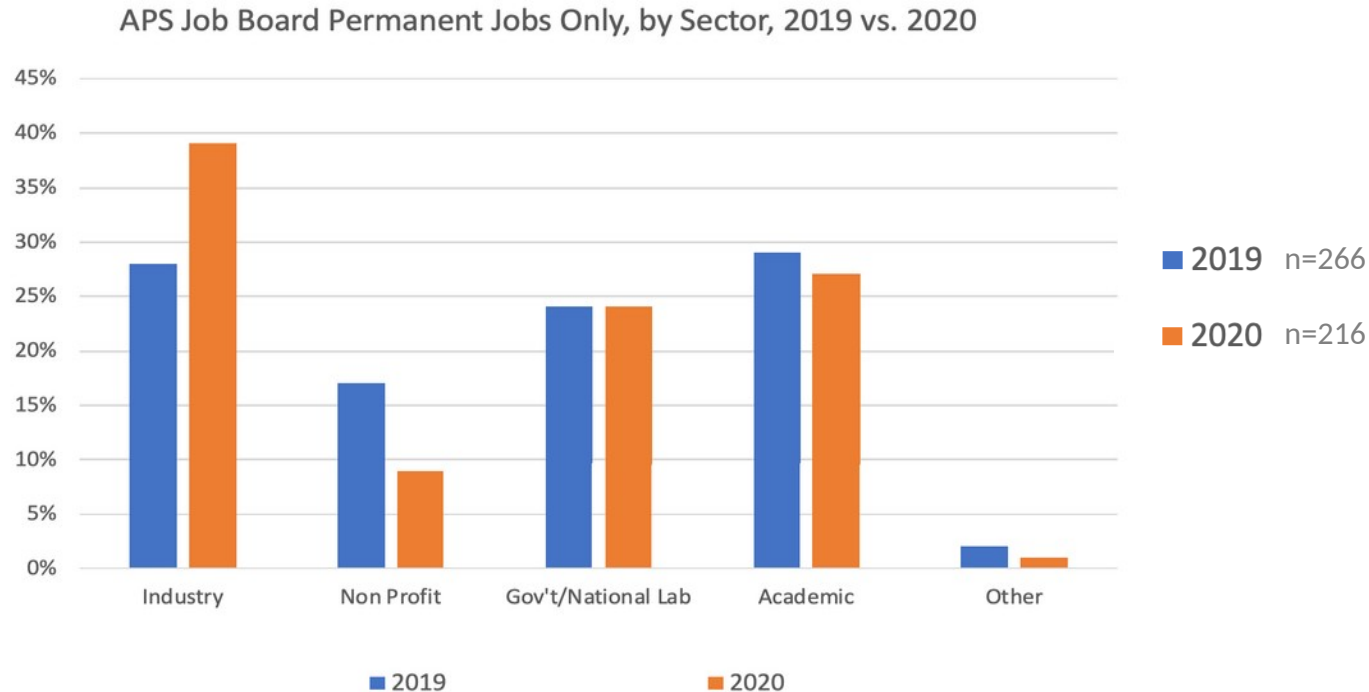


*Data includes PhDs employed in potentially permanent positions only. Data excludes PhDs not in the labor force. Average unemployment is 3%.

Source: NSF Survey of Doctoral Recipients, 2001 - 2013

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

The Impact of COVID on Job Market



- Govt/National labs and Academia have seen an **increased proportion** of temporary position recruitments
- Industry has seen an **increased proportion** of permanent position recruitments
- **Number of 4-year college recruitments has fallen ~64% in 2020**

Examples of Successful Physicists' Careers

[aps.org/careers/physicists/profiles](https://www.aps.org/careers/physicists/profiles)

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)

Physicist Profile



Jessica Kirkpatrick, PhD,
Director of Data Science and Digital
Exploration

Though Jessica often struggled in courses due to a learning disability, she discovered her talent for physics in high school and got a PhD.

Currently, Jessica uses machine learning to predict locations with new sources of battery minerals. Her long-term goal is to start a company to solve social problems.

Advice for students: Learn to build projects with code, and start networking early.

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

Physicist Profile



Ramón Barthelemy, PhD,
Assistant Professor

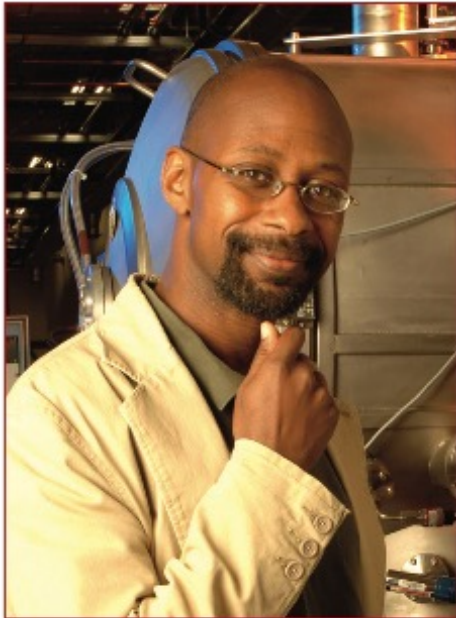
During his PhD, Ramón became interested in issues contributing to the lack of diversity in physics. He completed a AAAS Fellowship in the Department of Education and then spent a few years consulting with academic institutions.

