



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

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26 January 2022

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APS Career Mentoring Fellow

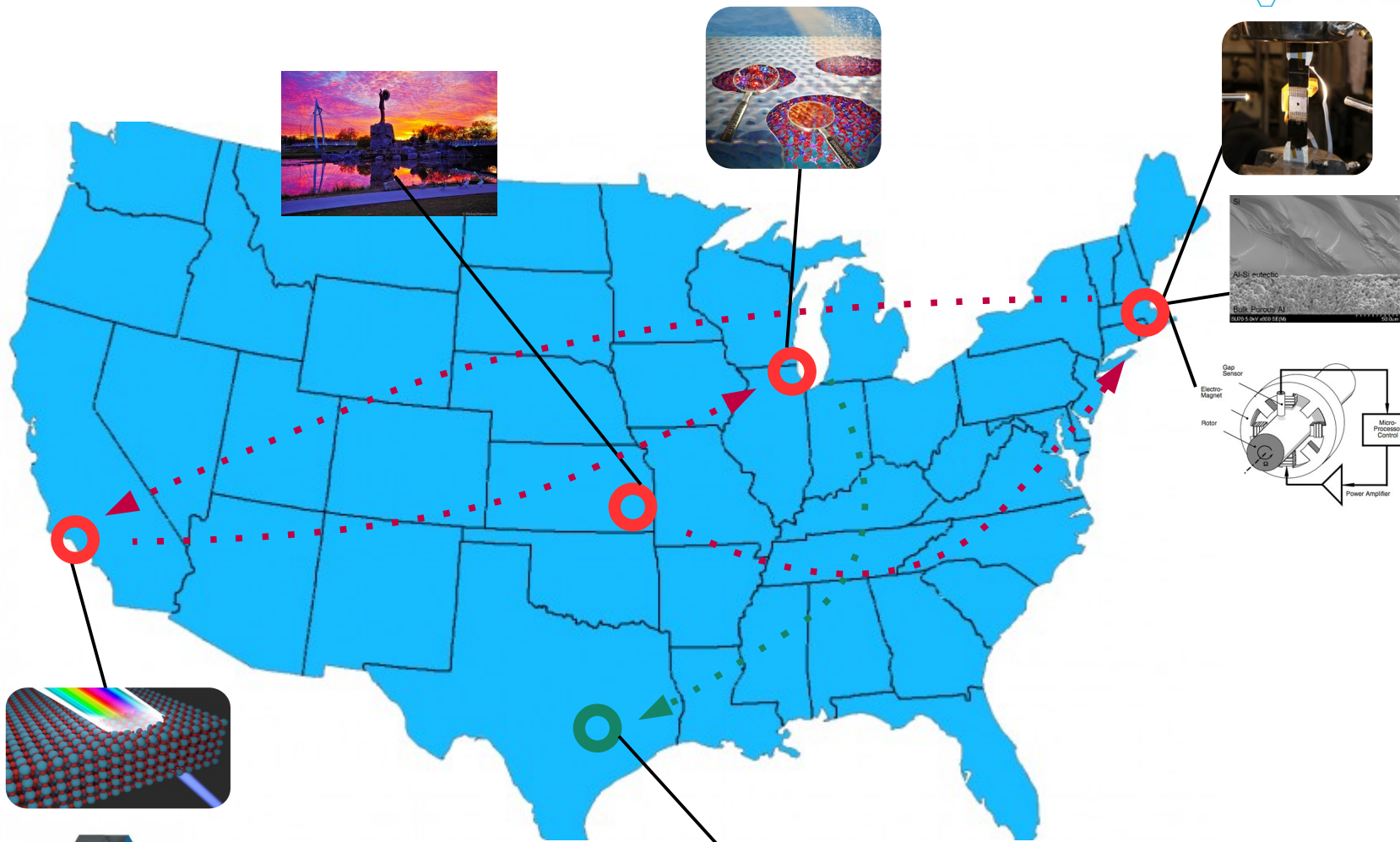
Goals for today:

- 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

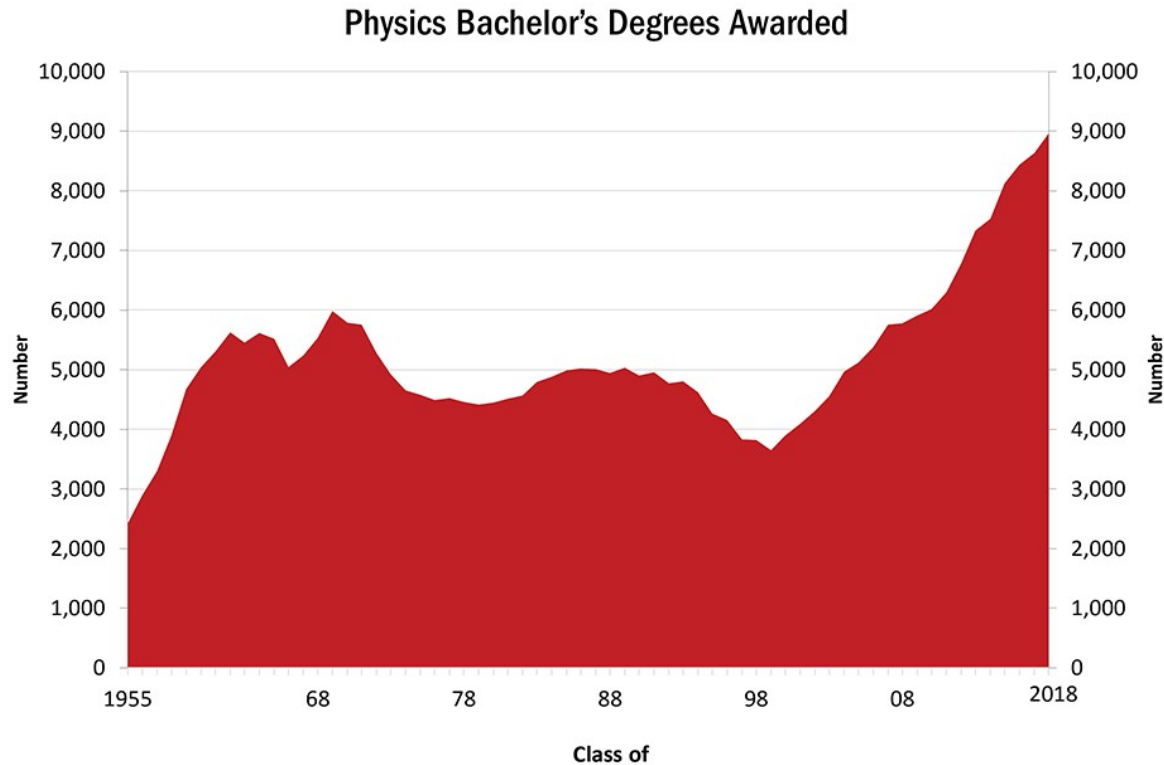
Exit Poll

A little bit about me



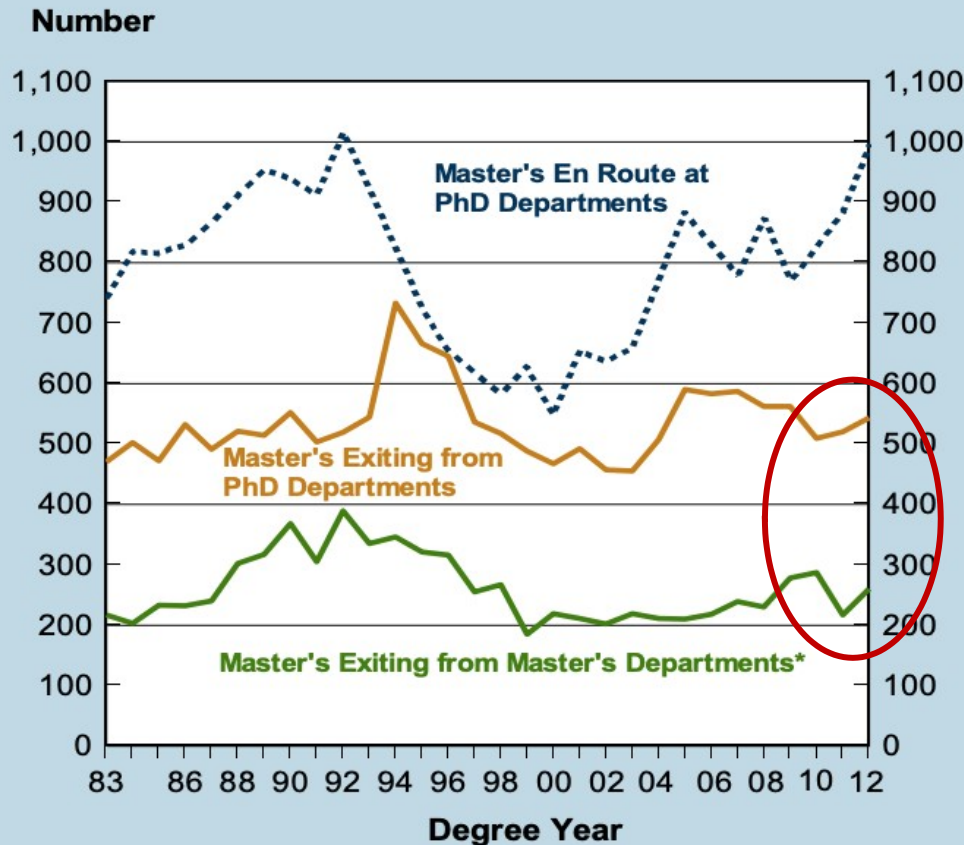
The University of Texas at Austin
McKetta Department
of Chemical Engineering
Cockrell School of Engineering

How many Physics Bachelor's are there?



>8500 Physics Bachelor's degrees are awarded annually

How many MS holders are there?



