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 Survey

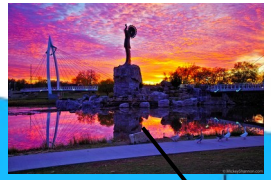
Exit Poll

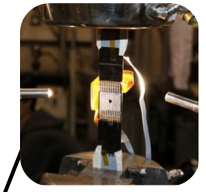
shorturl.at/bsJ35

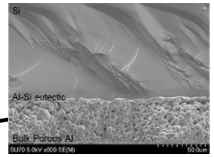
A little bit about me

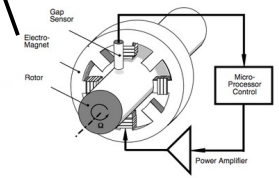
PRITZKER SCHOOL OF MOLECULAR ENGINEERING
THE UNIVERSITY OF CHICAGO

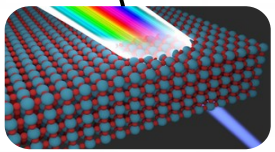
MIT DMSE











UC SANTA BARBARA
MATERIALS

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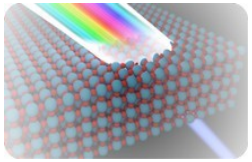
Wang Modern Materials

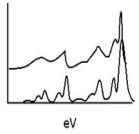
Wang Materials Group

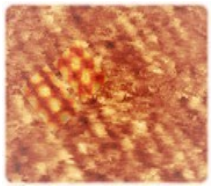
First-principles calculations



Enabled by HPC resources

Experimental collaboration





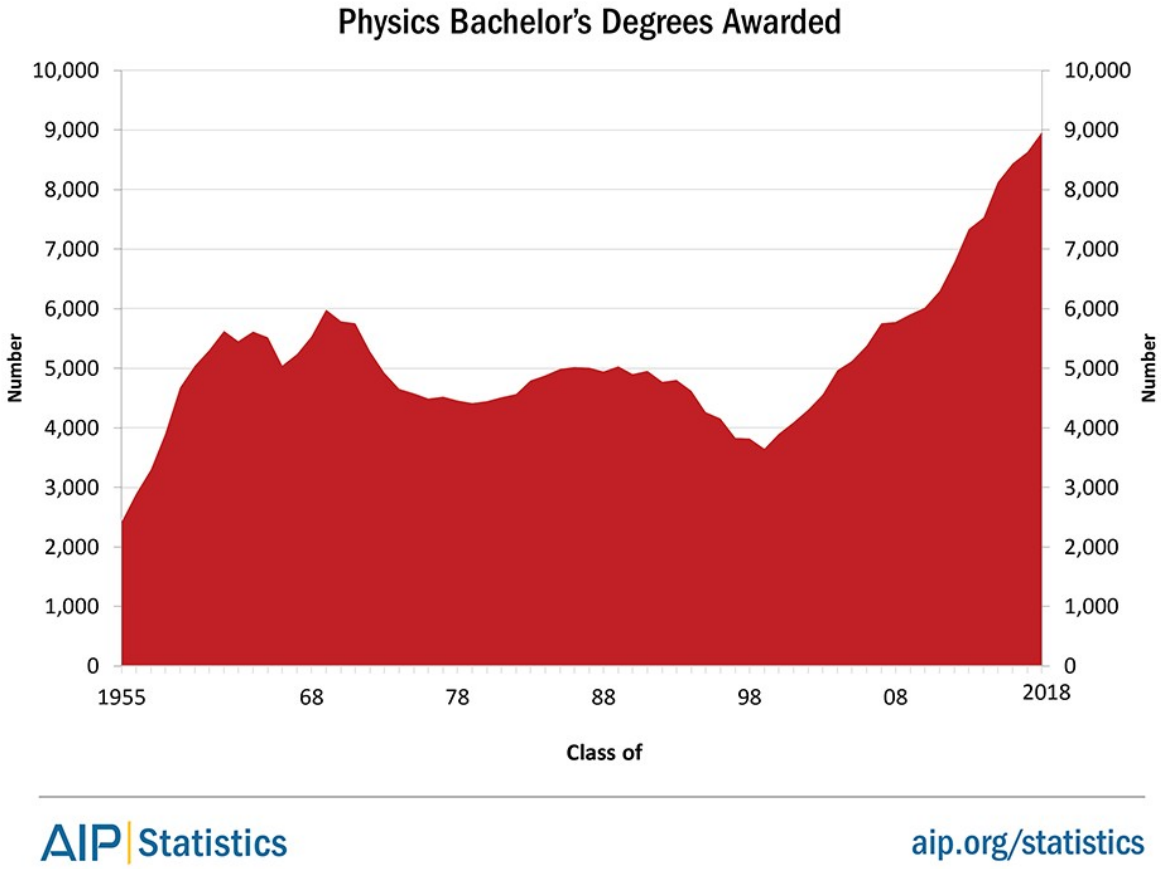
Spectroscopies, microscopies, ...

Harnessing Materials Imperfections for Energy Sustainability

https://wangmaterialsgroup.com

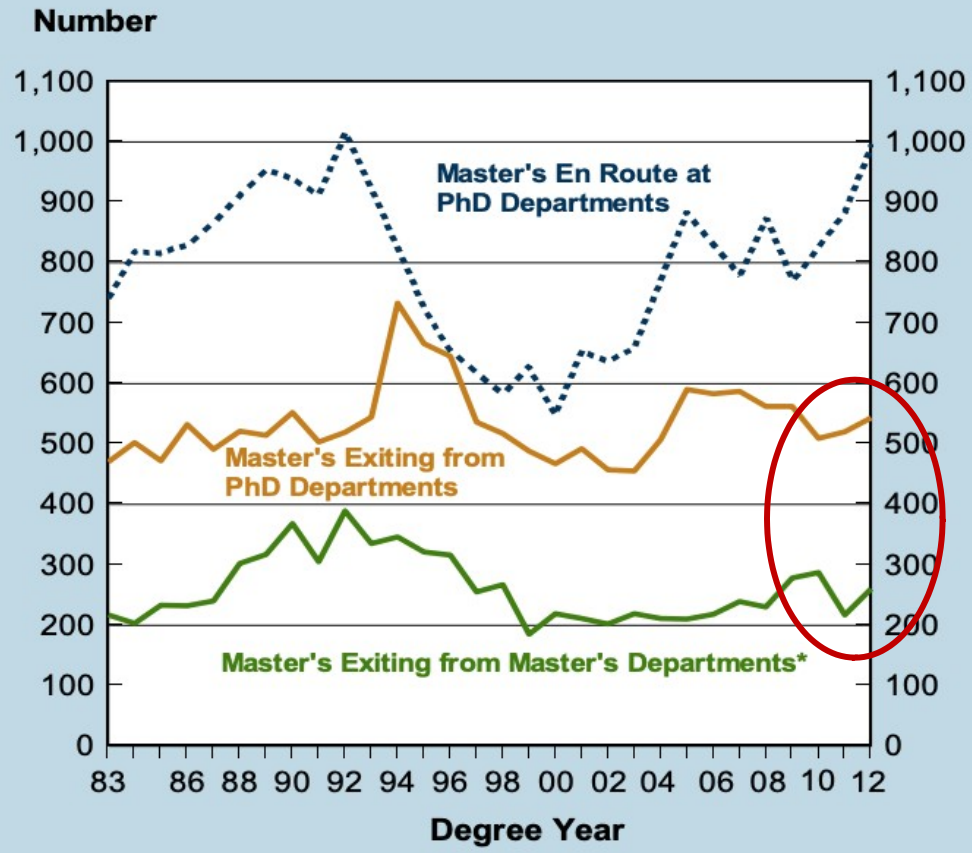
- Establish a **microscopic understanding** of defective systems
- Discover precise and novel ways for **finely tuning and predicting materials properties** for energy sustainability technologies
- Tight coupling with experiment through **spectroscopic fingerprinting**

How many Physics Bachelor's are there?



>8500 Physics Bachelor's degrees are awarded annually

How many MS holders are there?



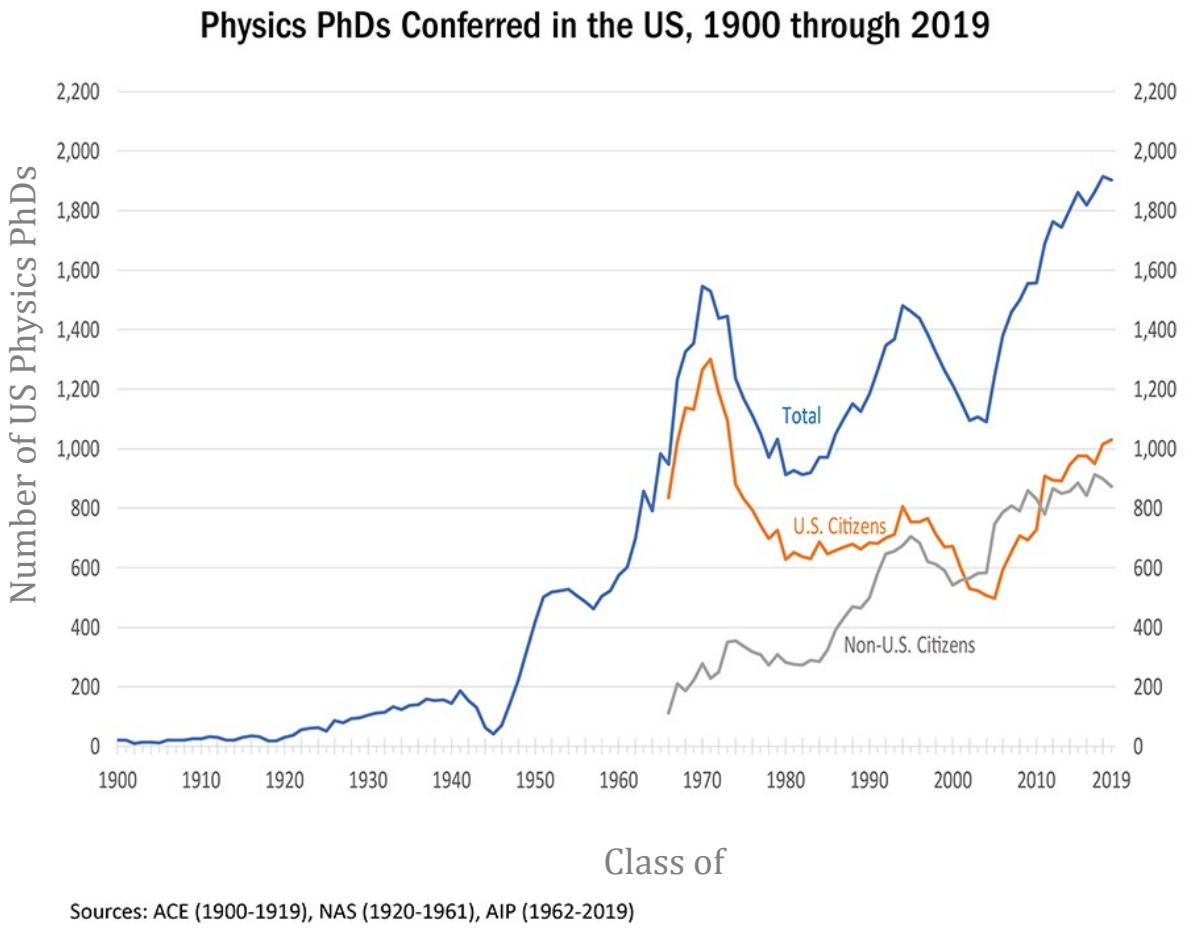
*These departments offer a master's as their highest physics degree.