Currently he is an assistant professor specializing in physics education research with a focus on equity and inclusion.



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

Physicist Profile



Paul Markoff-Johnson, MS
Director of Product Development

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

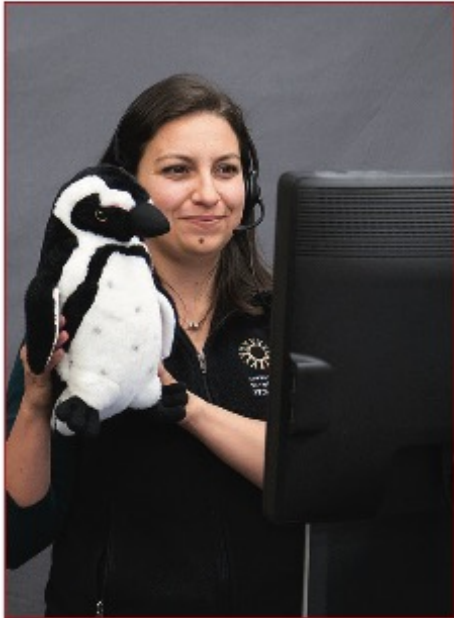
He switched majors from engineering to physics due to the broader scope, variety of career options, and the invaluable skill of using basic principles to solve problems.

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

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



Physicist Profile



Jacqueline Benitez, BA
Distance Learning Educator

Jacque initially found physics challenging. However, her fascination with stars led her to attain a Physics bachelor's with a concentration in Astronomy.

Teaching at a planetarium helped Jacque find her passion for education. Jacque now works at the California Academy of sciences, virtually facilitating science learning with students around the world.

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



Physicist Profile



Maggie Seeds, BS/BA
Business & Technology Consultant

Maggie found physics to be a natural path that “helped train her brain to think analytically.”

Currently, Maggie’s consultant role ranges from technical to strategic, falling anywhere in the process of raw materials making it all the way to finished, marketable products.

Advice for students: Work on soft skills, especially how to communicate with different audiences.

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



Physicist Profile



Thomas Hefner, BS
High School Physics Teacher

Combining his passion to give back to society with his love for physics, Thomas became a high school teacher. When teaching, he finds the physics material to be just as useful as the critical thinking skills taught in science courses.

Advice for students: Take different types of science courses and build communication skills through outreach activities.

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



How can you start preparing?

Look Inwards/Reflect



Perform a detailed self-assessment

- Includes what you are good at doing *and* what you enjoy doing. Values are important!
- Where do I want to be in 1 year? 5 years?

Keep a Career Journal

- Track insights, contacts, skills.
- Note when you're happiest and when you are the *least* happy.
- **What is important to you?**
 - Work-life balance? Money? Location?
 - Flexible schedule? Control over research?

Document Skills

- Record your skills – technical and non-technical. These will be the building blocks of every resume you'll write.

How can you start preparing?

Write it down (formal documents)

Understand practices in the field



Explore the job market

- Many university “Beyond Academia”
- (e.g., UC Berkeley, UCSB, U. Washington)

Keep a “master copy” CV

- Transferable skills, active verbs

Establish an online presence

- LinkedIn, Github
- Personal website: free website builders

Communicate with your adviser/mentor early

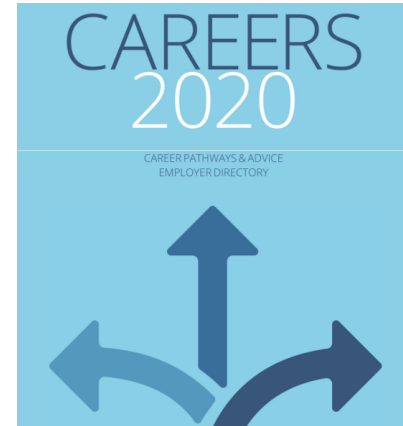
How can you start preparing?

Use Resources (from APS)

APS Careers 2020 Guide

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

go.aps.org/careers2020



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

How can you start preparing?

Use Resources (general)



- Resume/CV/personal statements review
- Career coaching appointments
- Mock interviews

- Job boards of other professional societies (see also [MRS](#), [SPIE](#),...)
- [Careers in Physics Workshop/Webinar by Peter Fiske](#)
- [Linkedin page: Who is hiring right now](#)
- [Candor: Who's freezing hiring during COVID](#)
- [1point3acres: Who's hiring during COVID](#)
- [Google doc made by Dr. Karen Kelsk about academic hiring](#)

(Courtesy of Shaowei Li, FECS Chair-elect)



Sign up for email lists to get notifications

How can you start preparing?