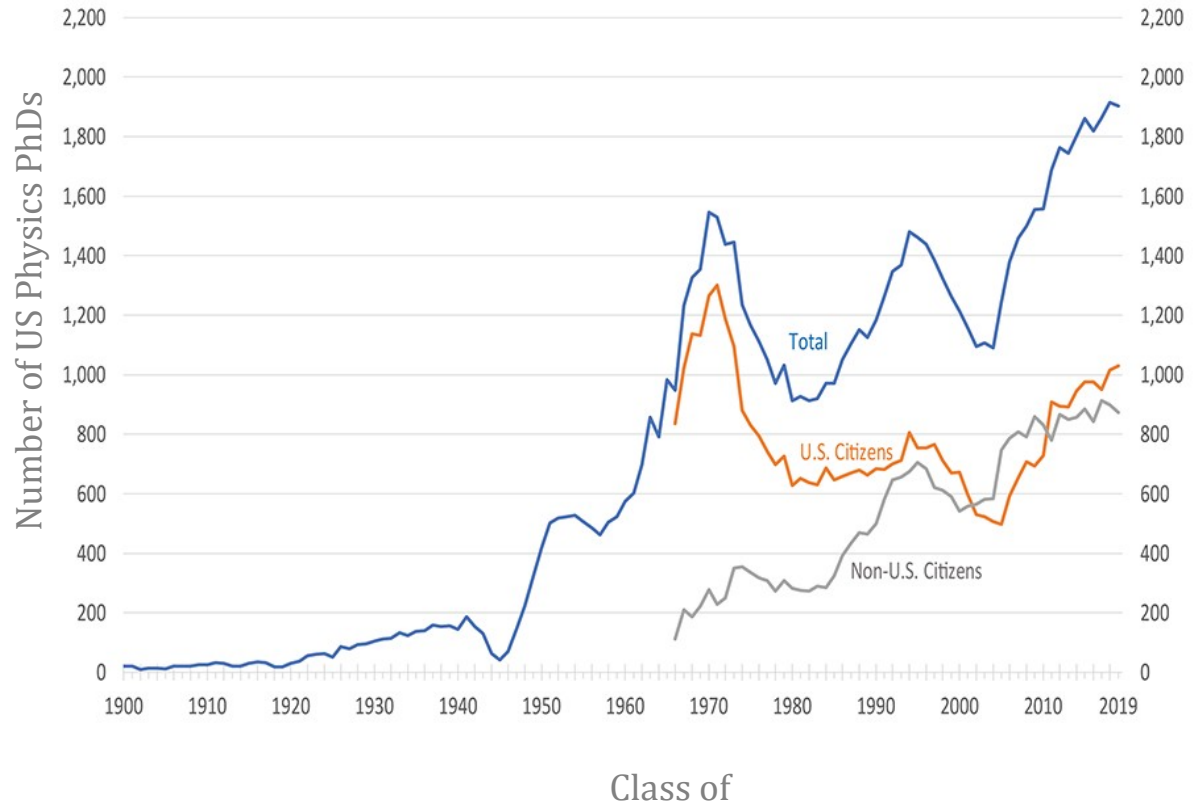
Additionally, of
~700 new
Physics Master's
holders, >300
also look for jobs
(or continue
employment)
every year.

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

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

How many PhDs are there?

Physics PhDs Conferred in the US, 1900 through 2019

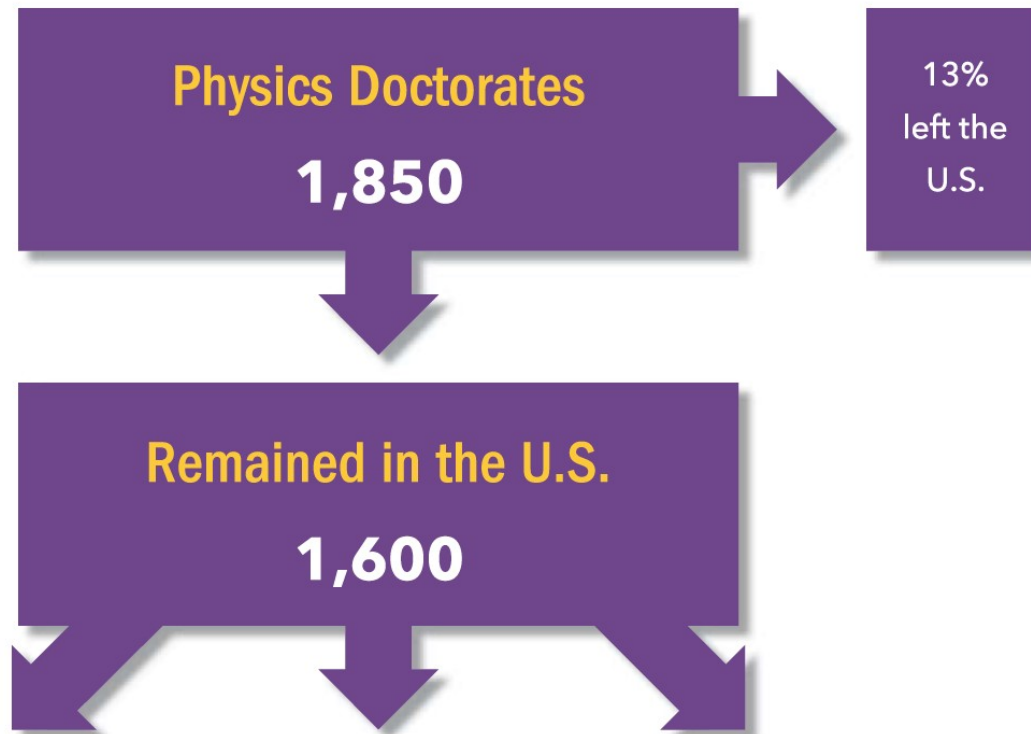


Sources: ACE (1900-1919), NAS (1920-1961), AIP (1962-2019)

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

How many PhDs are there?

2015-2016 graduates: 1 year after PhD



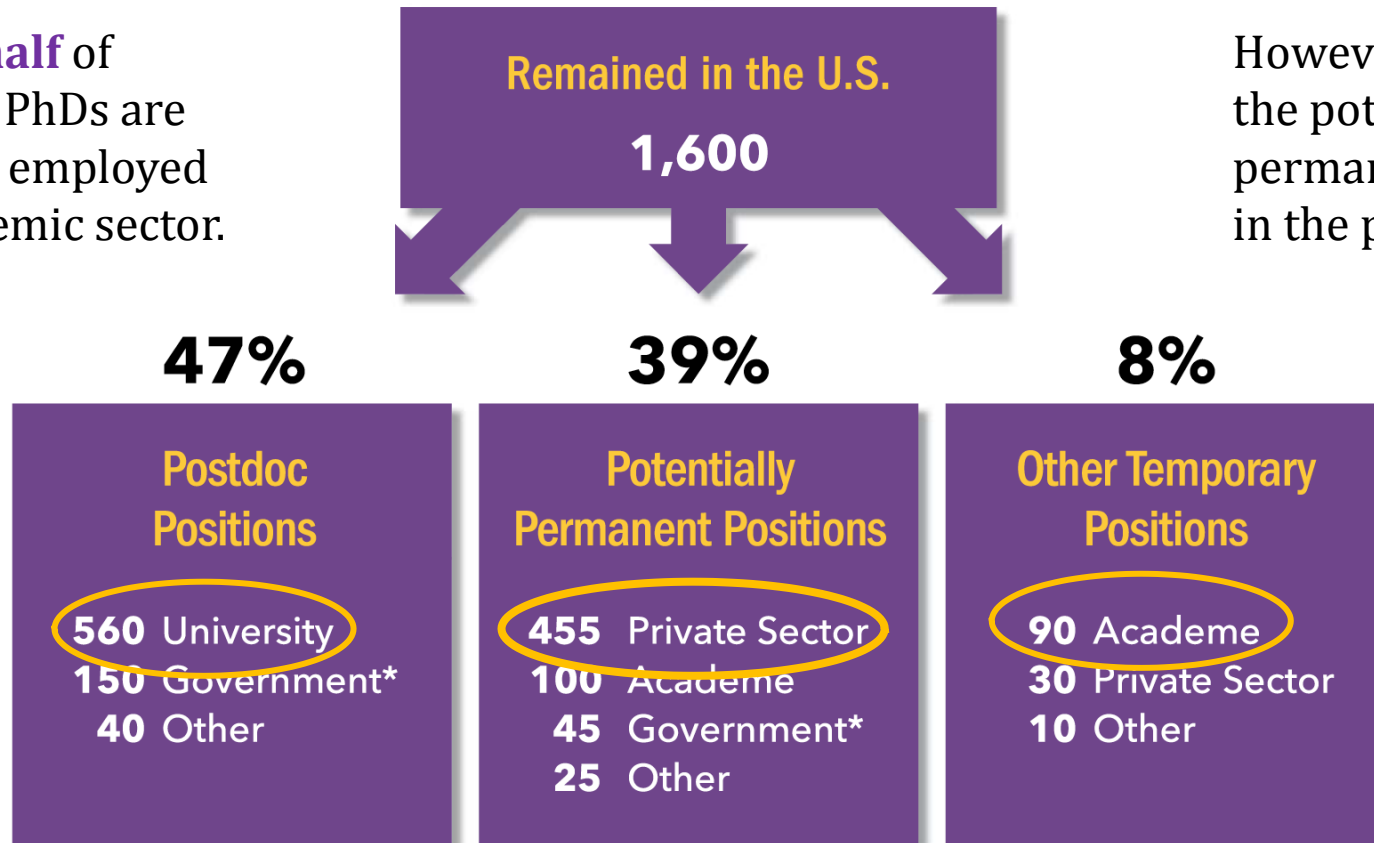
~1600 Physics PhDs go into the job market every year

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

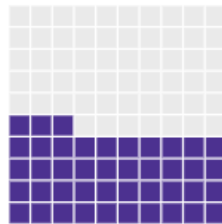
For-profit companies

Non-profit organizations

Federal government

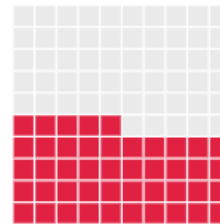
State & local government

10 - 14 years since receiving degree



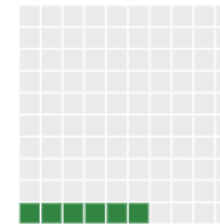
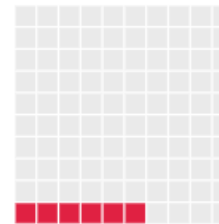
43%