http://www.aip.org/statistics

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

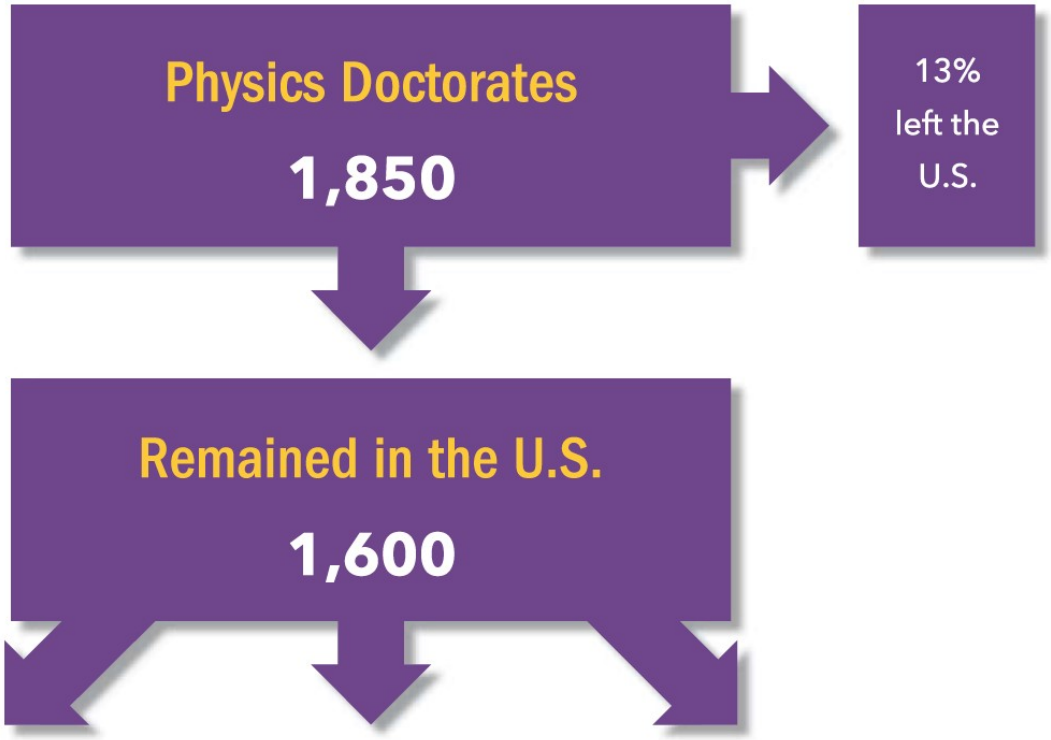
How many PhDs are there?

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



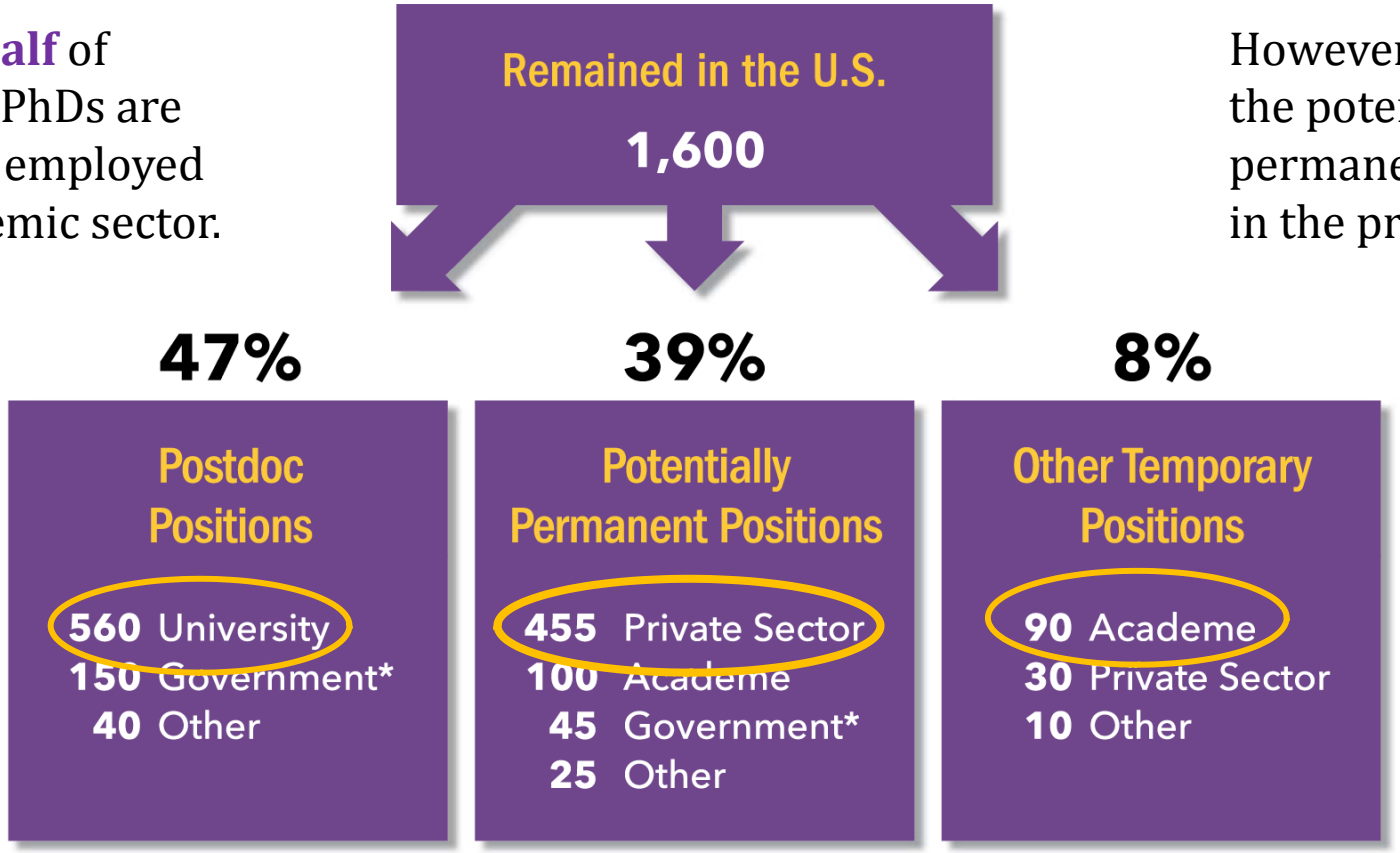
~1600 Physics PhDs go into the job market every year

AIP Statistics @AIPStatistics aip.org/statistics

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.

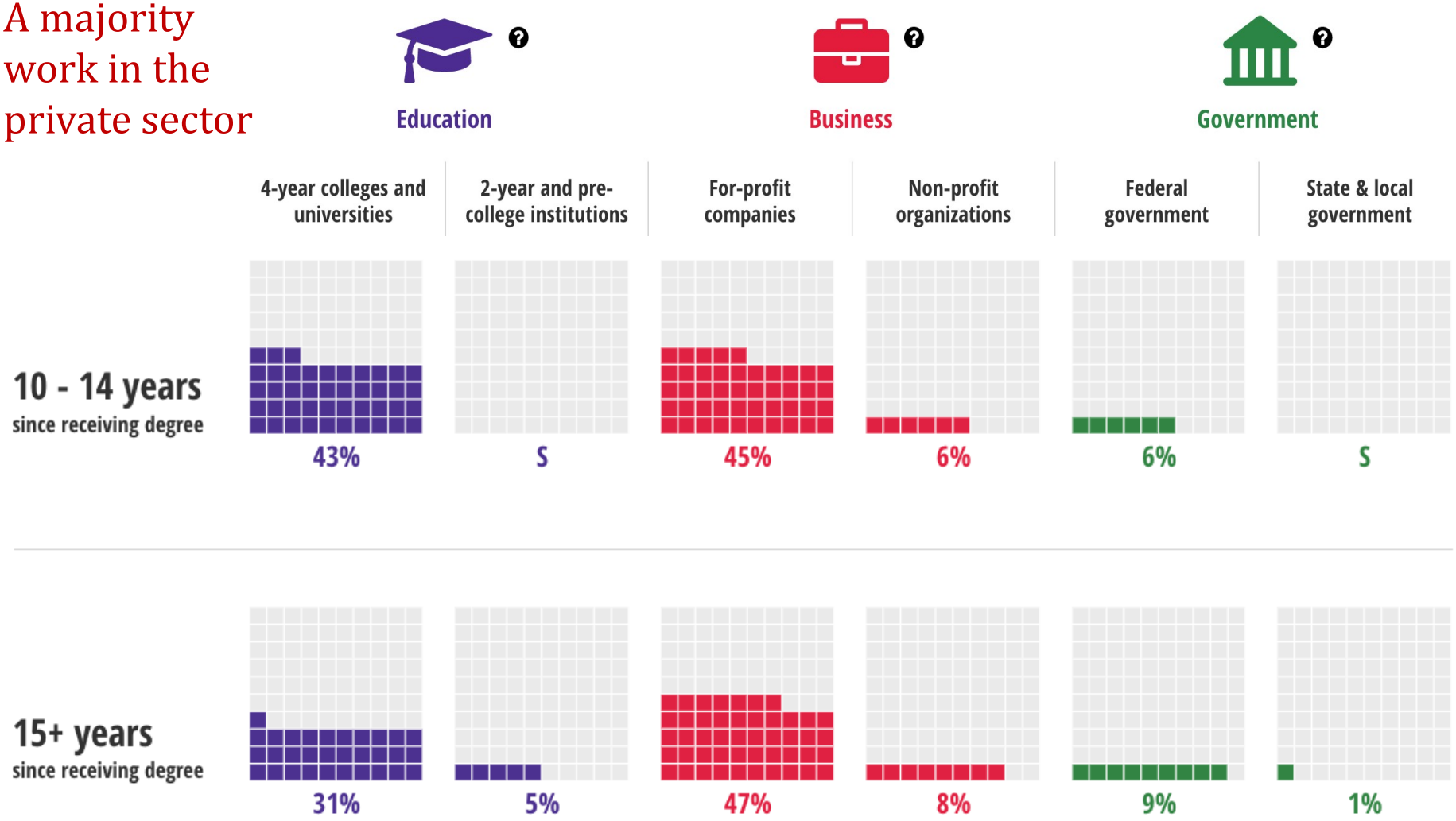
6% of those in the U.S. were unemployed the winter after receiving their degrees.
<1% of those in the U.S. were not employed and not seeking employment.