Use Resources



APS Webinars

- Summer series on various topics, including professional development during COVID, preparing for a career in data science, and a two-part series on science policy. All videos available: go.aps.org/summer-webinars
- Launched this Fall: Success in Industry Careers series, Sept 2020-May 2021
- Also launching series on topics relevant to career exploration and international physicists

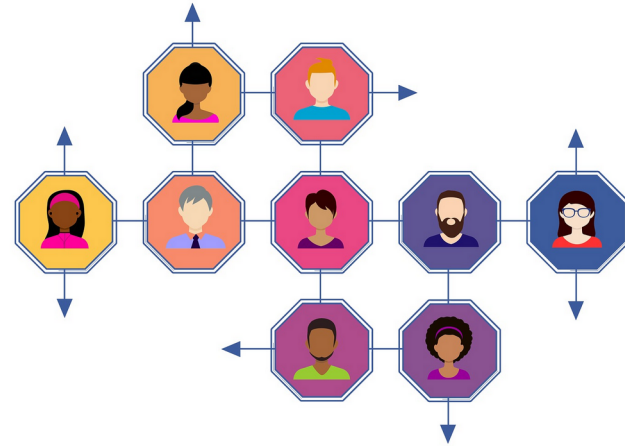
Sign up:

info.aps.org/careers/webinars

How can you start preparing?

Build Your Network

- Join LinkedIn
- Attend alumni mixers, career fairs, conferences, etc.
- Volunteer or Job Shadow



Industry Mentoring for Physicists

Find Career Mentors

- Join the APS IMPact program to find industry mentors: impact.aps.org
- Ask faculty mentors to connect you to industry professionals/past students

Attend Informational Interviews

- Reach out to contacts and ask for a 20-minute chat
- Here, *you* get to ask the questions!
 - Ask about their career path, their typical work day
 - Ask what aspects of work they like or dislike
- Don't ask for a job!



What about non-US Citizens

Recent executive orders hindering international physicists' employment in the US
Harvard-MIT filed lawsuit and APS provided additional support

Important Resources

APS International Affairs Website
aps.org/programs/international/

APS Office of Government Affairs Website
aps.org/policy/

APS IMPact Program - Effort to add more mentors from non-US backgrounds
impact.aps.org

APS Series on Career Development for International Physicists - Coming Summer 2021

Sign up to receive updates when this series goes live!
info.aps.org/careers/webinars

First Name *

Last Name *

Email *

Affiliation

Where are you in your physics career? *

Select webinar topics you would like to receive more information about. *

- Success in Industry Careers
- Physics Career Exploration
- Success in Physics Graduate School
- Professional Development Advice for Job Seekers
- Career Development for International Physicists

Exit Poll

<https://tinyurl.com/y2jwx6tw>



Summary

- Hundreds of physics degree holders enter the job market every year
- Majority find careers in the private sector
- You can start preparing now by expanding your network and using APS Resources
- Finding a job is a job in and of itself- time intensive!

Thank you!