5

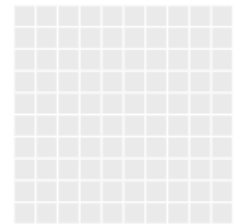


45%

6%

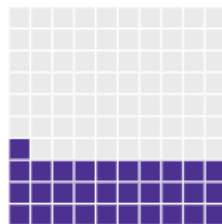


6%

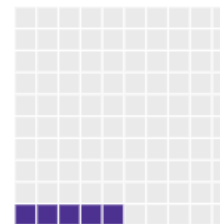


5

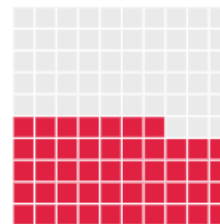
15+ years since receiving degree



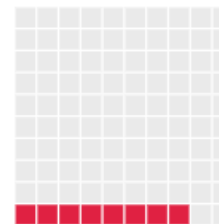
31%



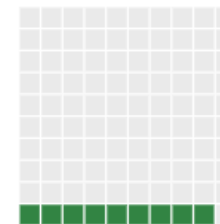
5%



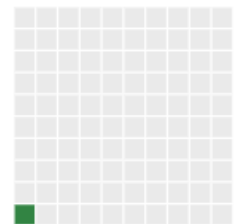
47%



8%



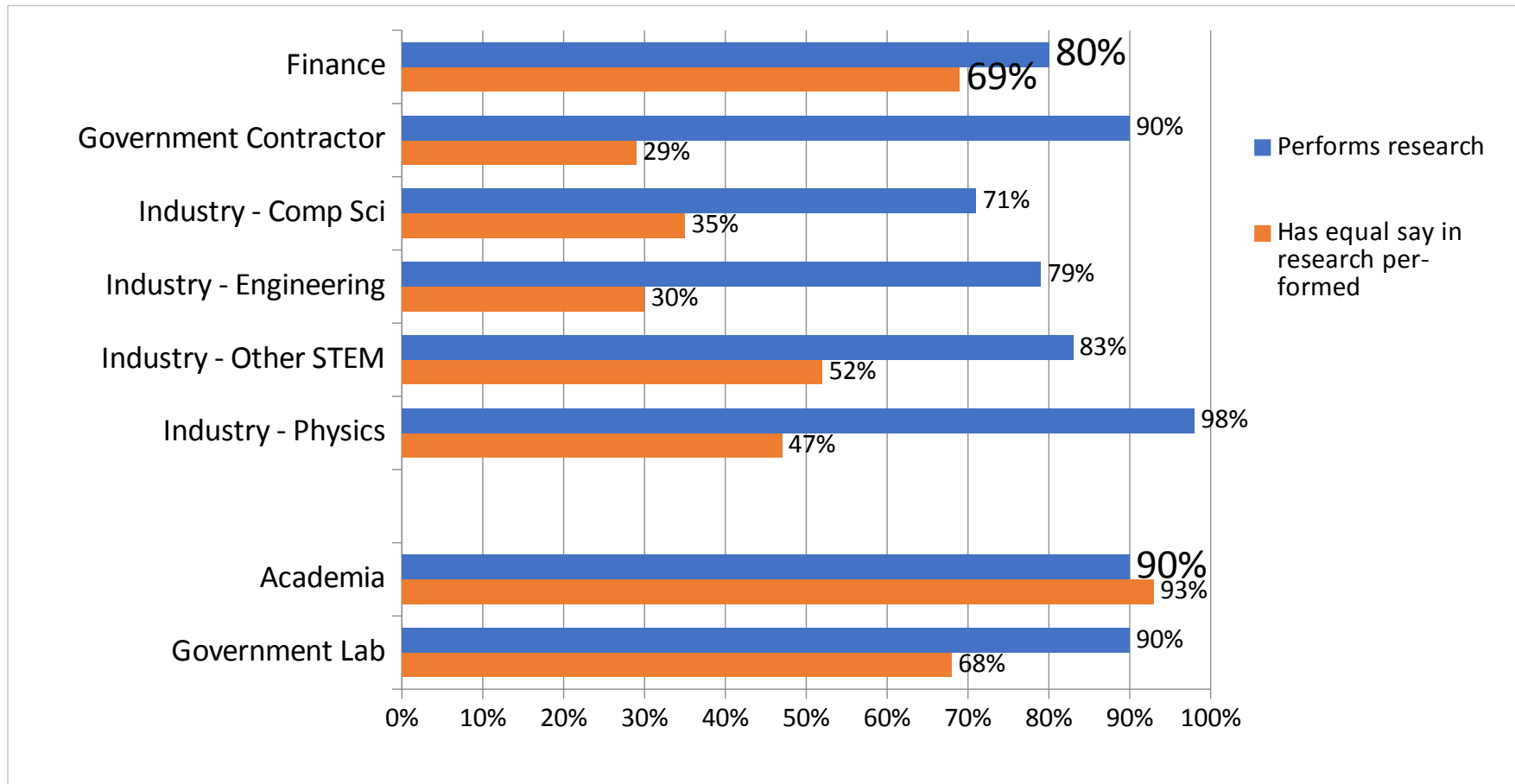
9%



1%

Source: NSF Survey of Doctoral Recipients, 2001 - 2013

What are they doing (PhDs)?

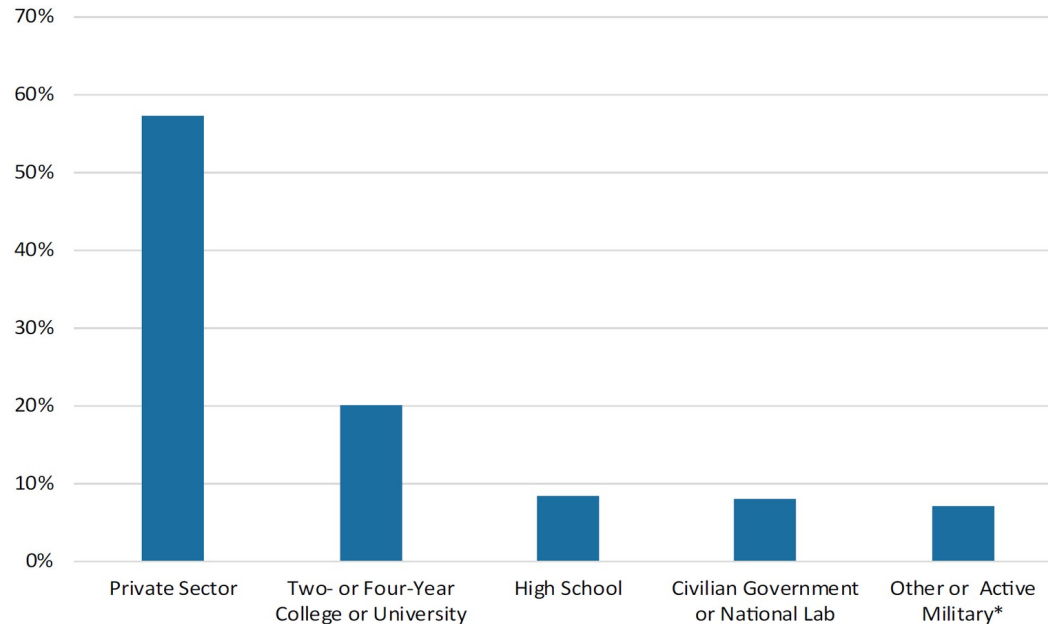


Source: AIP Statistical Research Center Report Common Careers of Physics PhDs in the Private Sector, June 2015

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



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

~20% find jobs at colleges or universities

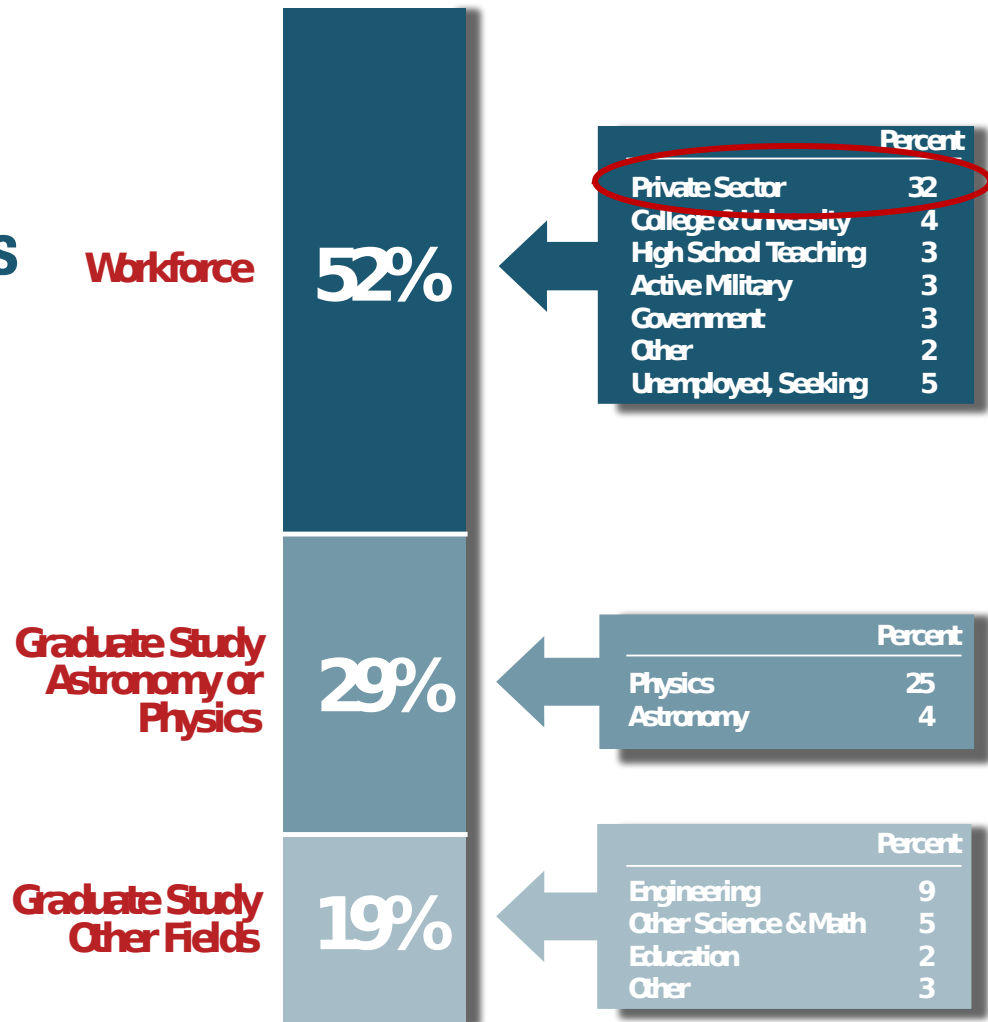
Exiting masters are individuals who, upon receiving their master's degrees, leave their current physics departments. Figure includes US employed physics masters, including those who were employed part-time and not enrolled in a degree program and masters continuing in positions they held while pursuing 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.