AIP Statistics | @AIPStatistics | aip.org/statistics

Slide from APS Careers

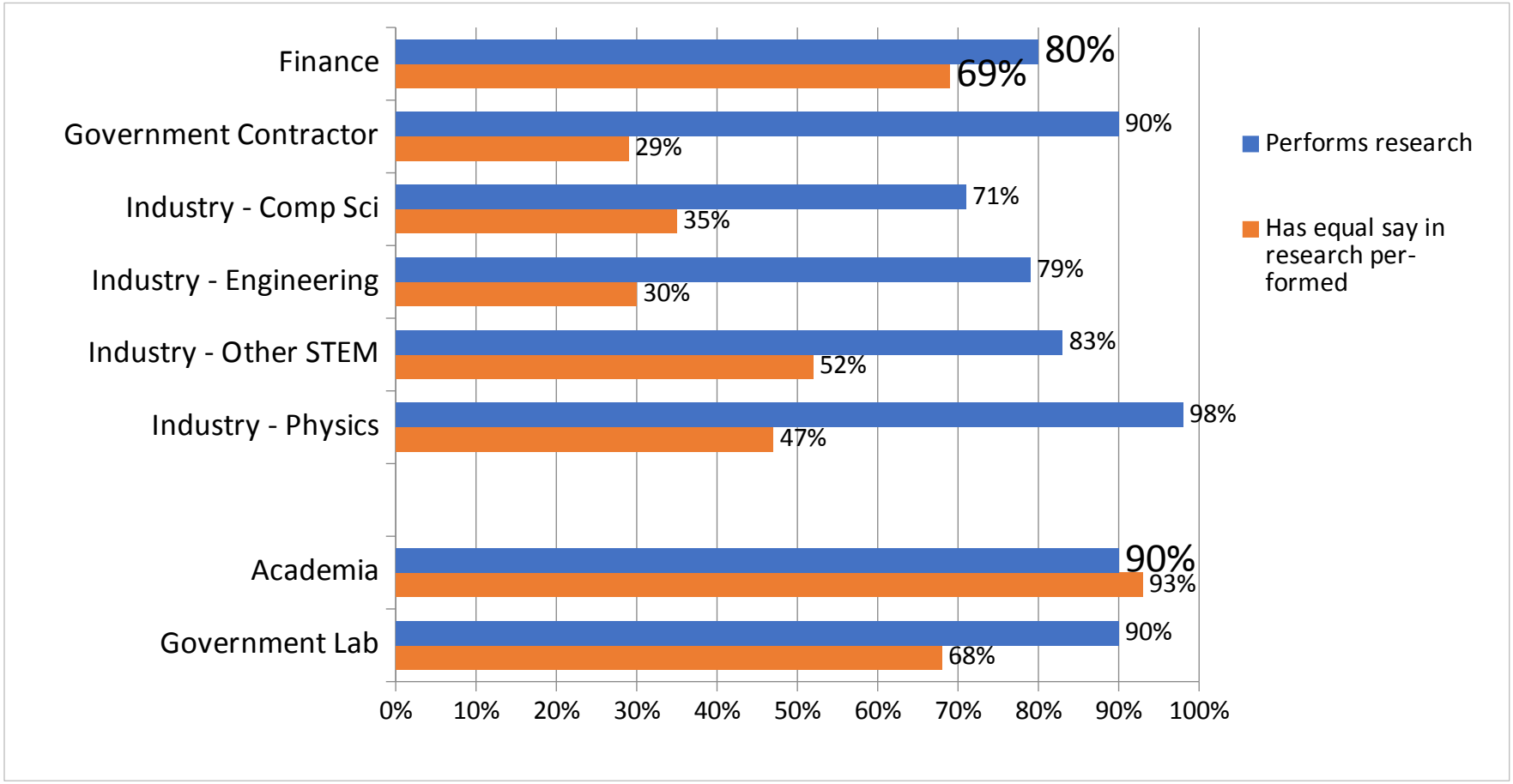
What are they doing (PhDs)?

A majority work in the private sector



Source: NSF Survey of Doctoral Recipients, 2001 - 2013

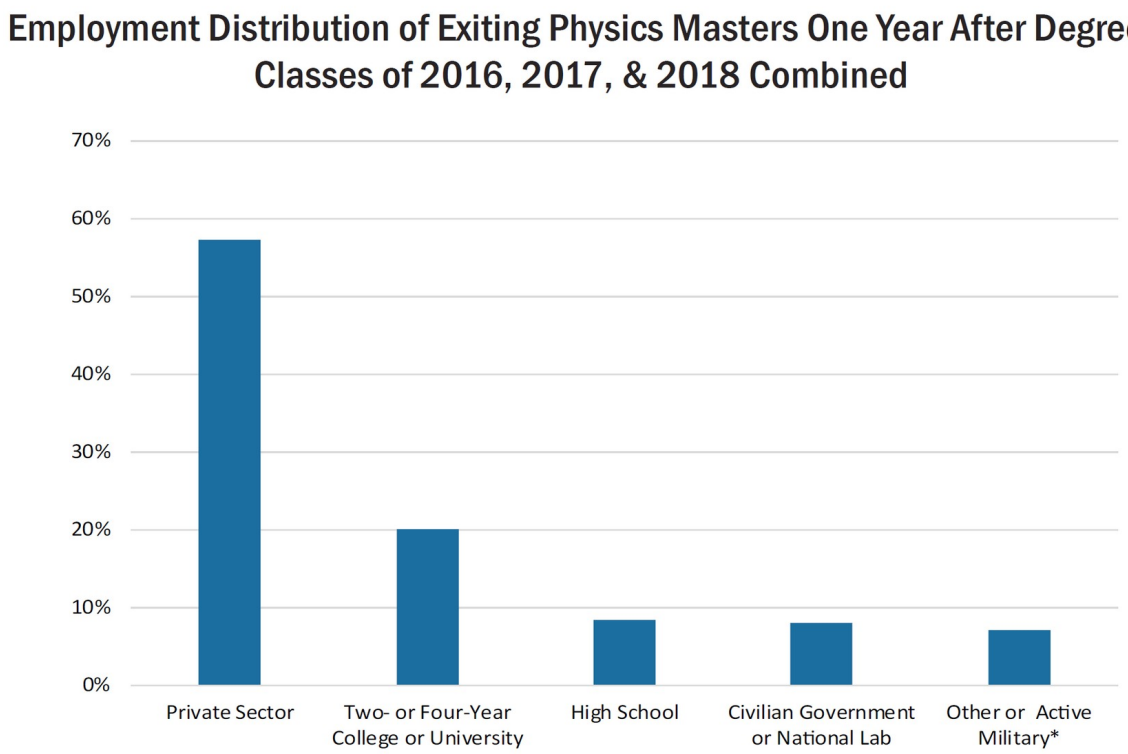
What are they doing (PhDs)?



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)?



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

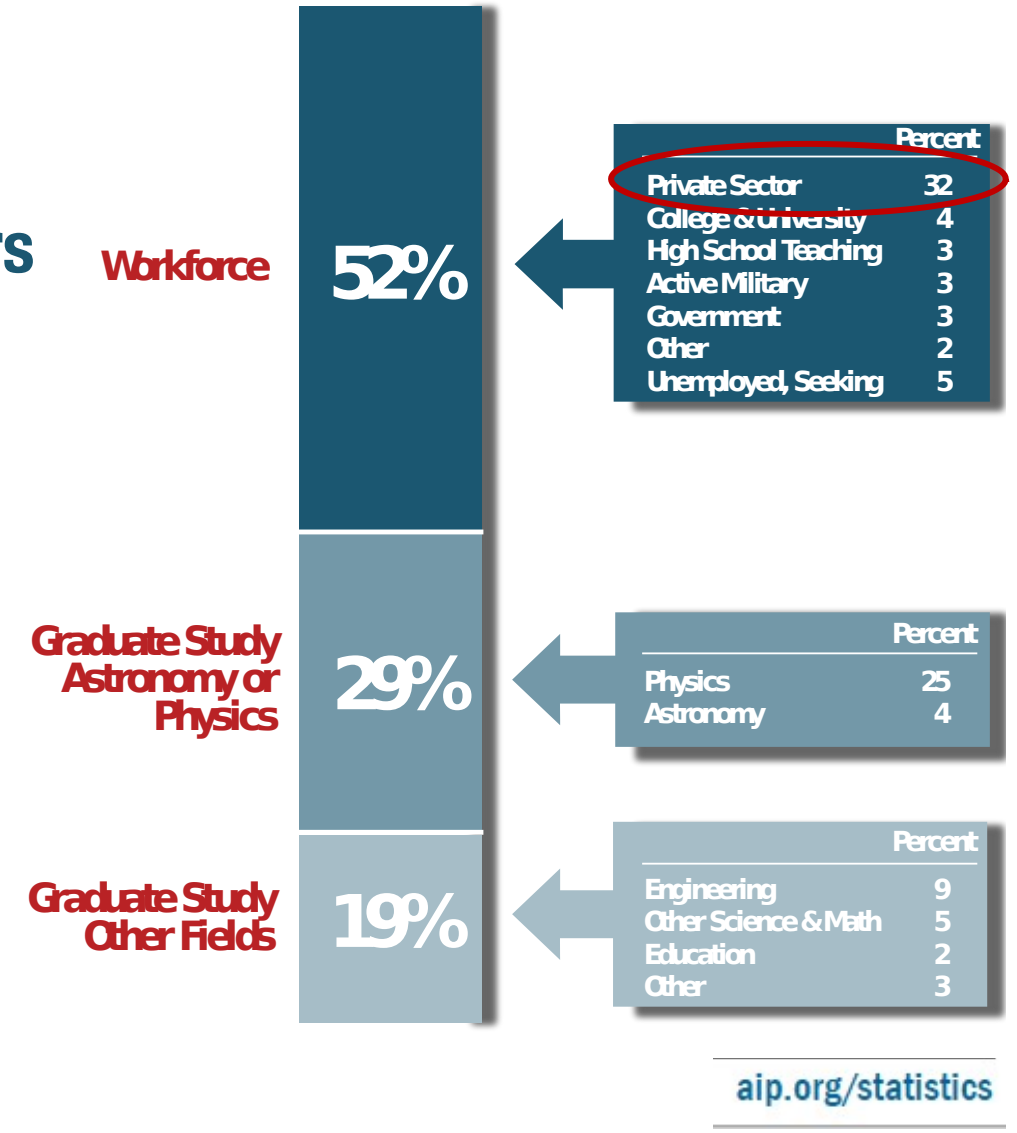
~20% find jobs at colleges or universities