More info: aps.org/careers

Back up slides

Typical Starting Salaries of New Physics PhDs

Potentially Permanent Positions

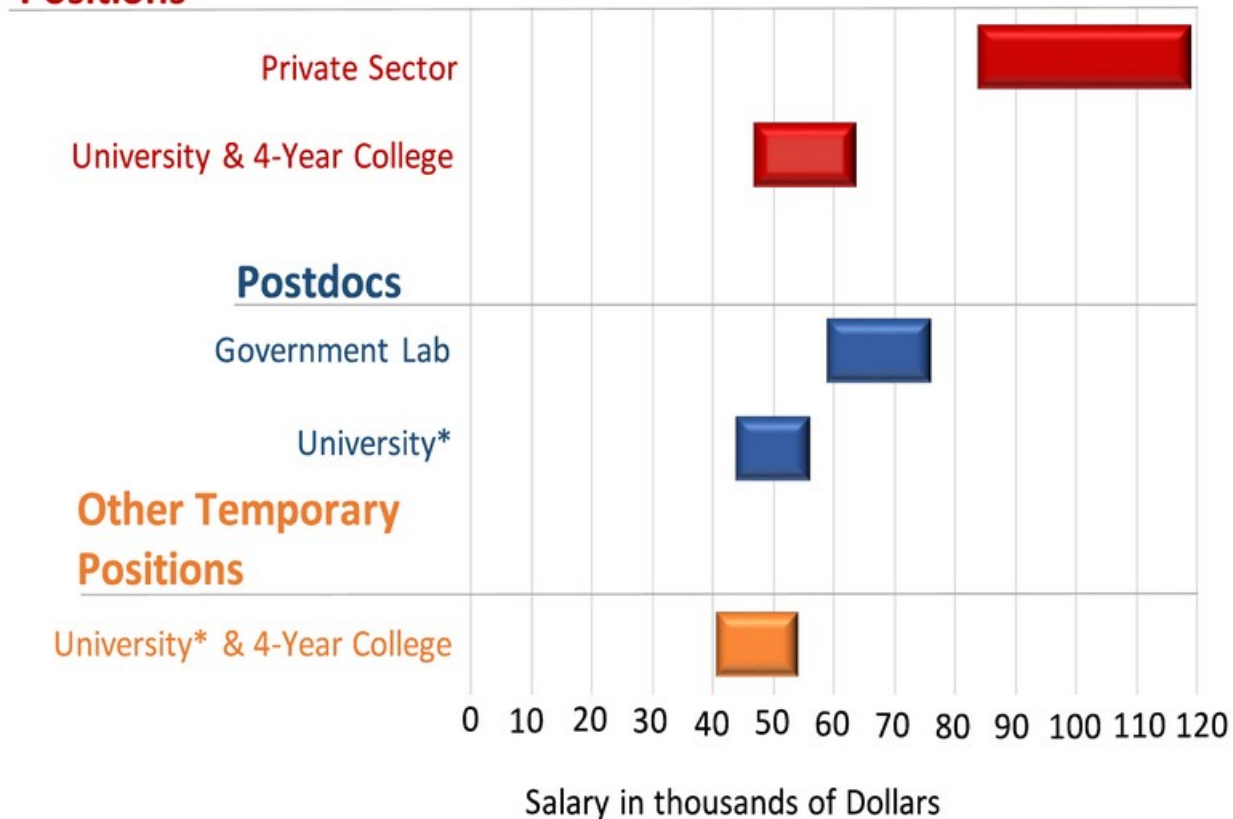
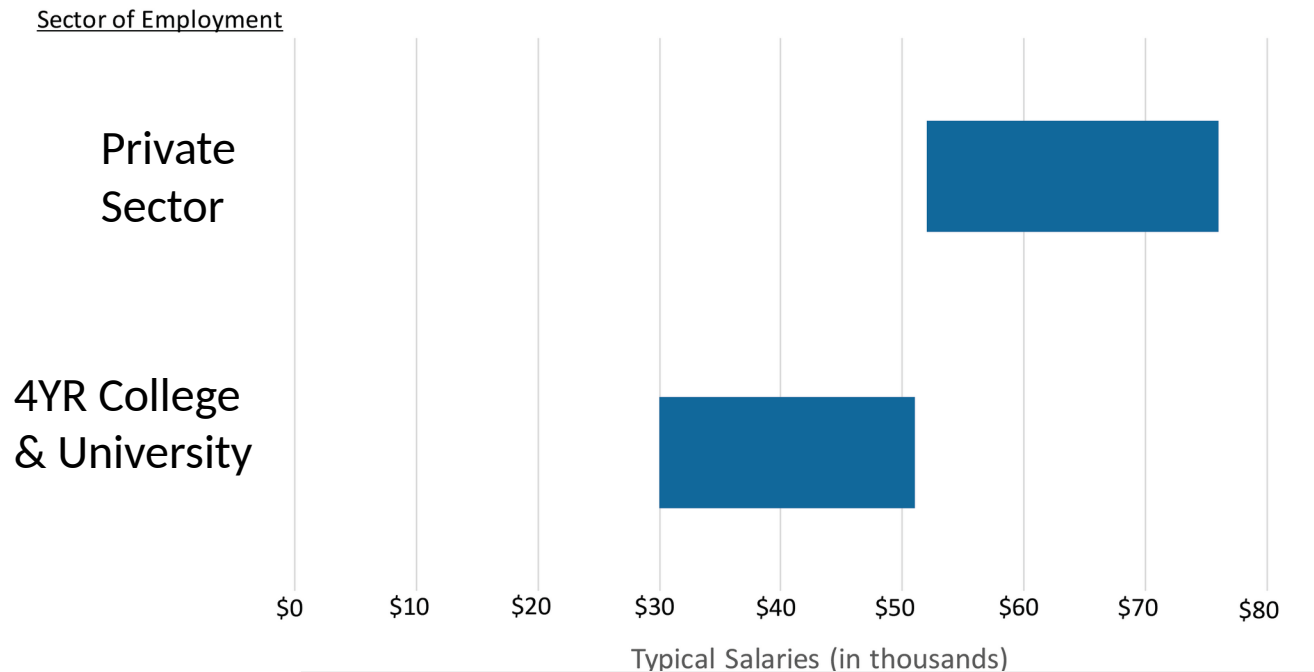


Figure includes only doctorates in full-time, newly accepted positions from the classes of 2015 and 2016 combined. Typical salaries are in the middle 50% i.e, between the 25th and 75th percentiles.

How much do physics Master's earn?

Typical Salaries for Physics Masters, Classes of 2014, 2015 & 2016 Combined



AIP | Statistics

aip.org/statistics

How much do physics Bachelor's earn?

Typical Starting Salaries for New Physics Bachelors, Classes of 2015 & 2016 Combined