What are they doing (Bachelor's)?

Physics Bachelors One Year Later

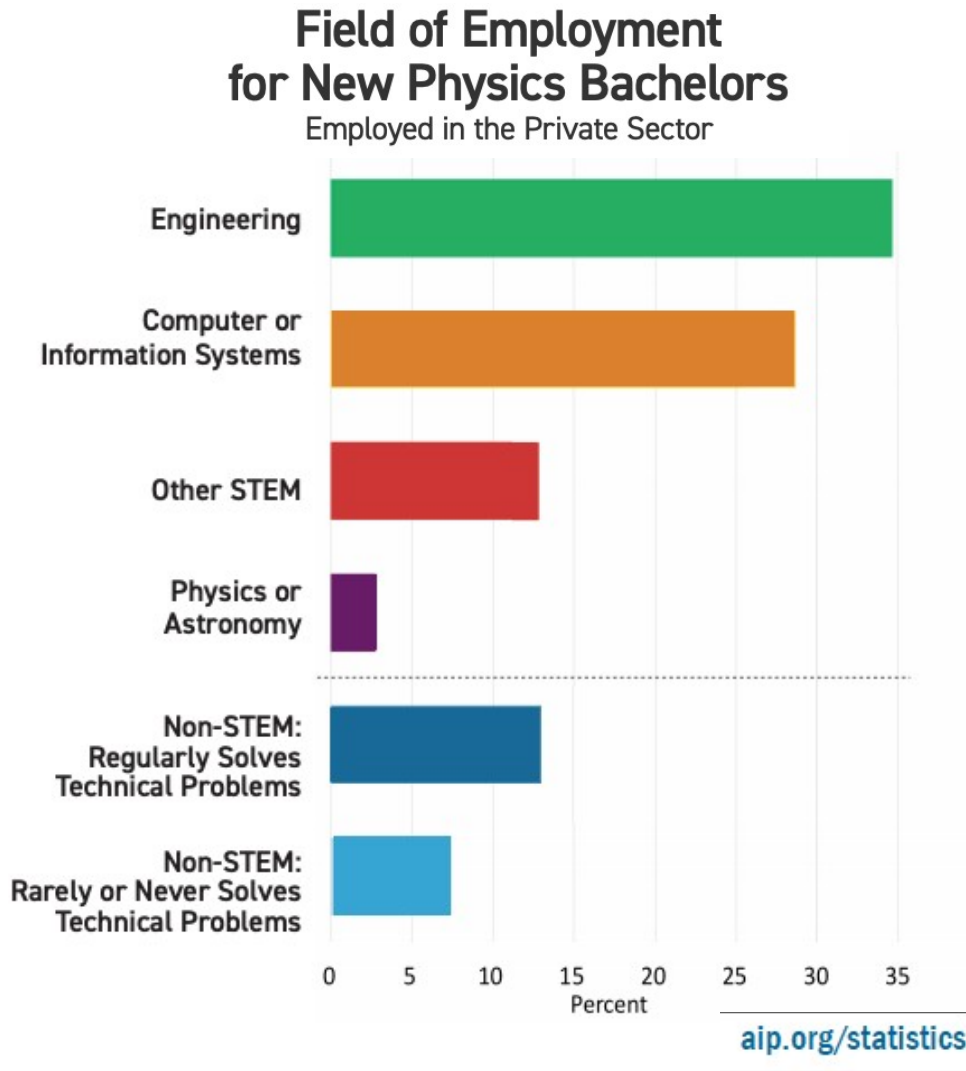
8,800 Recent Degree
Recipients
(2017 & 2018)

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



aip.org/statistics

What are they doing (Bachelor's)?

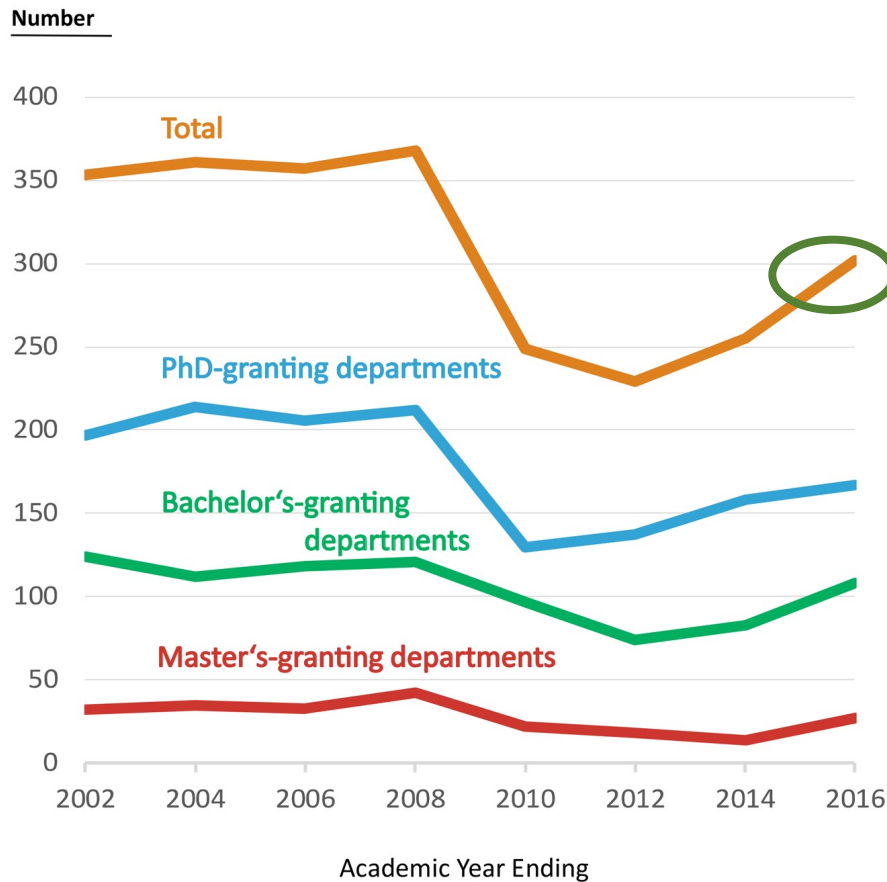


2/3 of those who entered the workforce found jobs in the private sector

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.

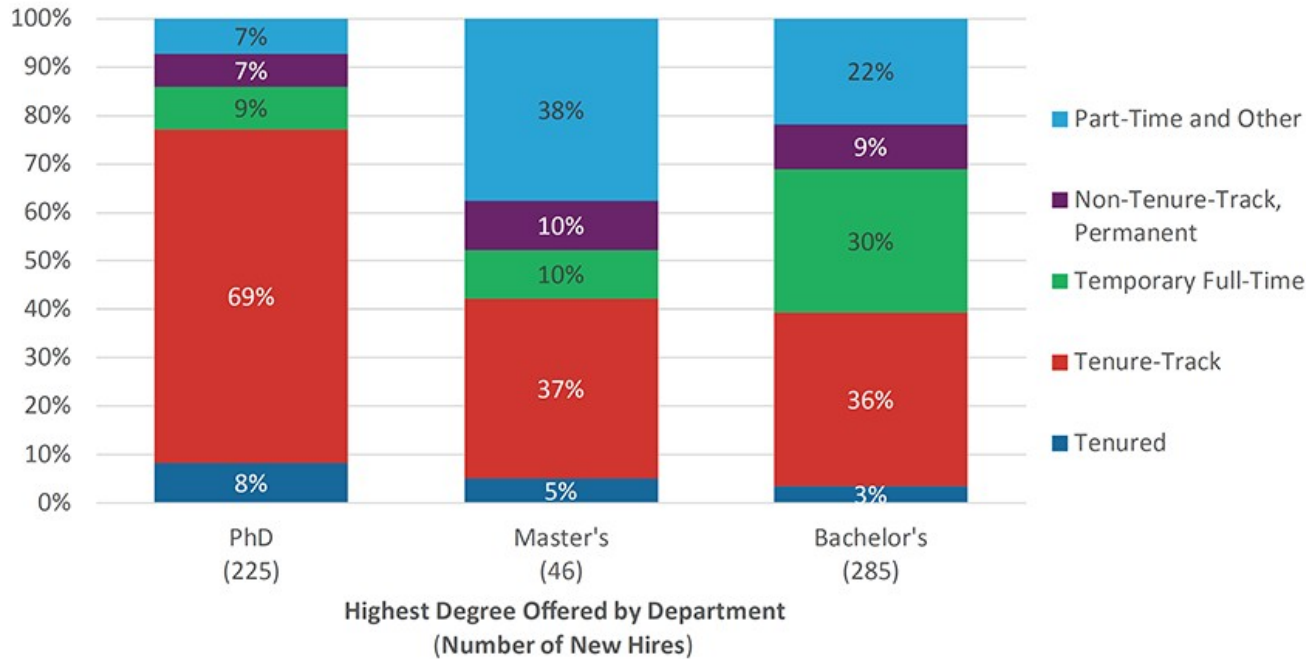
Recall: ~1600 PhDs looking for jobs yearly