What are they doing (Bachelor's)?

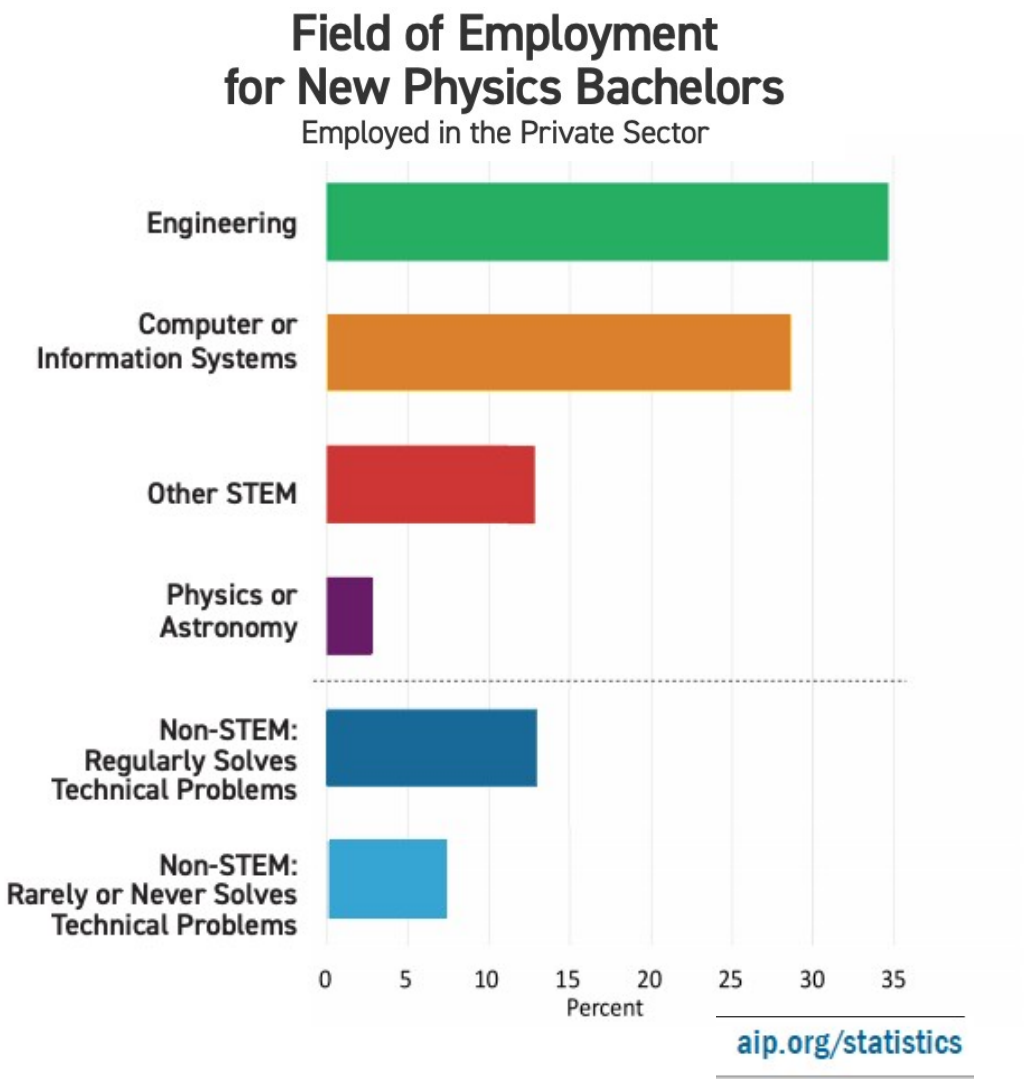
Physics Bachelors One Year Later

8,800 Recent Degree Recipients (2017 & 2018)

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



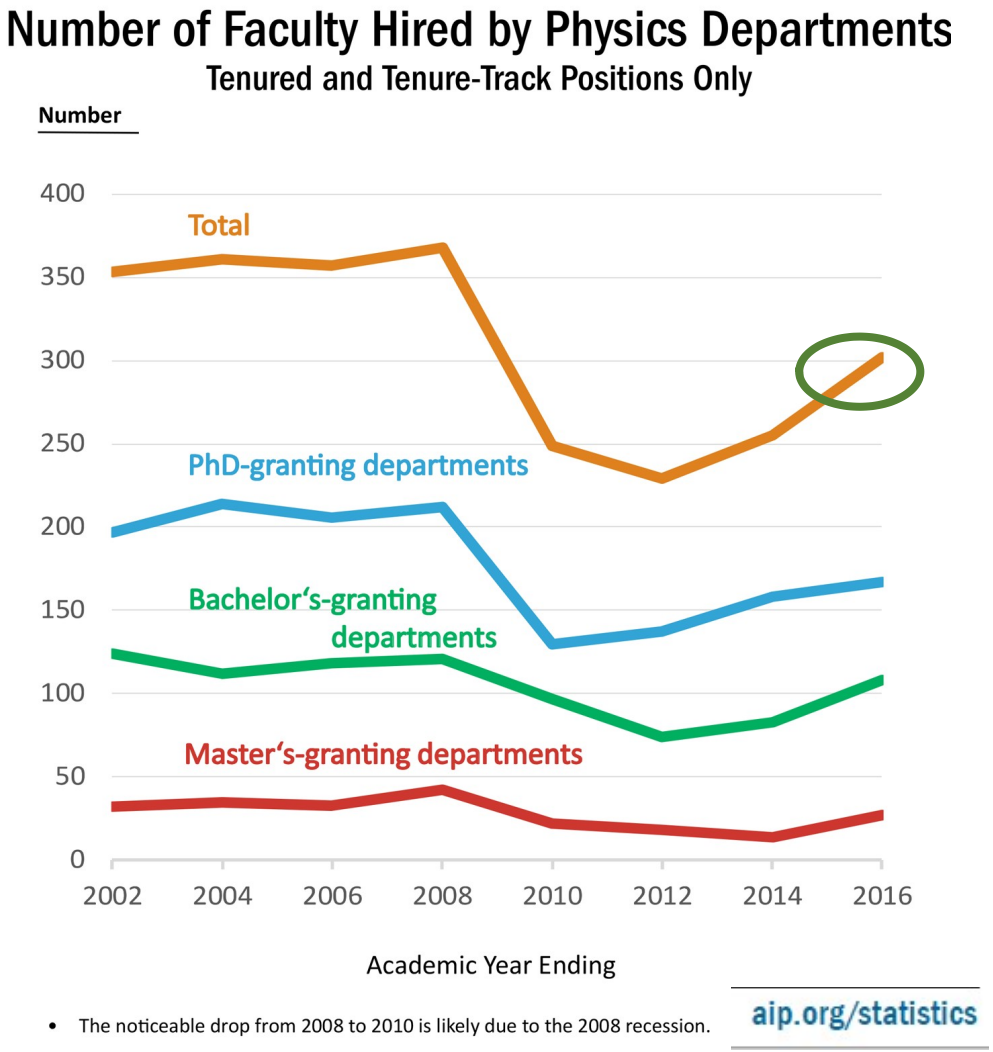
What are they doing (Bachelor's)?