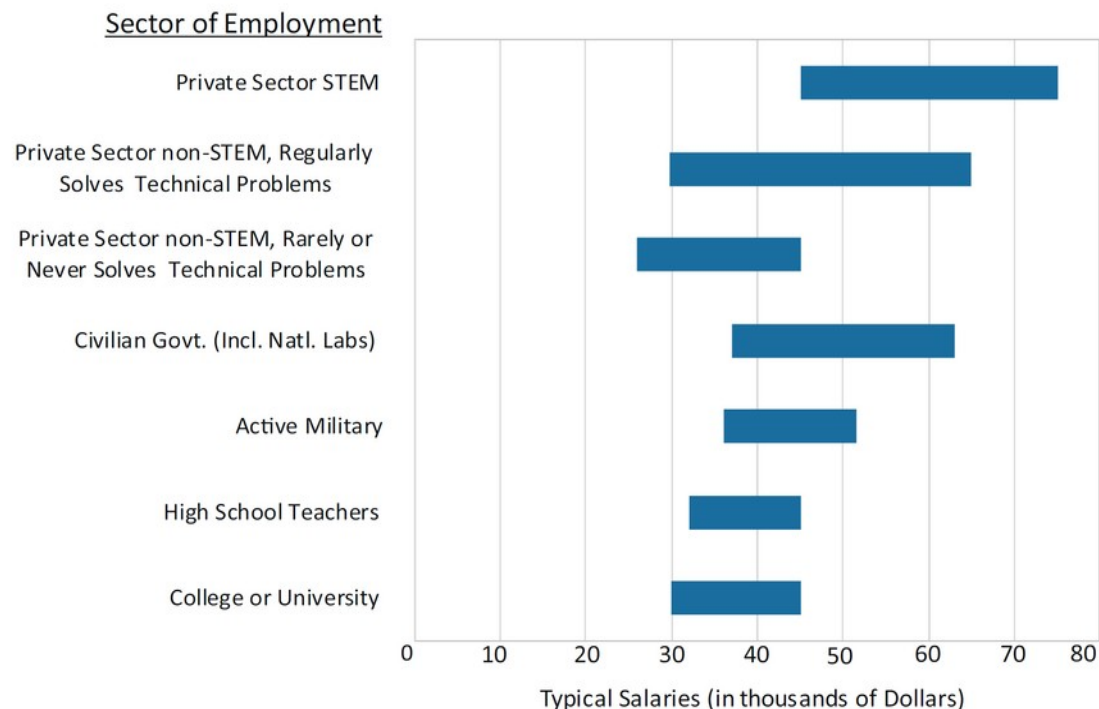
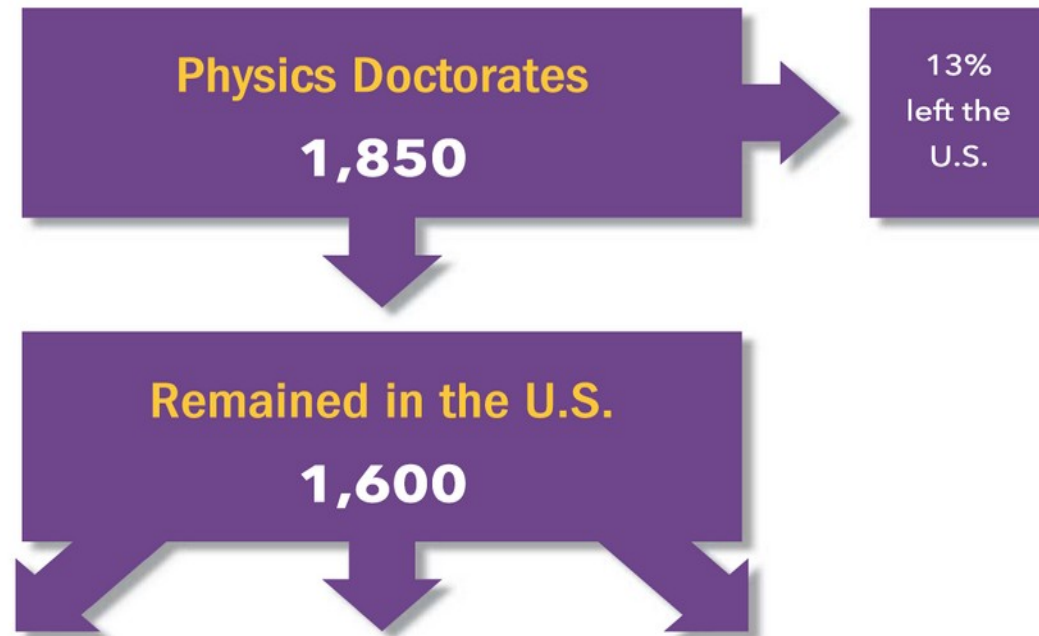


Figure includes only bachelors in full-time, newly accepted positions.

Typical salaries are in the middle 50% i.e. between the 25th and 75th percentiles. STEM refers to positions in natural science, technology, engineering and math. Regularly solving technical problems refers to respondents who selected "Daily", "Weekly", or "Monthly" on a four-point scale that also included "Rarely or Never" when asked how frequently they solved technical problems in their positions.

How many PhDs are there?

2015-2016 graduates: 1 year after PhD



~1600 Physics PhDs go into
the job market every year

Academic Sector Demand

2016-2017 saw 371 total faculty departures. In 2018-2019, there were 571 recruitments, of which 369 were tenured/tenure-track.

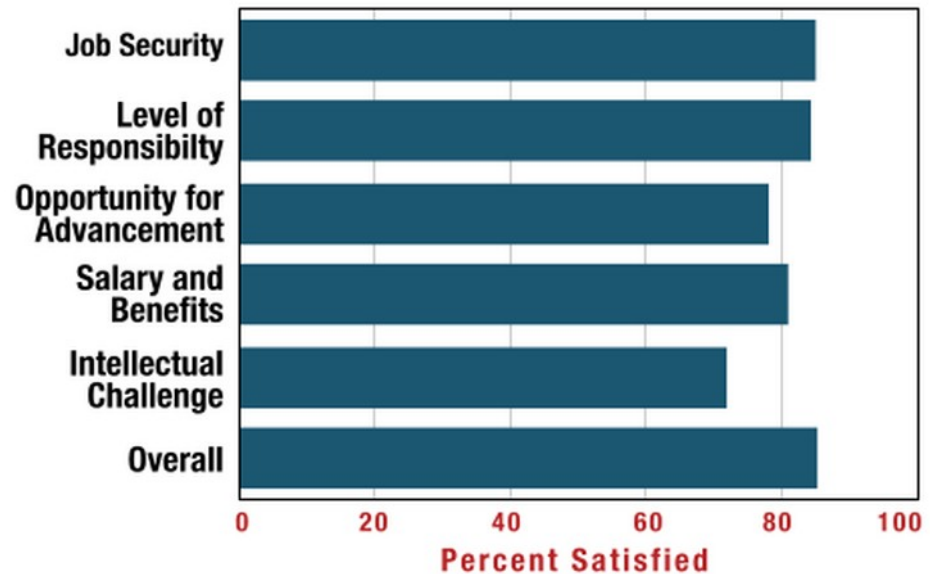
Compared to the supply of ~1600 PhD's each year, this is still relatively low.