- 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



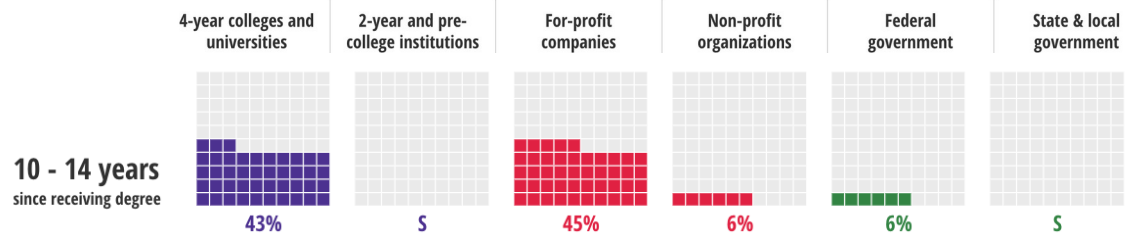
Education



Business

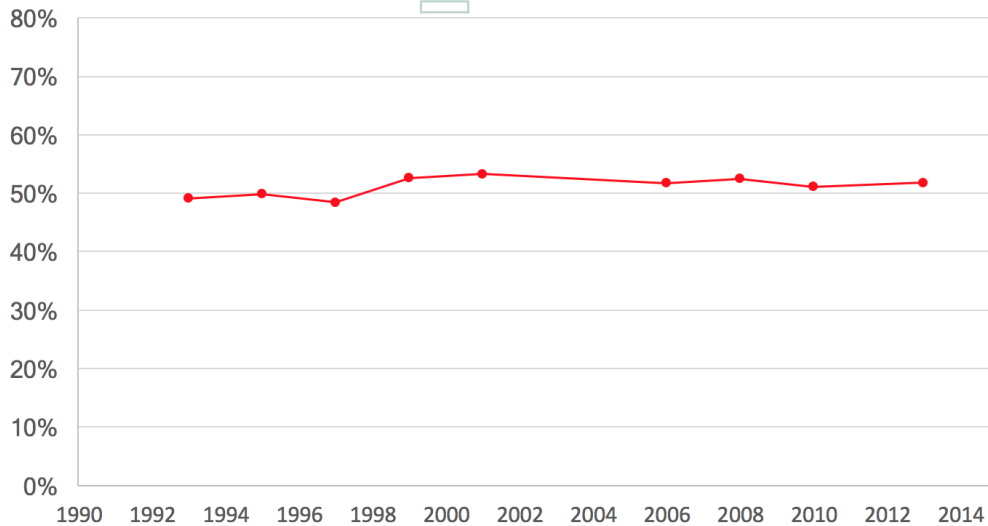
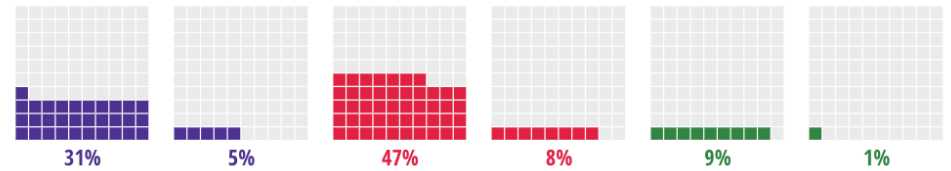


Government



Percentage of Physics PhDs* Employed in the Private Sector

15+ years since receiving degree



*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](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

Physicist Profile



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

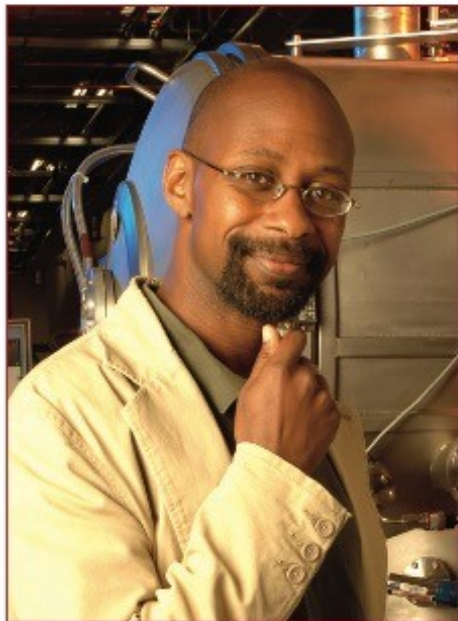

Though Jessica often struggled in courses due to a learning disability, she discovered her talent for physics in high school and got a PhD.

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



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



Julia Scherschligt, MS Thermodynamic Metrology Scientist

Julia found a job at the National Institute of Standards and Technology (NIST) through her network.

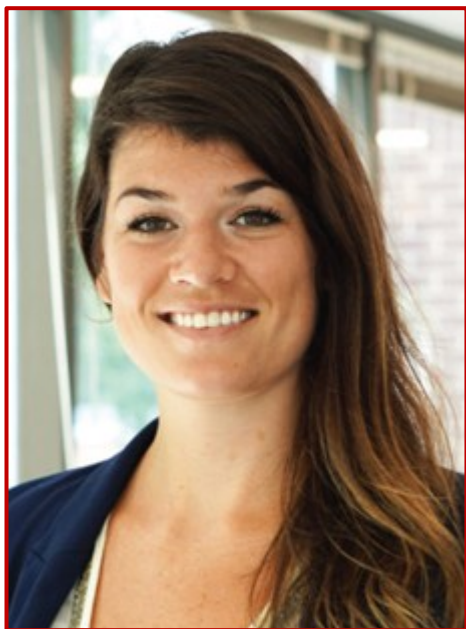
After working in different areas at NIST, she now leads a group responsible for the fundamental measurements of temperature and pressure.

Advice for students: Talk to the grad students before applying to a school and take skills-based classes.



Learn more: aps.org/careers/physicists/profiles/scherschligt.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!
- Reflect on your working style: collaborative, independent, goal-oriented?

Keep a Career Notebook/Doc

- Track insights, skills, and contacts
- 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.

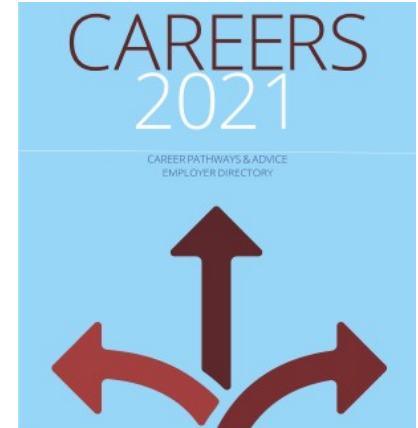
How can you start preparing?

Use Resources

APS Careers 2021 Guide

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

go.aps.org/careers2021



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



APS Webinars

Free webinars on topics like: professional development during COVID, science policy careers, effective communication, and more:

- Success in Industry
- Career Exploration
- Public Engagement
- Professional Development for International Physicists in the U.S.

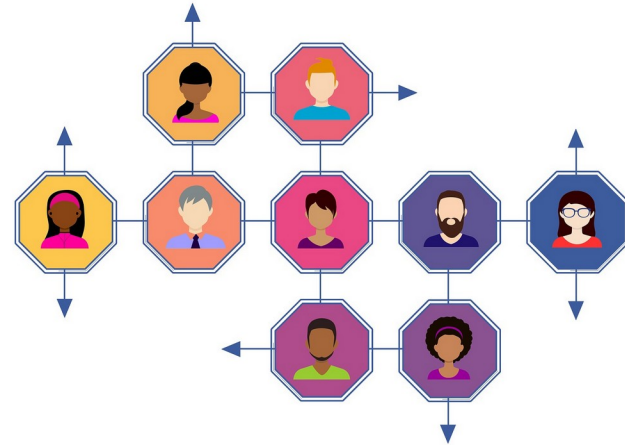
View Webinars & Sign up:

aps.org/webinars

How can you start preparing?

Build Your Network

- Join LinkedIn
- Attend alumni mixers, career fairs, conferences, etc.
- Volunteer or Find internship



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
- [Add advice here]

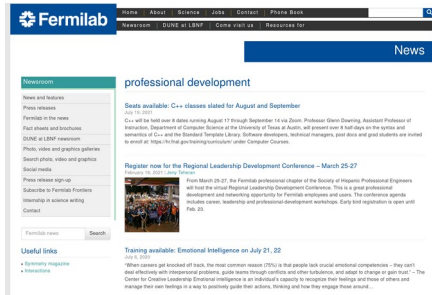
Attend Informational Interviews

- 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!



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)



Sign up for email lists to get notifications

LinkedIn Basics (and establishing an online presence in general)



Meghan Anzelc · 1st
Head of Data & Analytics at Spencer Stuart | Public Speaker
Greater Chicago Area · [Contact info](#)

Headline

- Subheading under your name, 120 characters
- Job title/company by default, but can be modified:
 - Materials scientist with expertise in quantum optics
 - Data Scientist | Machine Learning Expert | Problem-Solver
- Used in LinkedIn Search Algorithm

Photo

- Updated
- Should cover >60% of the frame
- High resolution
- Should look like you
- No one else should be in it

Profile Summary

- What combination of skills help you achieve results?
- What motivates you?
- Include skills and accomplishments
- Good place to explain any gaps or why you're switching fields

Other (free) options: [Github pages](#), Word Press, Square Space, Weebly, etc.

What about non-US Citizens

Recent US policies hindering international physicists' employment in the US
APS Government Affairs is advocating for better policies

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 Webinar Series on Career Development for International Physicists

Covers Professional Opportunities, Work Authorizations, etc.