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

Majority working in STEM jobs

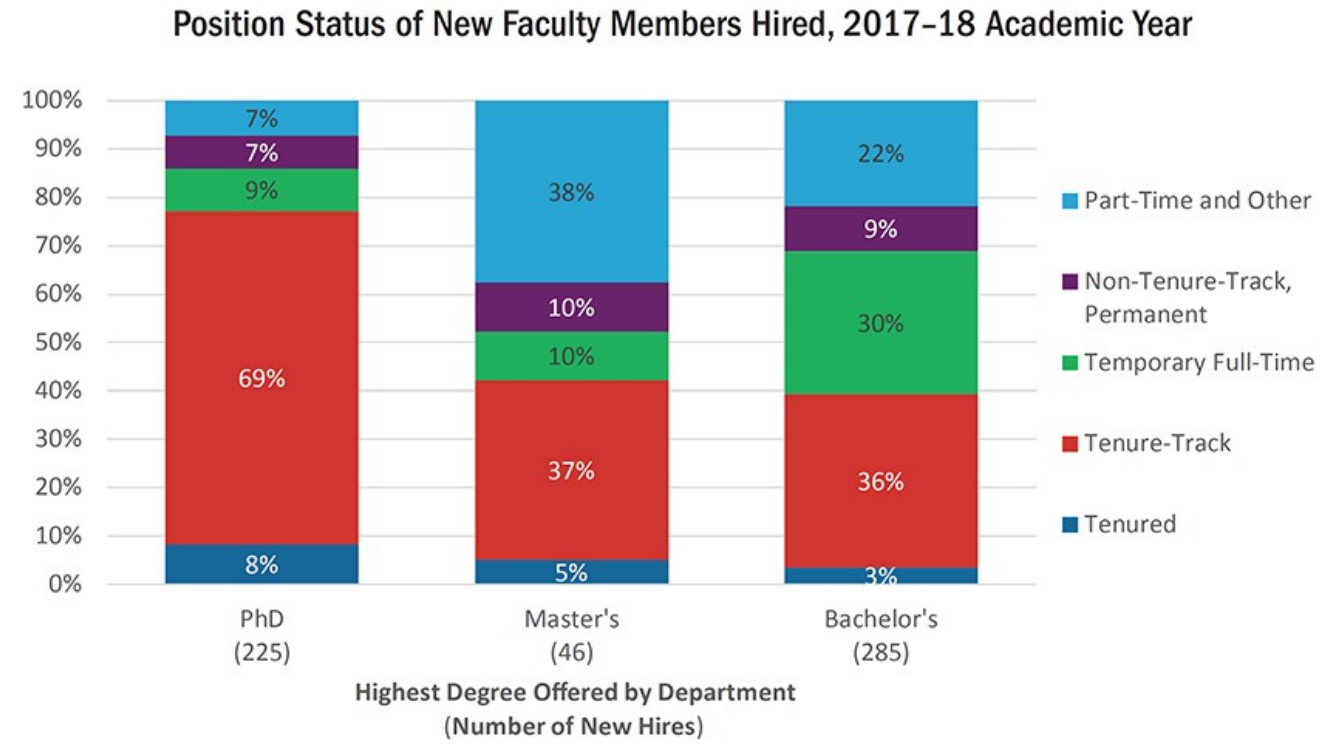
Academic sector demand



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

Recall: ~1600 PhDs looking for jobs yearly

Academic sector demand



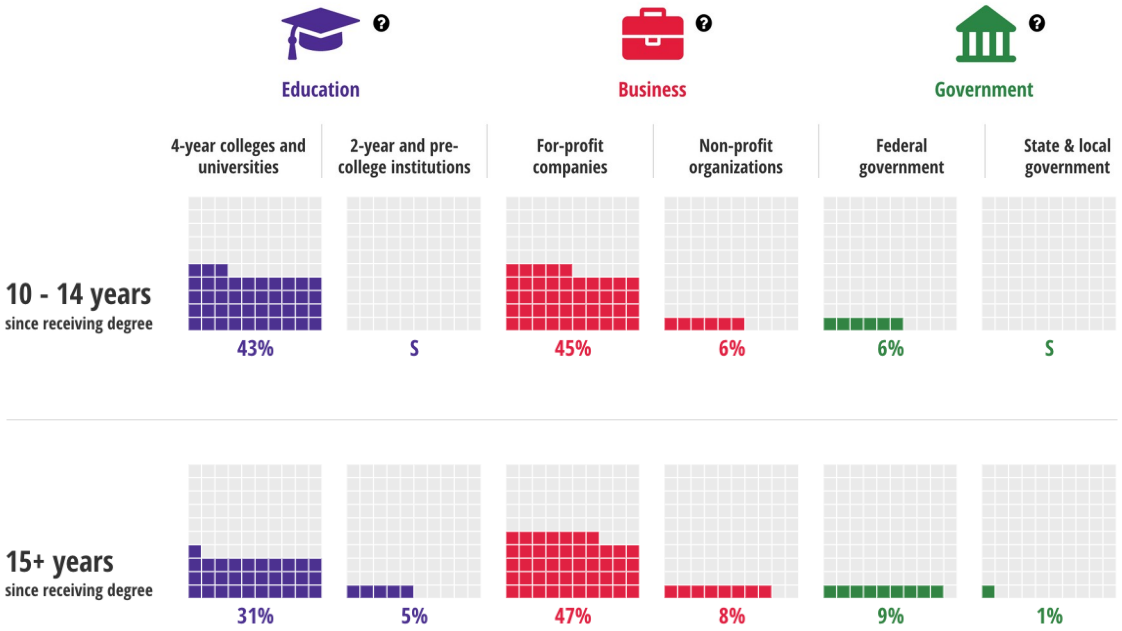
AIP Statistics aip.org/statistics

Faculty position types vary widely by institution.

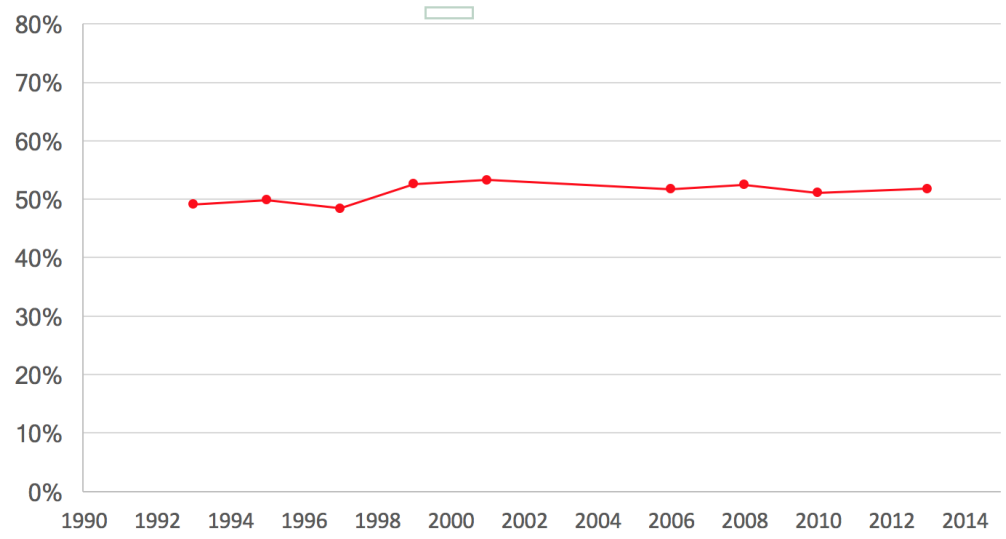
Total of 556 new faculty hires (including all position types).

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



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

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

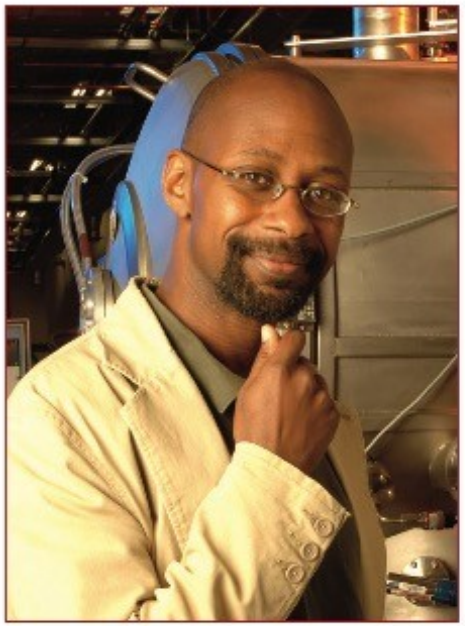
Though Jessica often struggled in courses due to a learning disability, she discovered her talent for physics in high school and got a PhD.

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

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.

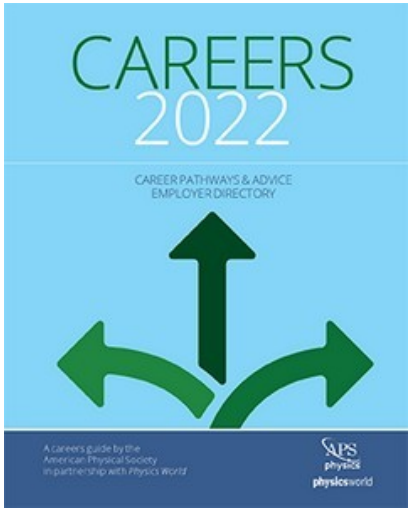
How can you start preparing?

Use Resources

APS Careers 2022 Guide

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

go.aps.org/careers2022



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

CAREERS TOOLBOX

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.

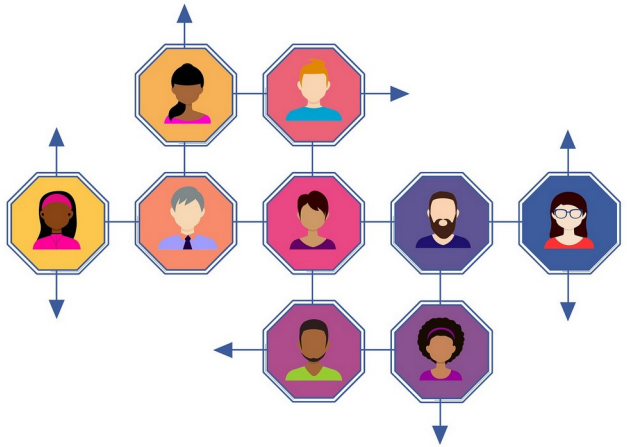
View Webinars & Sign up:

aps.org/webinars

How can you start preparing?

Build Your Network

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



APS physics IMPACT

Industry Mentoring for Physicists

Find Career Mentors

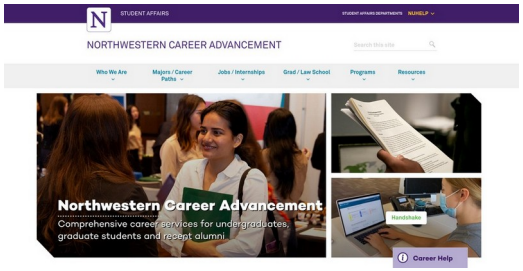
- Join the APS IMPact program to find industry mentors: impact.aps.org
- Ask faculty mentors to connect you to
- Talk to faculty in your department/institution

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
- Informational interviews

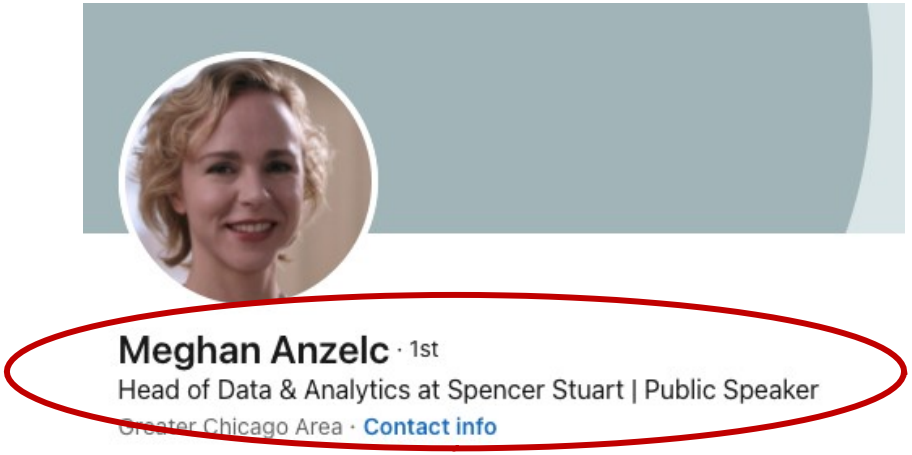
- Job boards of other professional societies (see also MRS, SPIE,...)
- Careers in Physics Workshop/Webinar by Peter Fiske
- Linkedin page: Who is hiring right now
- Candor: Who's freezing hiring during COVID
- 1point3acres: Who's hiring during COVID
- Google doc made by Dr. Karen Kelsk about academic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

APS physics | FECS FORUM FOR Early Career Scientists

Sign up for email lists to get notifications

(Courtesy of Shaowei Li, FECS Chair)

LinkedIn Basics (and establishing an online presence in general)



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.