Estimated Number of Faculty Departures in Physics Departments, 2016-17 Academic Year

	Highest Physics Degree Offered			
	PhD	Master's	Bachelor's	Overall
Number of Departures	202	31	138	371
Percent of Departures Among Faculty Members	3.4%	3.5%	3.8%	3.5%
Percent of Departments with Departures	61%	31%	25%	35%
Percent of Departing Faculty Members that Left Without Tenure	10%	15%	24%	16%
Total Headcount of Faculty Members	6,015	870	3,615	10,500

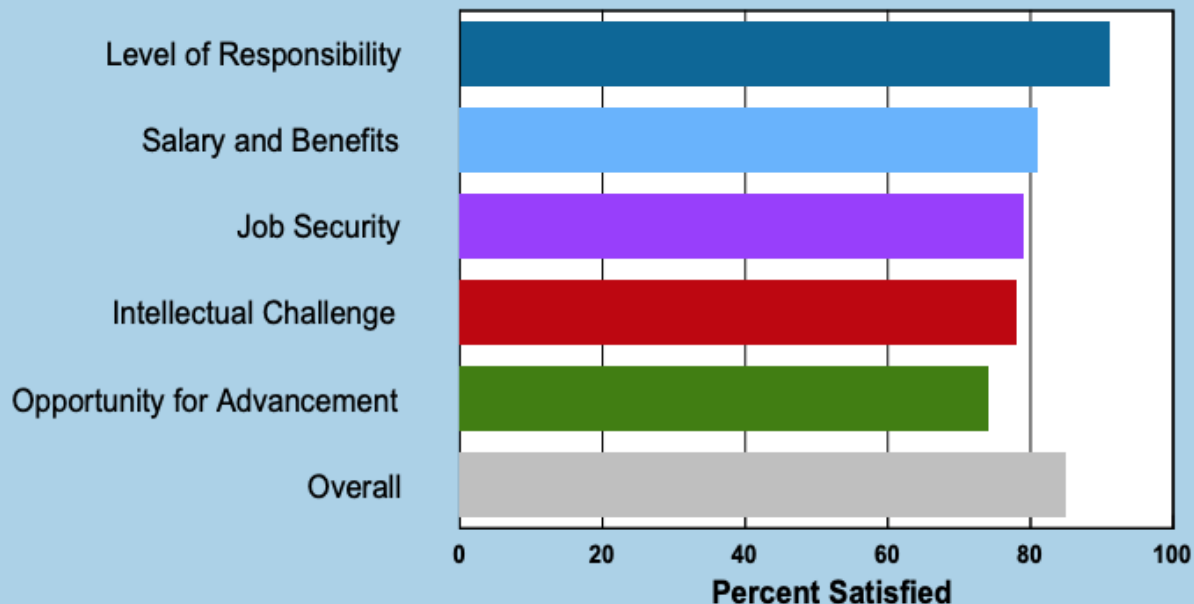
Note: The total headcount of faculty members is for the academic year of 2017-18. The total number of faculty members in this report differs from the total number reported in "The Number of Faculty Members in Physics Departments", which reported full-time equivalent (FTE) faculty totals, not headcount totals.

Job Satisfaction of Physics Bachelors In Private Sector STEM Positions (2013 & 2014)



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

Job Satisfaction of Exiting Physics Masters in Private Sector Positions, Classes of 2012, 2013 & 2014 Combined.



Exiting masters are individuals who, upon receiving their master's degrees, leave their current physics departments.

Percentages represent the physics masters who chose "very satisfied" or "somewhat satisfied" on a four-point scale that also included "somewhat dissatisfied" and "very dissatisfied". Figure is based on the responses of 86 individuals.