Sign up: **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

Summary

- Hundreds of physics degree holders enter the job market every year
- Majority find careers in the private sector, applying their physics knowledge and training
- You can start preparing now by expanding your network and using APS Resources
- Talk to people- peers, mentors, friends, family.
- Finding a job is a job in and of itself- time intensive!
- Apply broadly but strategically.

Thank you!



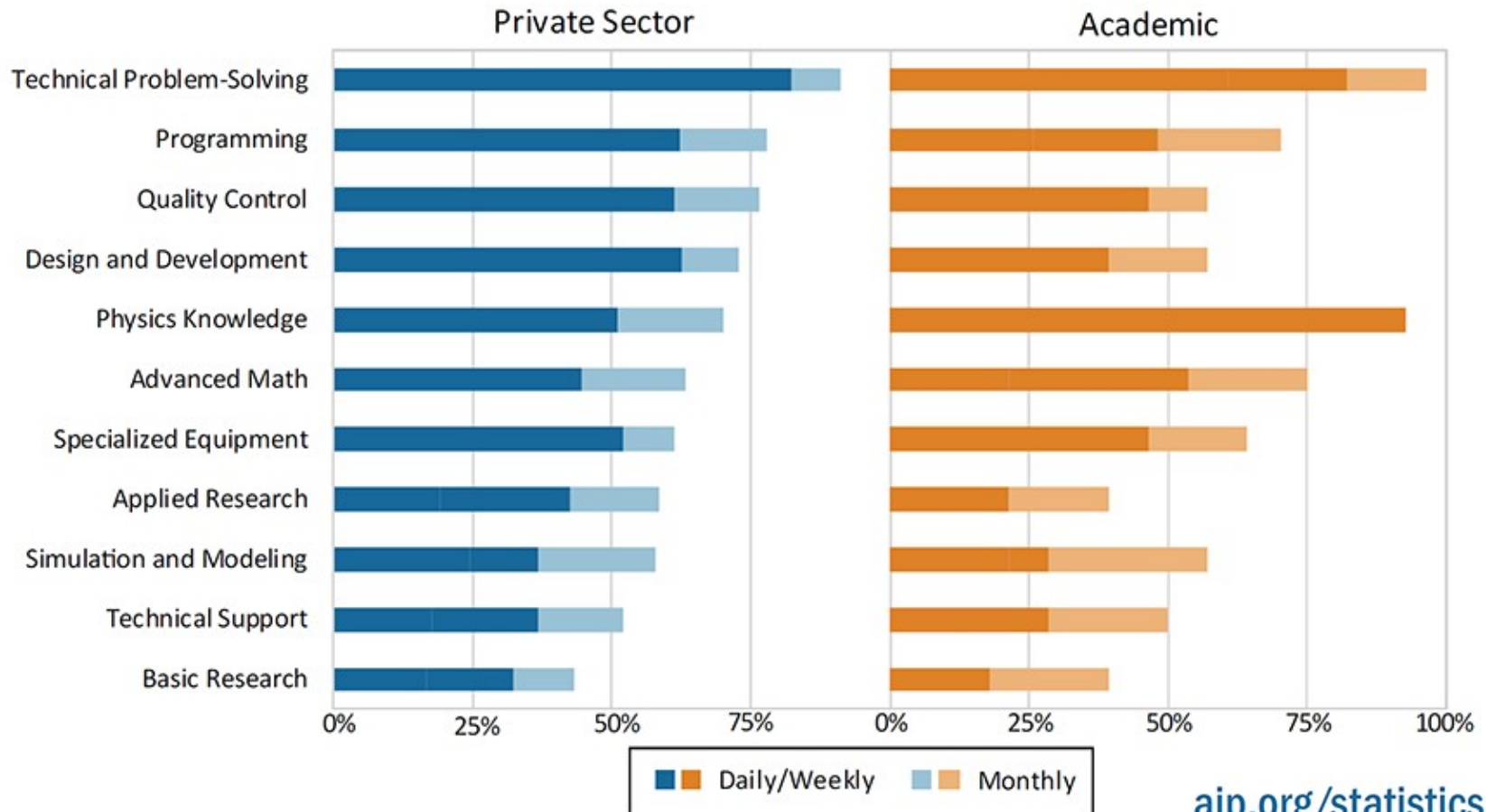
Survey:

tinyurl.com/APS-CareerTalk

Back up slides

What are they doing (Master's)?

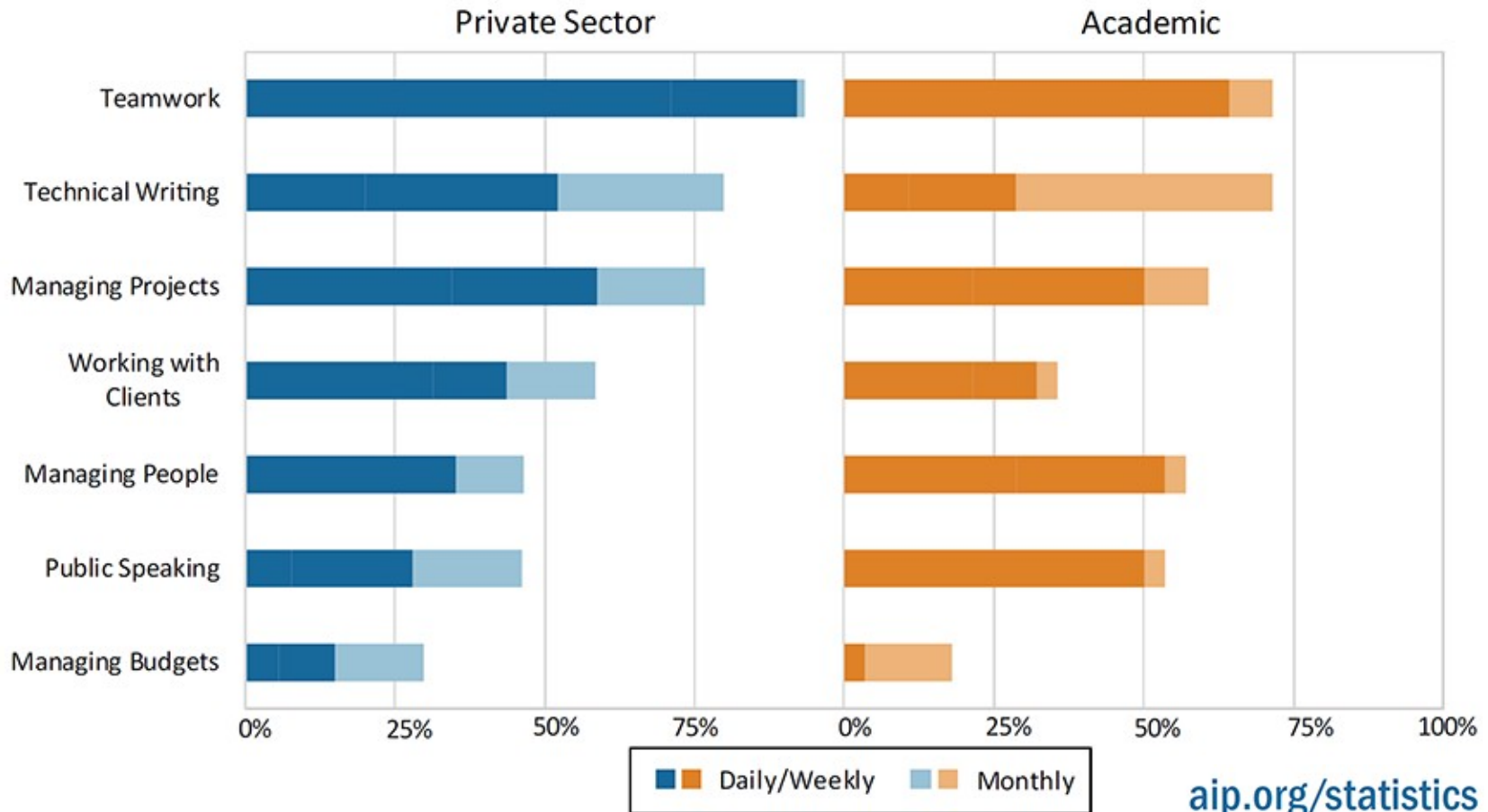
Scientific and Technical Knowledge and Skills Used by Exiting Physics Masters, Classes of 2016, 2017, & 2018 Combined



aip.org/statistics

What are they doing (Master's)?

Interpersonal and Management Skills Used by Exiting Physics Masters,
Classes of 2016, 2017, & 2018 Combined