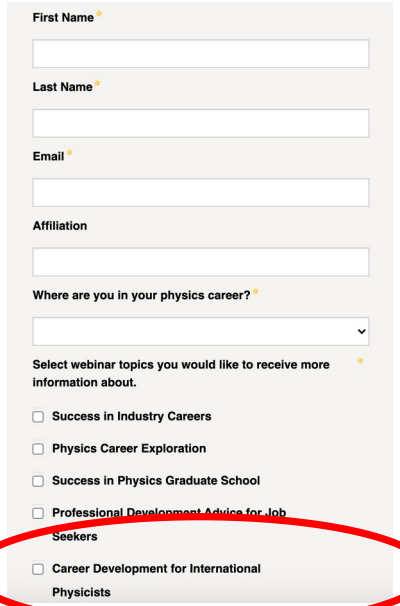
What about non-US Citizens

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**

Summary

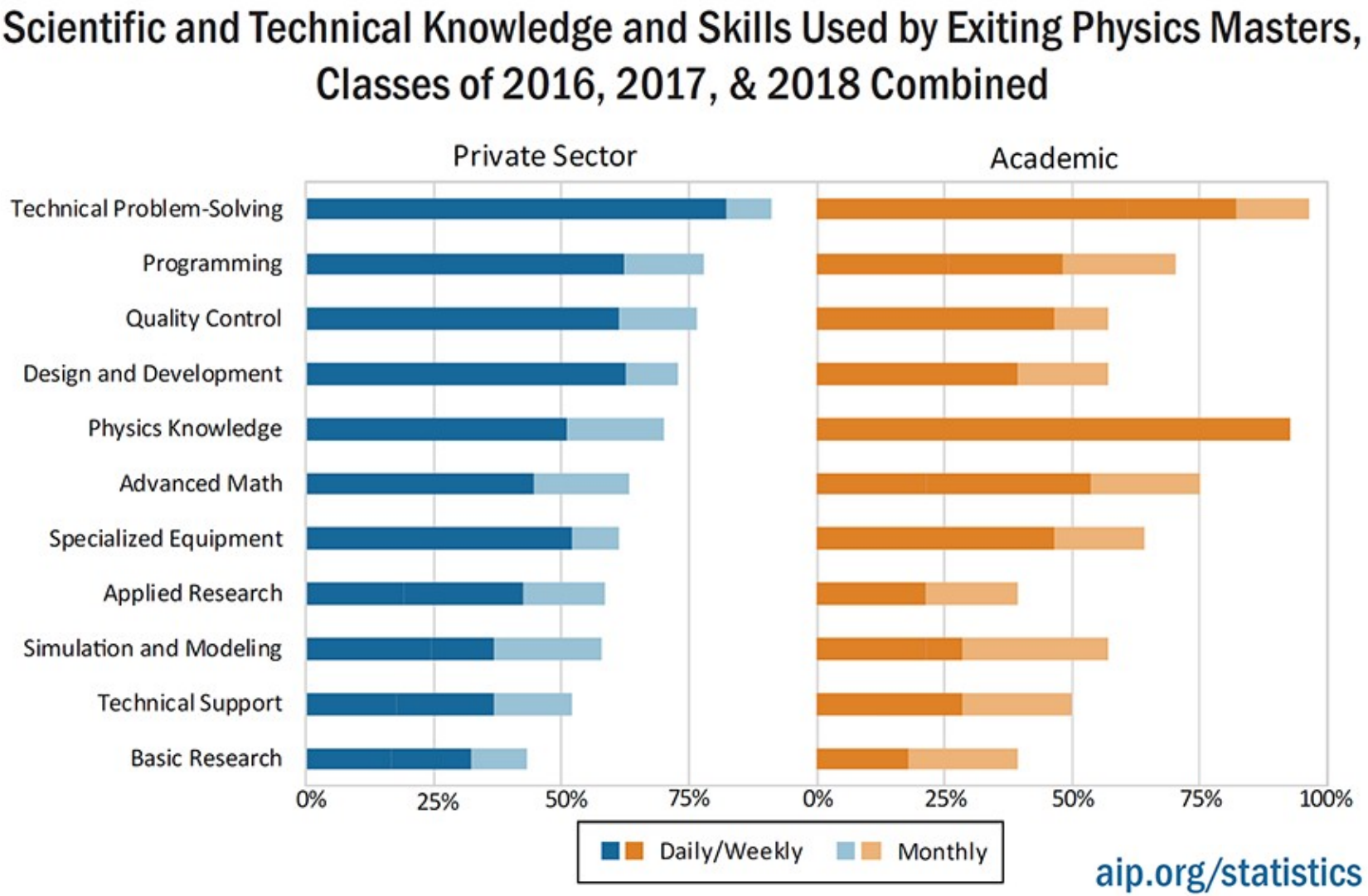
- Hundreds of physics degree holders enter the job market every year
- Majority find careers in the private sector, applying their physics knowledge and training
- You can start preparing now by expanding your network and using APS Resources
- Talk to people- peers, mentors, friends, family.
- Finding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

Thank you!

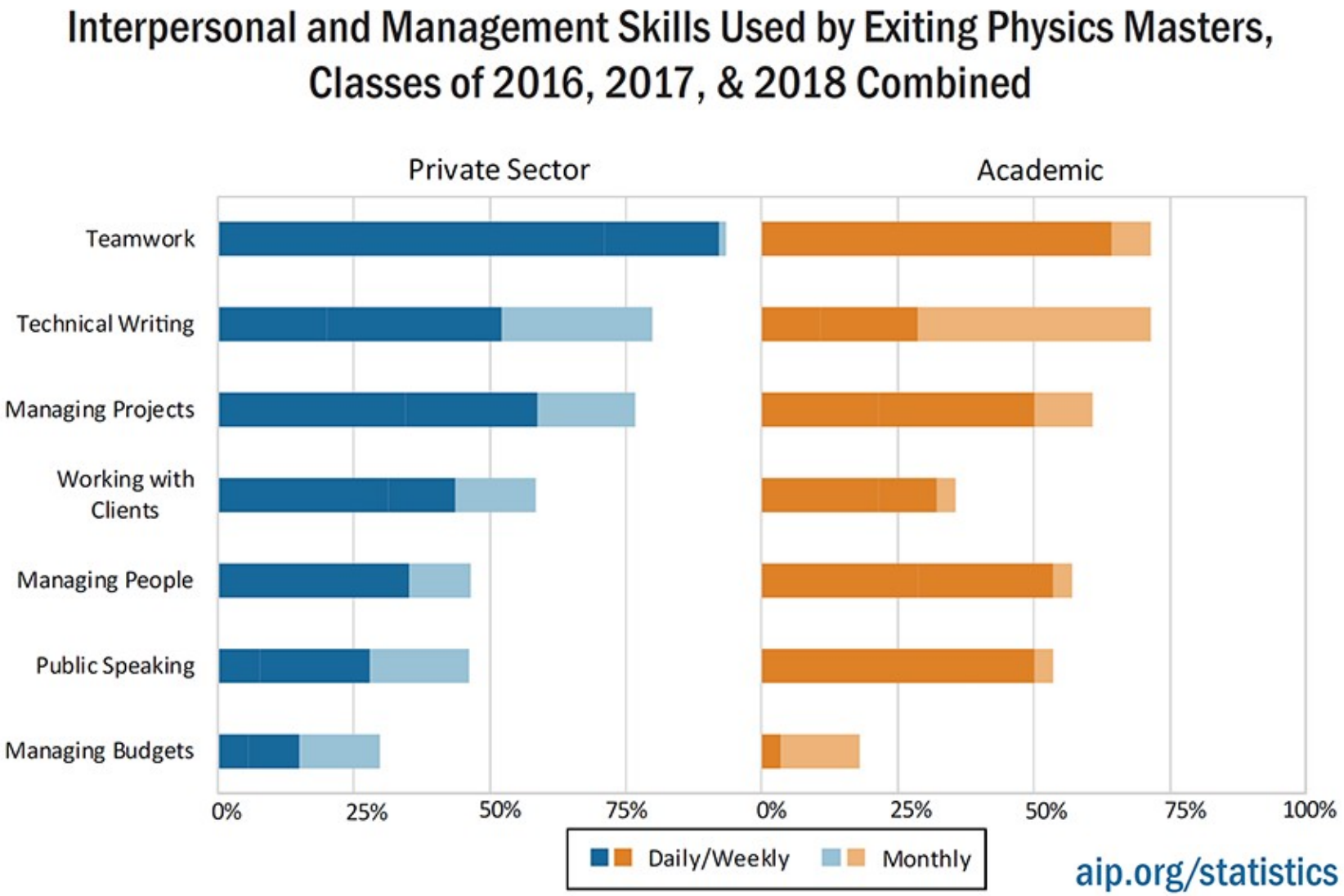
Survey:
tinyurl.com/APS-CareerTalk

Back up slides

What are they doing (Master's)?



What are they doing (Master's)?