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

Job Satisfaction of Physics PhDs

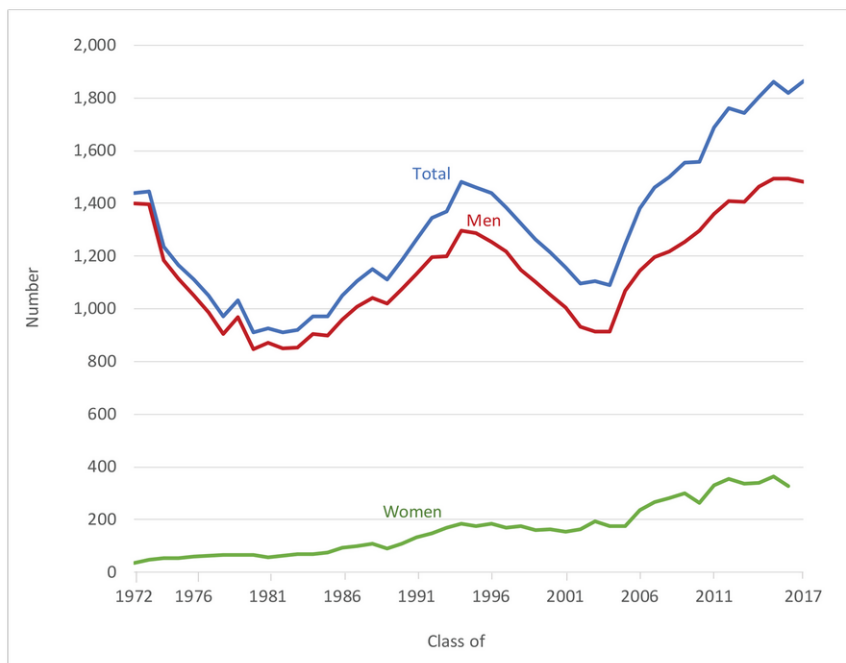
Subjective Aspects of Initial Employment for Physics PhDs Holding Potentially Permanent Positions by Sector, Classes of 2015 & 2016 Combined

Percent who felt:	Sector of Employment		
	Academic (%)	Private Sector (%)	Government (%)
A physics PhD is an appropriate background for this position.	87	83	81
This position is professionally challenging.	85	83	86
I consider myself underemployed in this position.	26	19	29
Overall, I am satisfied with this position.	89	87	86

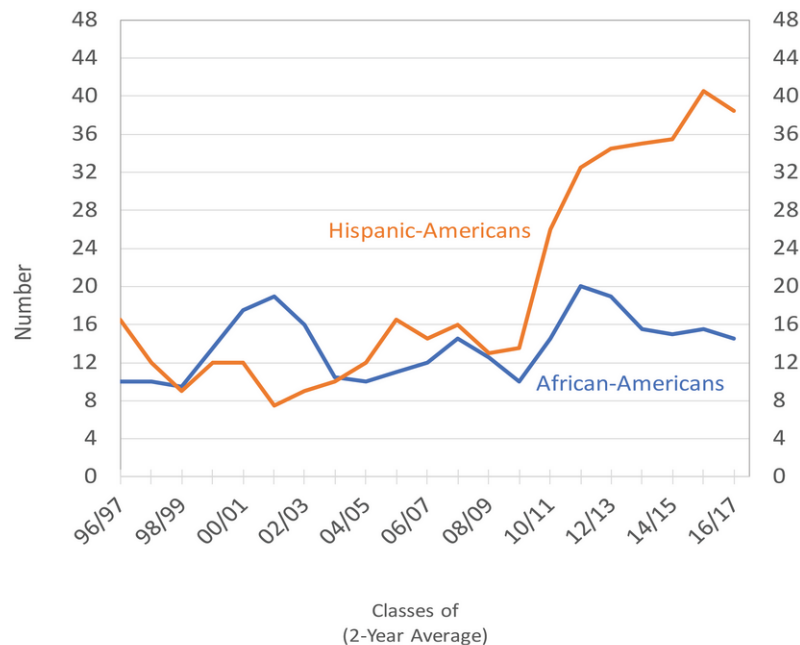
The percentages represent the two positive responses on a four-point scale such as: Very appropriate, Appropriate, Not very appropriate, and Not at all appropriate. Data only include US-educated physics PhDs who remained in the US after earning their degrees.

Demographic breakdown of PhDs

Number of Doctorates Earned in Physics, Classes 1972 through 2017.

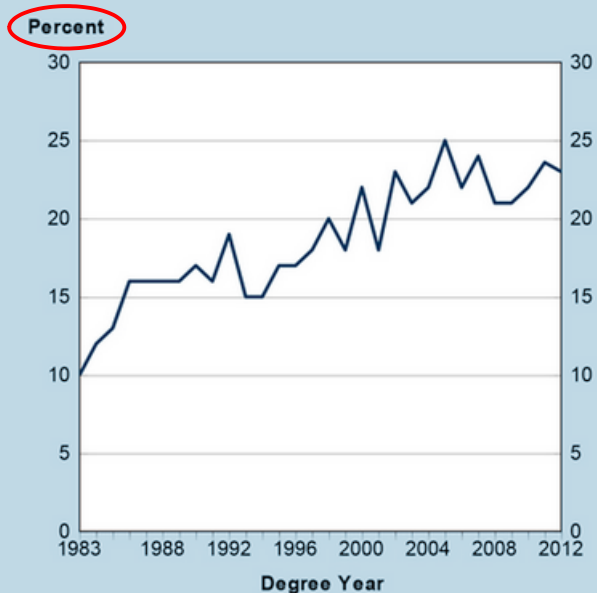


Number of Physics Doctorates Earned by African-Americans and Hispanic-Americans, Classes 1996 through 2017.