Typical Starting Salaries of New Physics PhDs

Potentially Permanent Positions

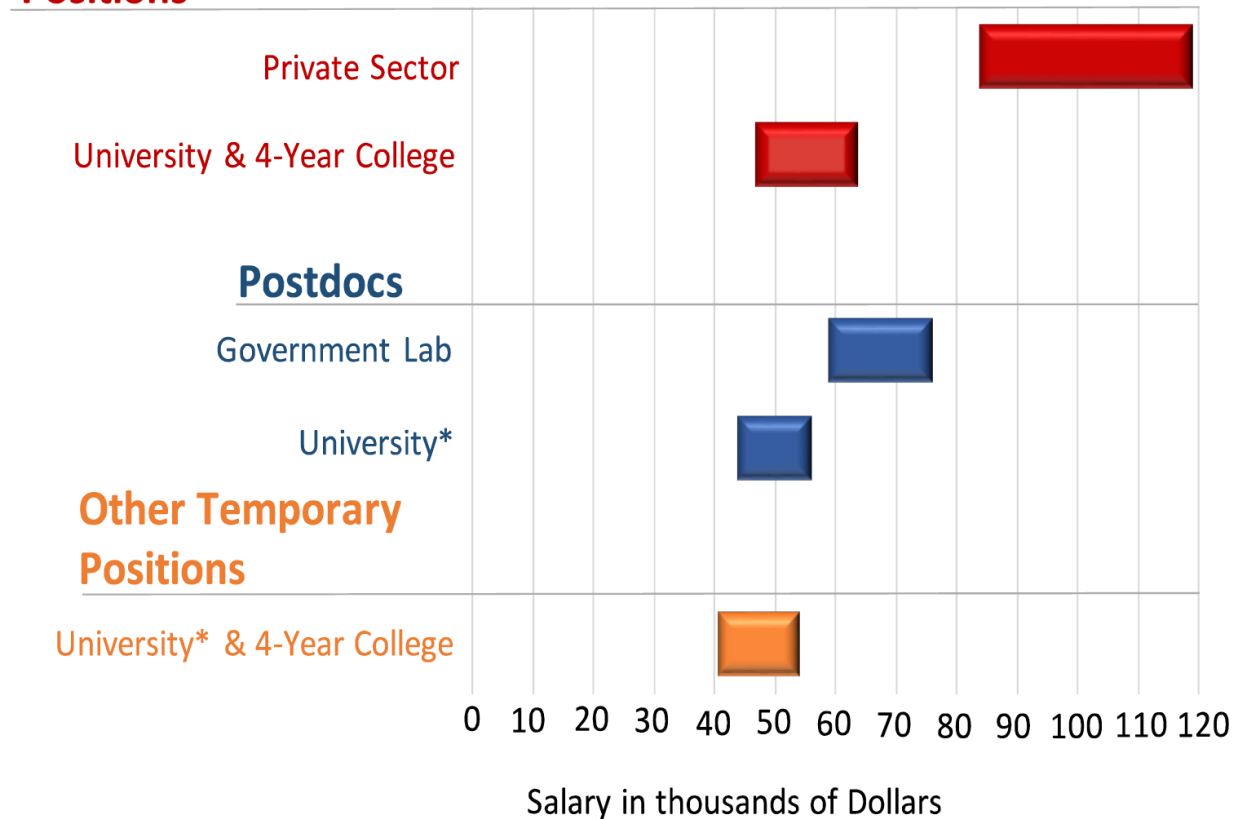
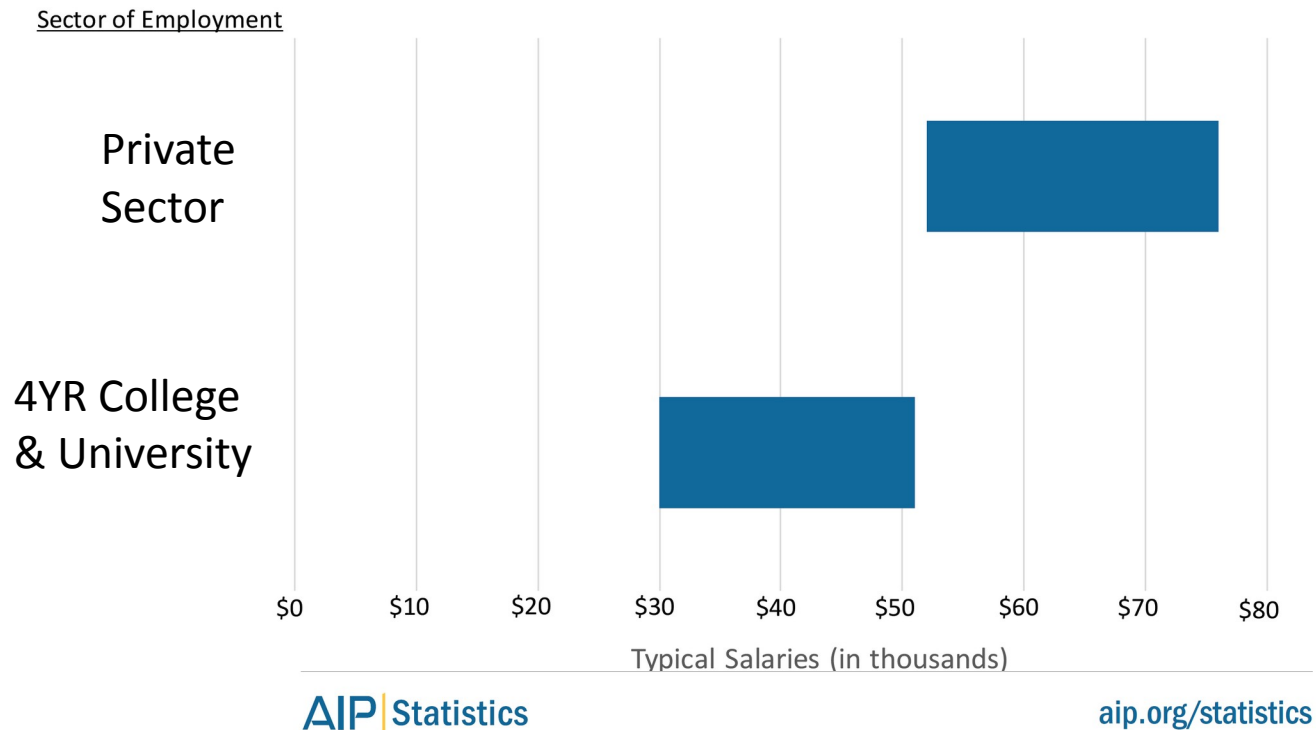


Figure includes only doctorates in full-time, newly accepted positions from the classes of 2015 and 2016 combined. Typical salaries are in the middle 50% i.e, between the 25th and 75th percentiles.

How much do physics Master's earn?

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



How much do physics Bachelor's earn?

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

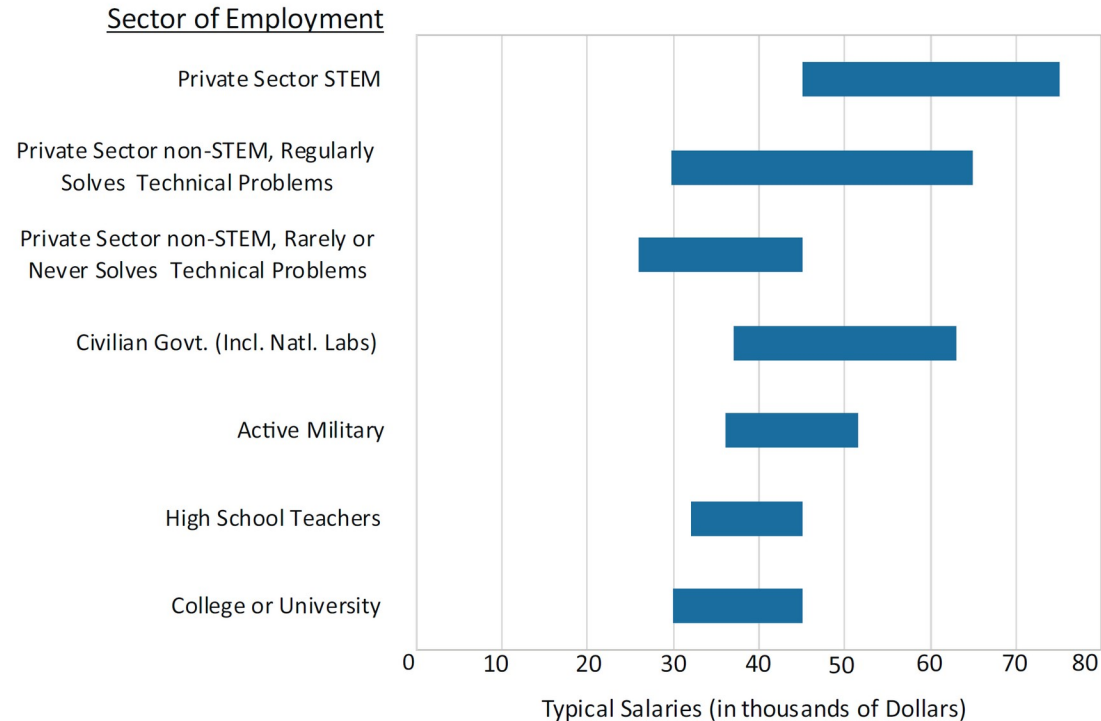


Figure includes only bachelors in full-time, newly accepted positions.

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.

What are they doing (PhDs)?

2015-2016 graduates: 1 year after PhD

Type of Employment of Physics by Employment Sector,
One Year After Degree, Classes of 2015 & 2016 Combined

About half of physics PhDs are initially employed in the academic sector.

However, ~**70%** of the potentially permanent jobs are in the private sector.

Sector of Employment	Initial Employment Type			Overall %
	Postdoc %	Potentially Permanent %	Other Temporary %	
Academic	75	16	70	49
Private	1	73	22	34
Government	20	7	5	14
Other	4	4	3	3
	100%	100%	100%	100%

Note: Data only includes US-educated physics PhDs who remained in the US after earning their degrees. Data are based on the responses of 593 postdocs, 514 individuals working in potentially permanent positions and 93 individuals working in "other temporary positions".

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.