Typical Starting Salaries of New Physics PhDs

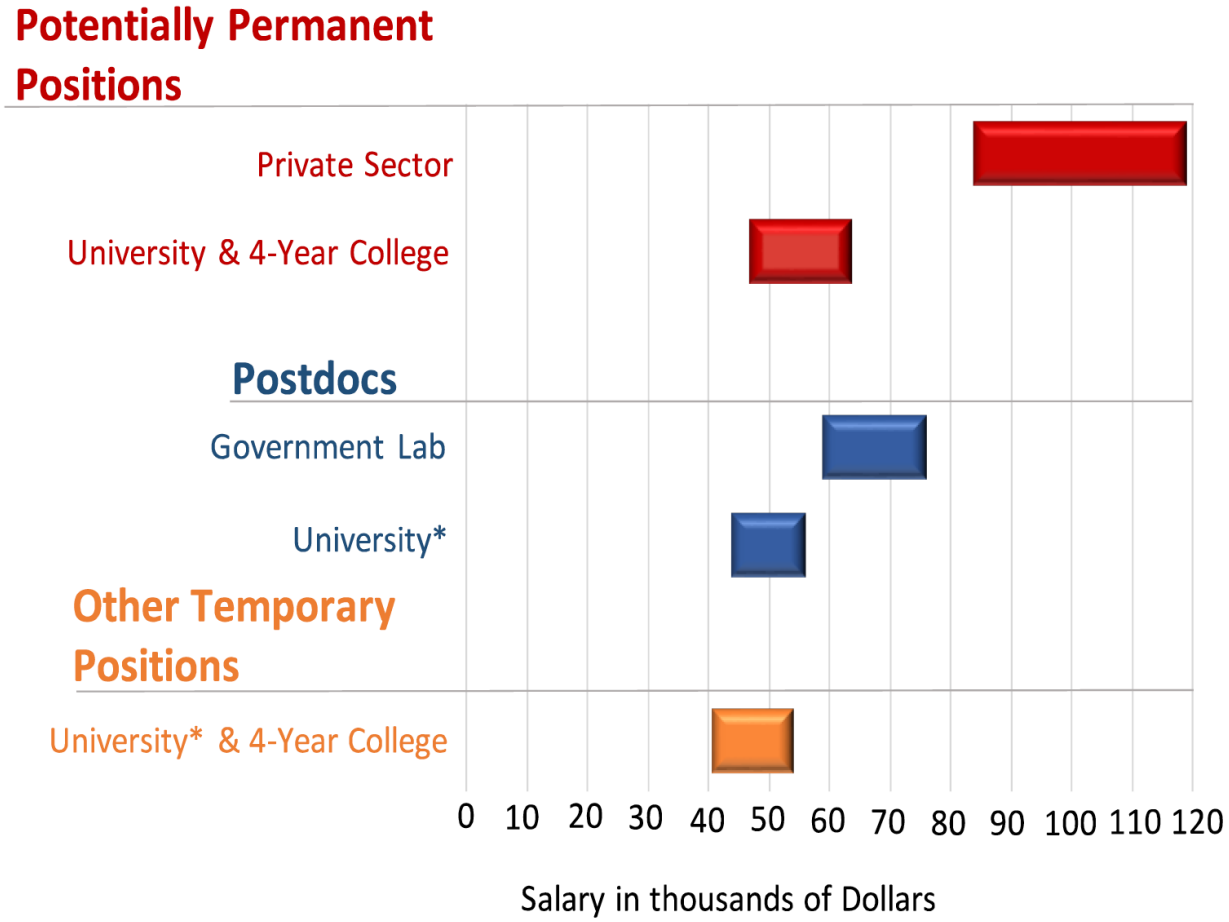
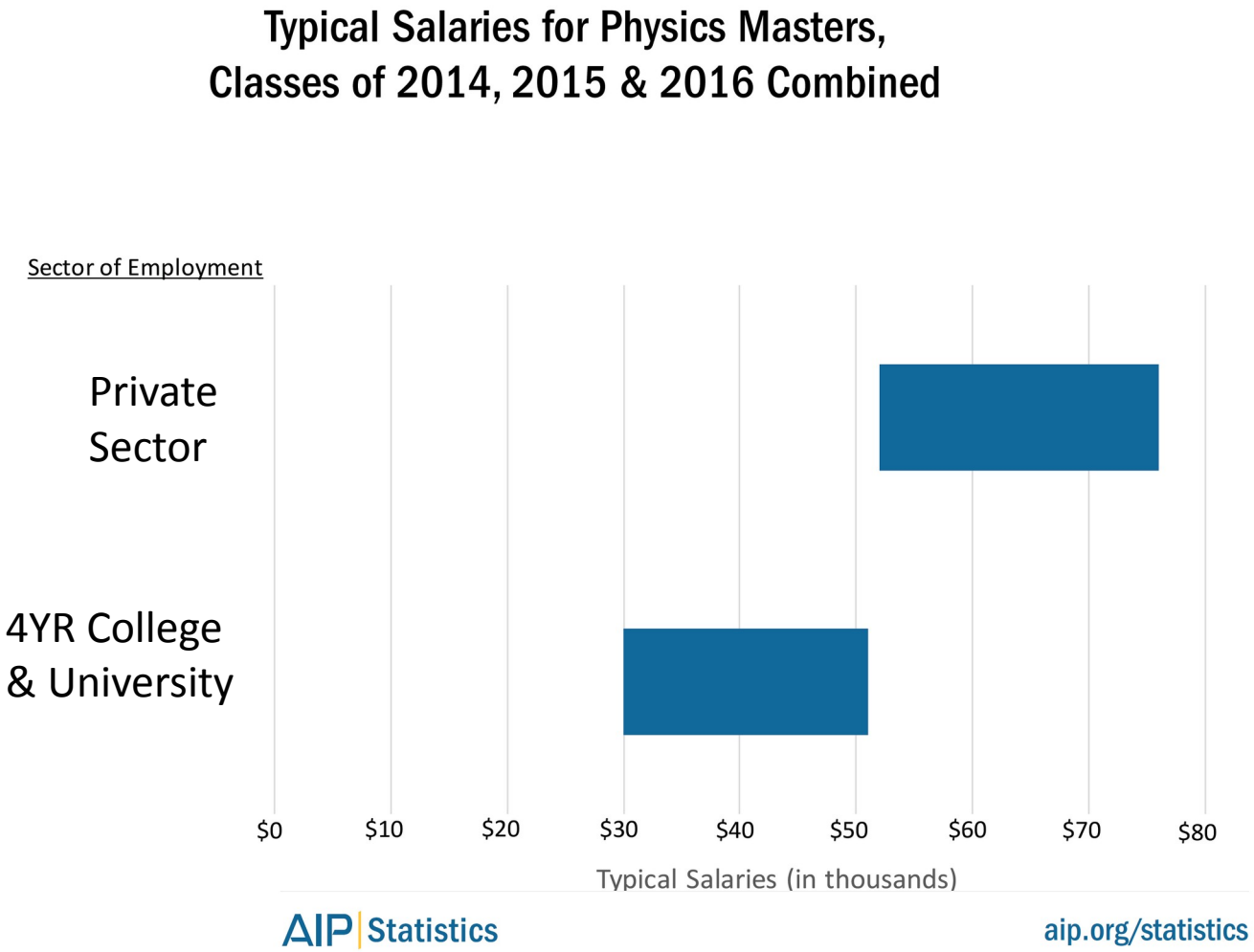


Figure includes only doctorates in full-time, newly accepted positions from the classes of 2015 and 2016 combined.
Typical salaries are in the middle 50% i.e, between the 25th and 75th percentiles.

How much do physics Master's earn?



How much do physics Bachelor's earn?

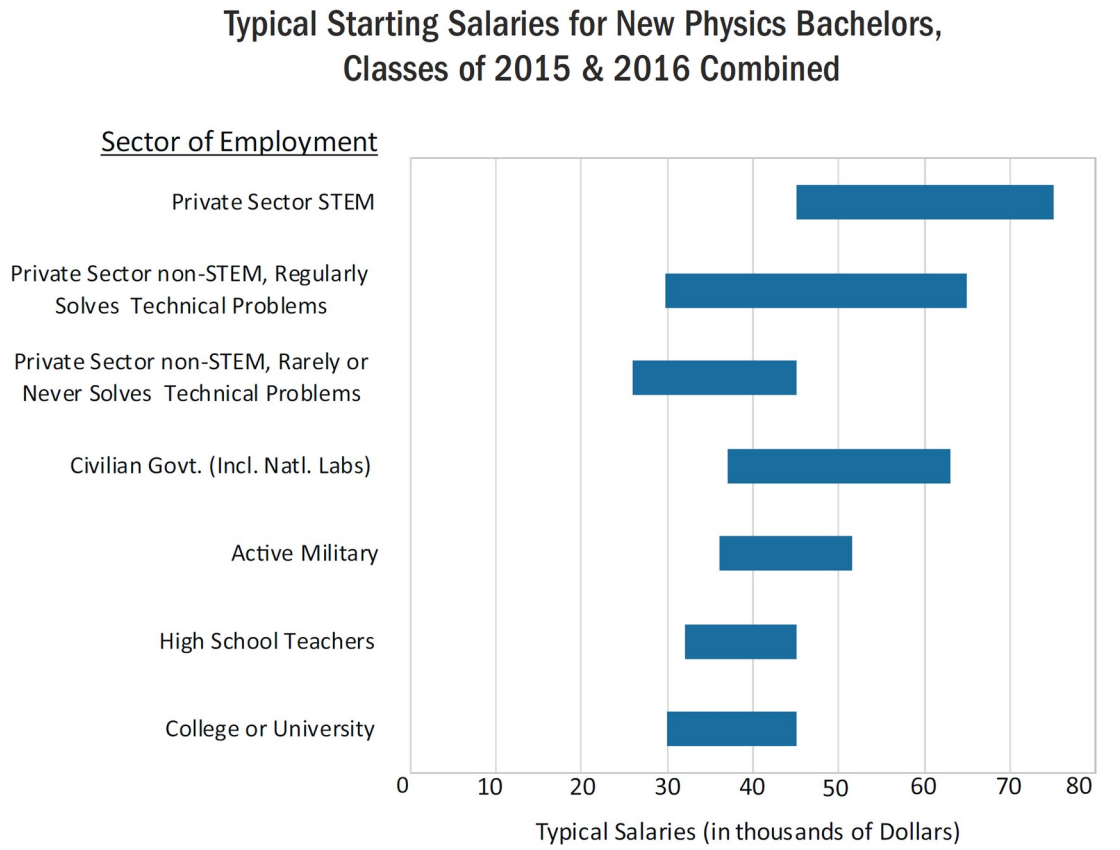


Figure includes only bachelors in full-time, newly accepted positions.

Typical salaries are in the middle 50% i.e, between the 25th and 75th percentiles. STEM referes 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.