Demographic breakdown of Master's

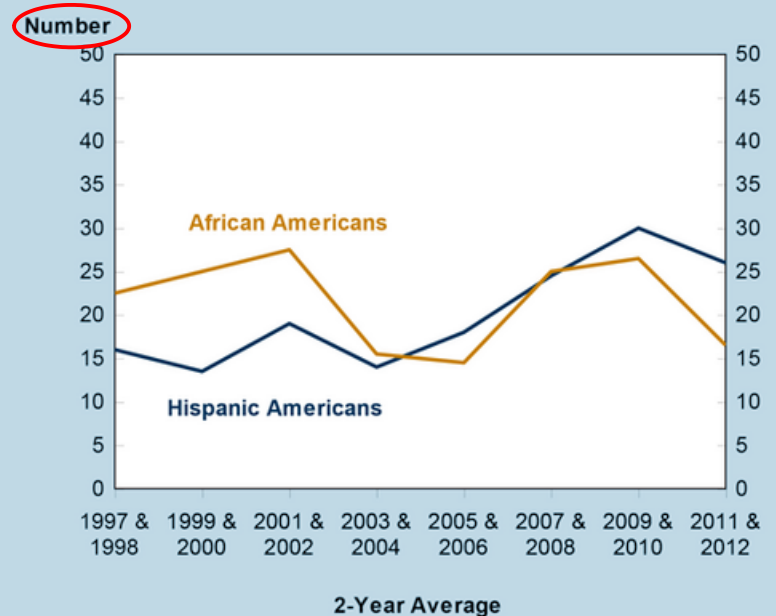
Percent of Physics Master's Earned by Women, 1983 through 2012.



Note: Exiting physics master's are individuals who upon receiving their degrees leave their current departments. They include graduates from departments where the master's is the highest degree offered as well as master's leaving departments that offer a PhD.

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

Number of Exiting Physics Master's Earned by African Americans and Hispanic Americans, Classes of 1997 through 2012.

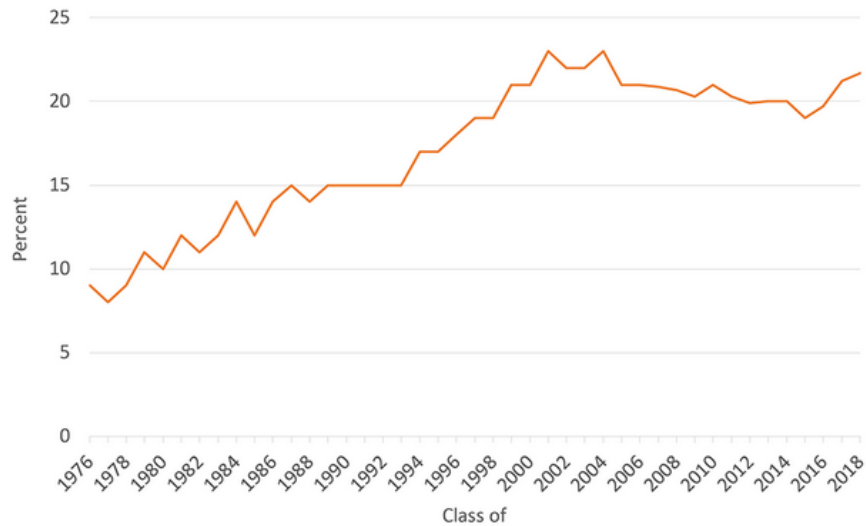


Note: Exiting physics master's are individuals who upon receiving their degrees leave their current departments. They include graduates from departments where the master's is the highest degree offered as well as master's leaving departments that offer a PhD.

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

Demographic breakdown of Bachelor's

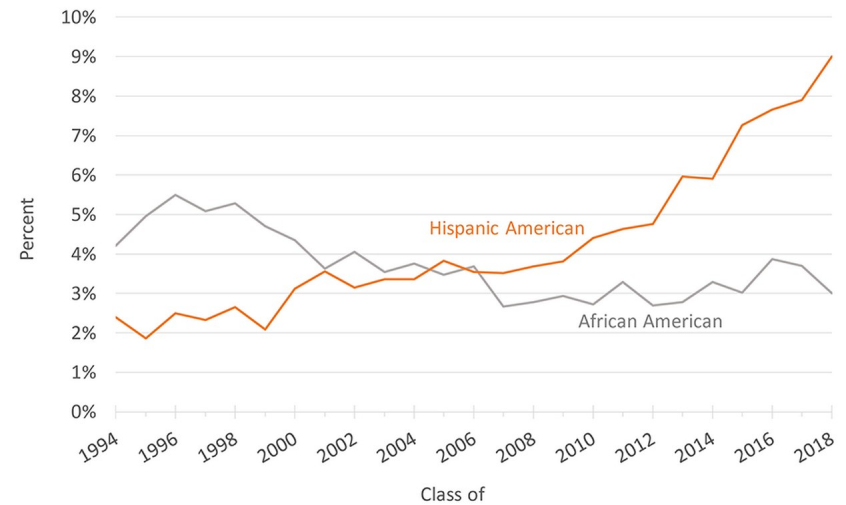
Percent of Physics Bachelor's Conferred to Women



AIP|Statistics

aip.org/statistics

The Proportion of Physics Bachelor's Degrees Awarded to African Americans and Hispanic Americans



AIP|Statistics

aip.org/statistics