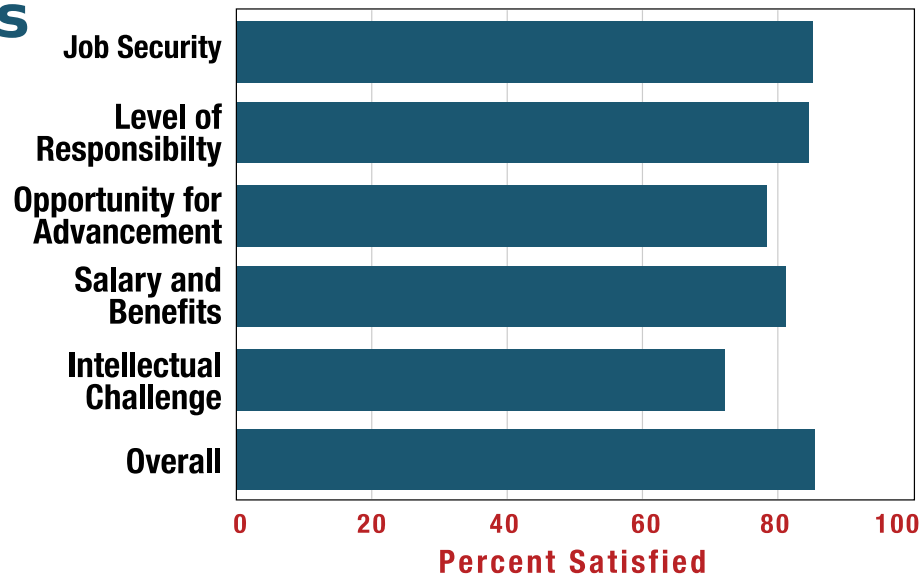
Estimated Number of Faculty Departures in Physics Departments, 2016-17 Academic Year

	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

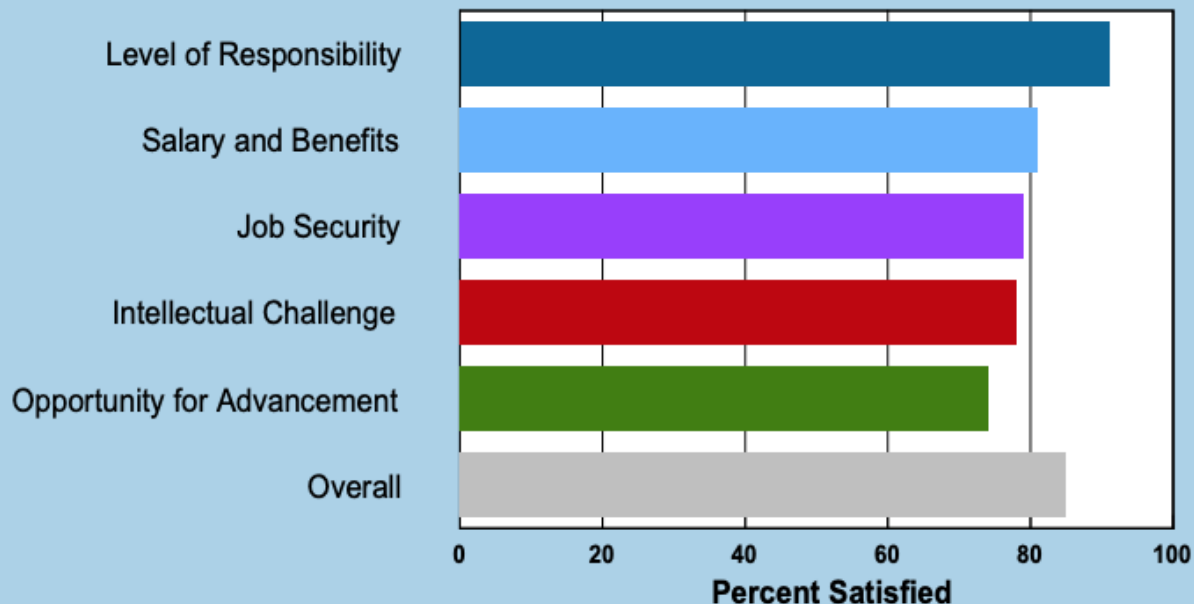
Note: The total headcount of faculty members is for the academic year of 2017-18. The total number of faculty members in this report differs from the total number reported in "The Number of Faculty Members in Physics Departments", which reported full-time equivalent (FTE) faculty totals, not headcount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

LinkedIn Basics



Meghan Anzelc · 1st
Head of Data & Analytics at Spencer Stuart | Public Speaker
Greater Chicago Area · [Contact info](#)

Headline

- Subheading under your name, 120 characters
- Job title/company by default, but can be modified:
 - Materials scientist with expertise in quantum optics
 - Data Scientist | Machine Learning Expert | Problem-Solver
- Used in LinkedIn Search Algorithm

Photo

- Extremely important for forming connections
- Should cover >60% of the frame
- High resolution
- Should look like you
- No one else should be in it

Profile Summary

- What combination of skills help you achieve results?
- What motivates you?
- Include skills and accomplishments
- Good place to explain any gaps or why you're switching fields

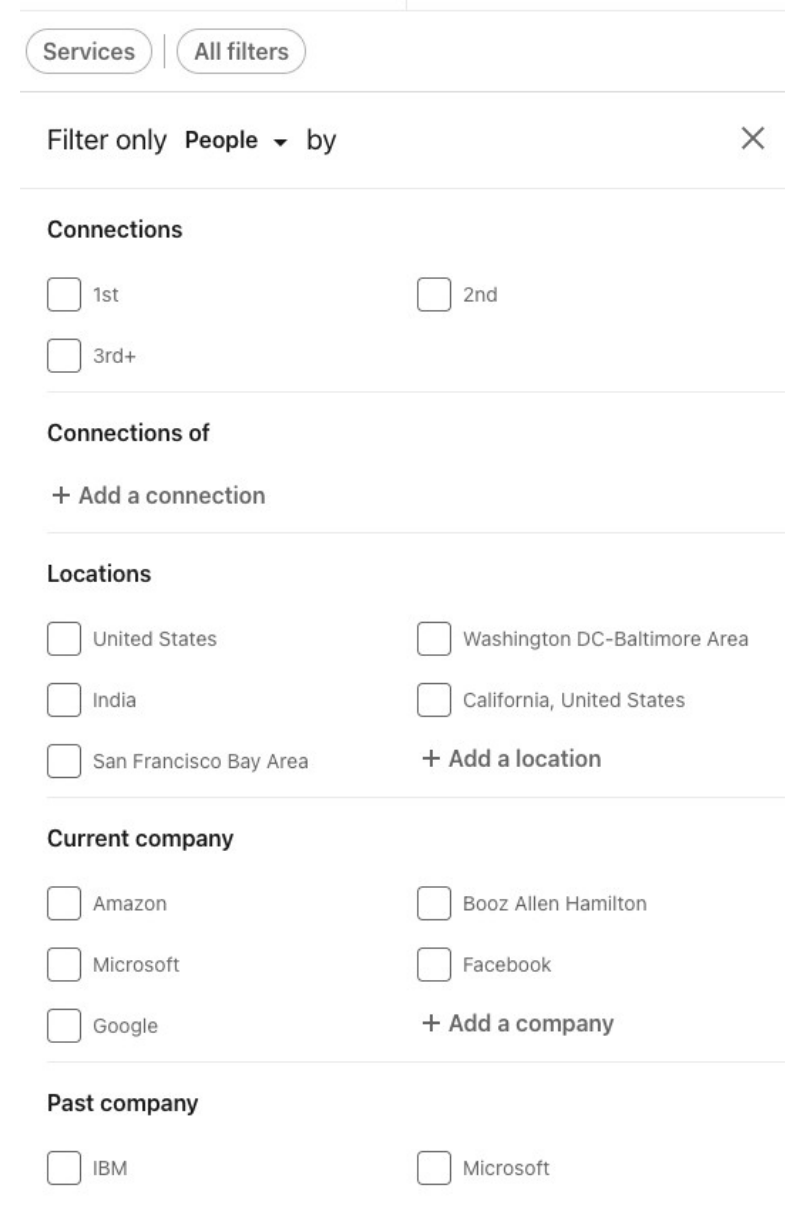
Using LinkedIn

LinkedIn Search Feature

- Order of connection:
 - 1st – searches through your current connections,
 - 2nd – connections of your connections, etc.
- Location, company (current or past!), school, industry, job title, etc.

Inviting New Contacts

- Tailor/personalize each invitation
- If you know them, good idea to remind them how
- Find something in common
- Be enthusiastic/give reason for why they would want to connect



The image shows a screenshot of the LinkedIn search filter interface. At the top, there are two buttons: "Services" and "All filters". Below this, a filter bar shows "Filter only People" with a dropdown arrow and "by" followed by a close button (X). The filters are organized into several sections:

- Connections:** Includes checkboxes for "1st", "2nd", and "3rd+" connections.
- Connections of:** Includes a "+ Add a connection" button.
- Locations:** Includes checkboxes for "United States", "India", "San Francisco Bay Area", "Washington DC-Baltimore Area", and "California, United States", along with a "+ Add a location" button.
- Current company:** Includes checkboxes for "Amazon", "Microsoft", "Google", "Booz Allen Hamilton", and "Facebook", along with a "+ Add a company" button.
- Past company:** Includes checkboxes for "IBM" and "Microsoft".

Tips on Resume Writing

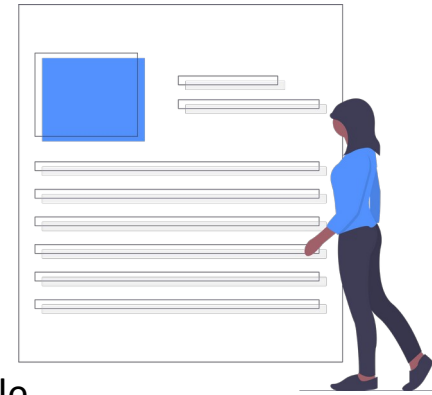
Resume vs. CV

Resume

- 1-2 pages,
- Specifically tailored to job posting,
- Only lists relevant skills and experiences
- More common in industry

CV

- Several pages,
- Can be used for multiple applications,
- Lists all experiences
- More common in academia



Writing a Resume

- Carefully read the job description and highlight required skills
- Organize resume into sections based on each prominent skill (rather than organizing by job title/experience)
- Use bullet points to describe experiences and accomplishments relevant to each section

Name, Contact Info

Skill Area #1 – e.g. “Data Analysis Skills”

- Bulleted Skill (Title, Organization, Year)
- Bulleted Skill (Title, Organization, Year)
- Etc....

Skill Area #2 – e.g. “Leadership Skills”

- Bulleted Skill (Title, Organization, Year)
- Bulleted Skill (Title, Organization, Year)
- Etc....

Interviewing Process

Typical Interview Trajectory at a Company

- Phone interview with HR – usually to determine if you meet basic requirements
- In person (or virtual) interviews with specific department and team members
- Presentation to department on your research or other work relevant to the position (sometimes required)

Preparing for Interviews

- Review job description – be able to provide examples of how you qualify for specific requirements
- Practice answering common questions
 - “Tell me about yourself” “Why are you interested in this position?”
 - “Tell us about a time when you...”
 - Dealt with a conflict, worked with someone difficult, etc.
- Test out any technical issues for video calls beforehand

Common Job Titles of Physics Bachelors



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