AIP Statistics

aip.org/statistics

What are they doing (PhDs)?

2015-2016 graduates: 1 year after PhD

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

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

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

	Initial Employment Type			
Sector of Employment	Postdoc %	Potentially Permanent %	Other Temporary %	Overall %
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

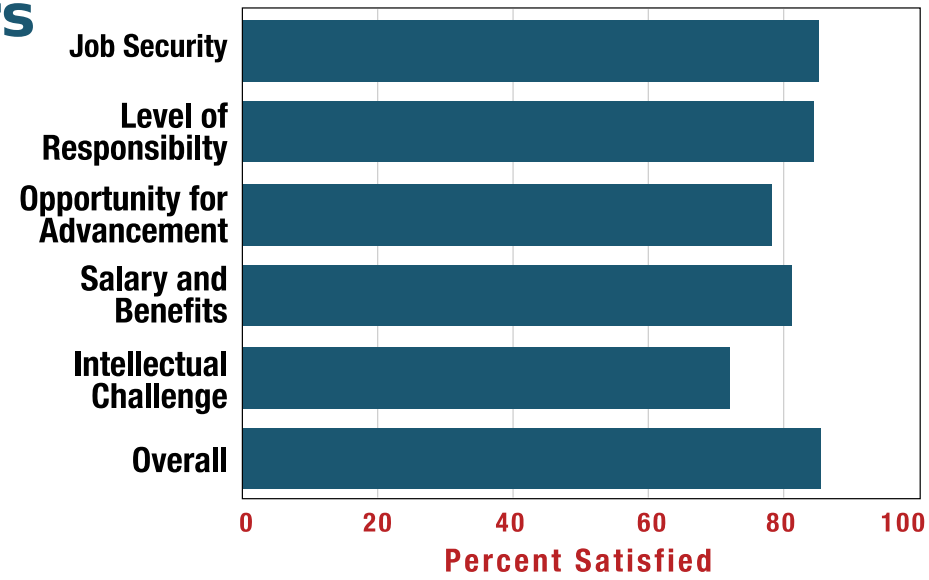
	Highest Physics Degree Offered			
	PhD	Master's	Bachelor's	Overall
Number of Departures	202	31	138	371
Percent of Departures Among Faculty Members	3.4%	3.5%	3.8%	3.5%
Percent of Departments with Departures	61%	31%	25%	35%
Percent of Departing Faculty Members that Left Without Tenure	10%	15%	24%	16%
Total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

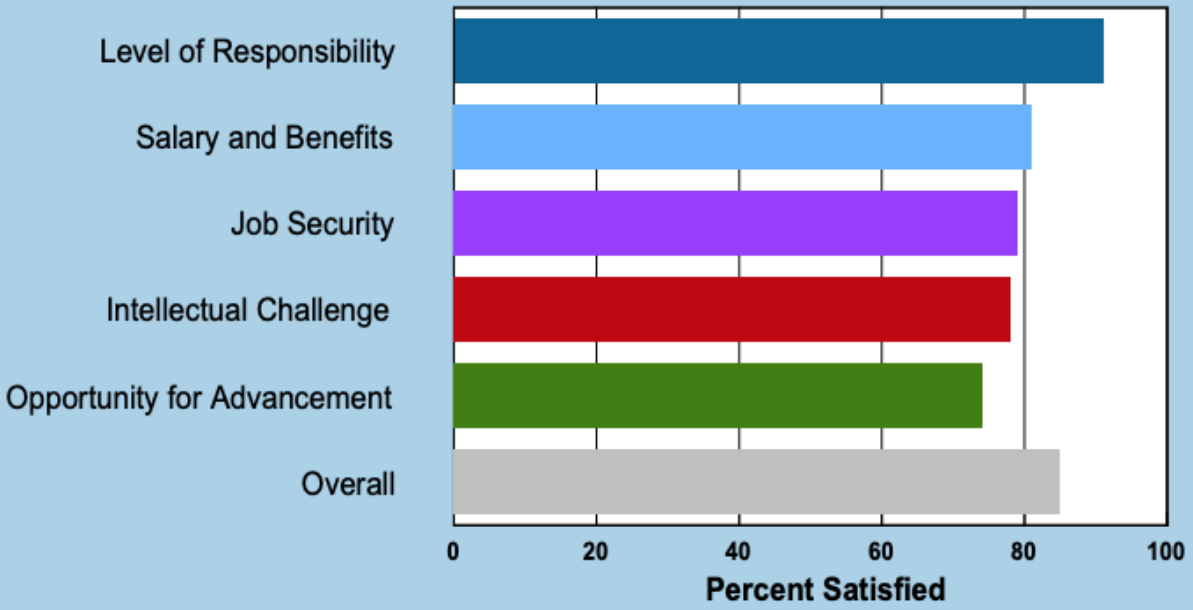
AIP Statistics aip.org/statistics

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

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

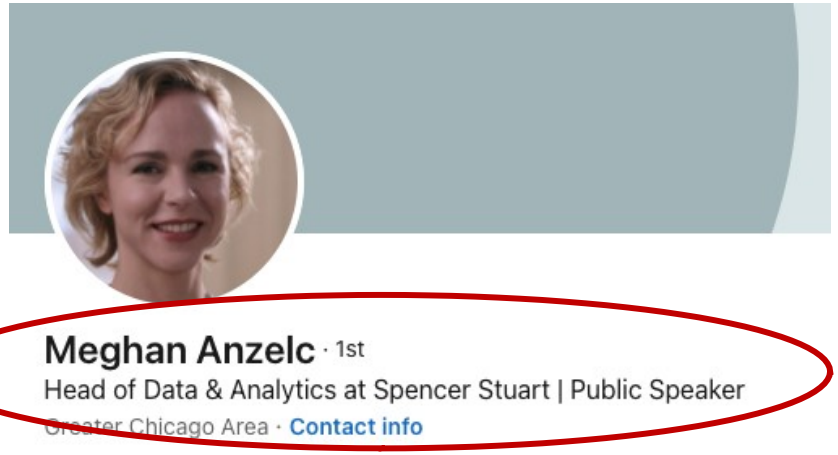
Subjective Aspects of Initial Employment for Physics PhDs Holding Potentially Permanent Positions by Sector, Classes of 2015 & 2016 Combined

	Sector of Employment		
Percent who felt:	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.

AIP Statistics aip.org/statistics

LinkedIn Basics



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

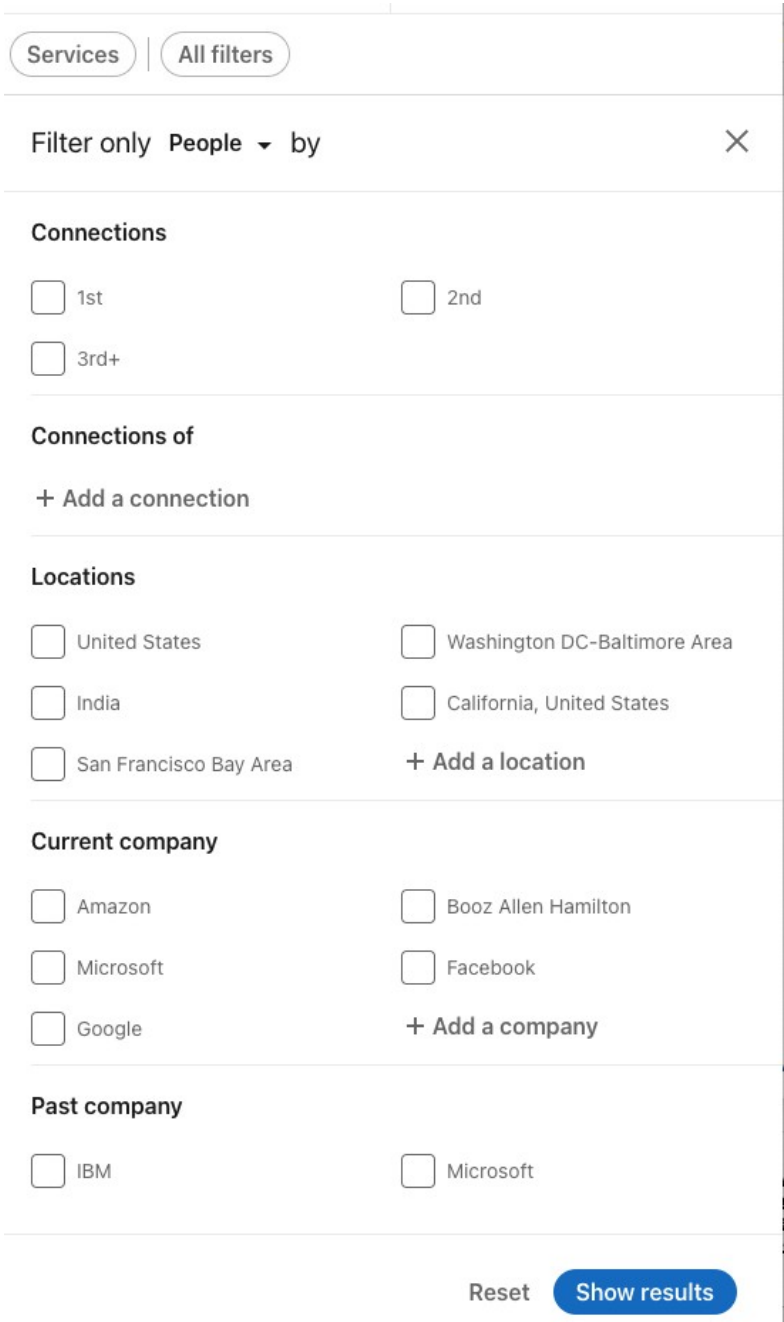
Using LinkedIn

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.

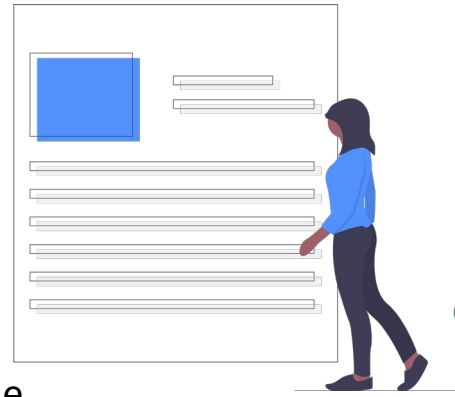
Inviting New Contacts

- 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



Slide from APS Careers

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.