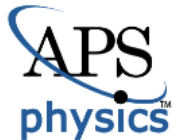


Career Paths of Physics Degree Holders



Brendan Kiburg (he/him)
Scientist, Fermi National Accelerator Laboratory
APS Career Mentoring Fellow
Careers Seminar, UIUC Physics Department
March 24, 2023

kiburg@fnal.gov



Meet The Audience

- Career Stage - Undergraduate, Graduate, Postdoc, Junior Faculty, Senior Faculty, Other?
- Career Goals
 - How many know exactly what you want to do next? Eventually?
 - How many of you are open to multiple possibilities?
 - How many of you know where to go to get good advice on the career paths that you plan to follow?

Outline

- Goals and Introductions
- Discuss AIP/APS statistics on career paths
- Physics Profiles
- Types of Careers at Fermilab
- Preparing for Jobs
- Discussion

This talk is intended to be a resource for you. Slides will be made available.

Please FEel Free to Ask questions at any point!

My goals for today

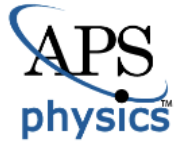
1. Explore a variety of career paths taken by physics degree holders
2. Examine data from recent graduates
3. Become familiar with available resources for working towards career goals

Advice on Advice

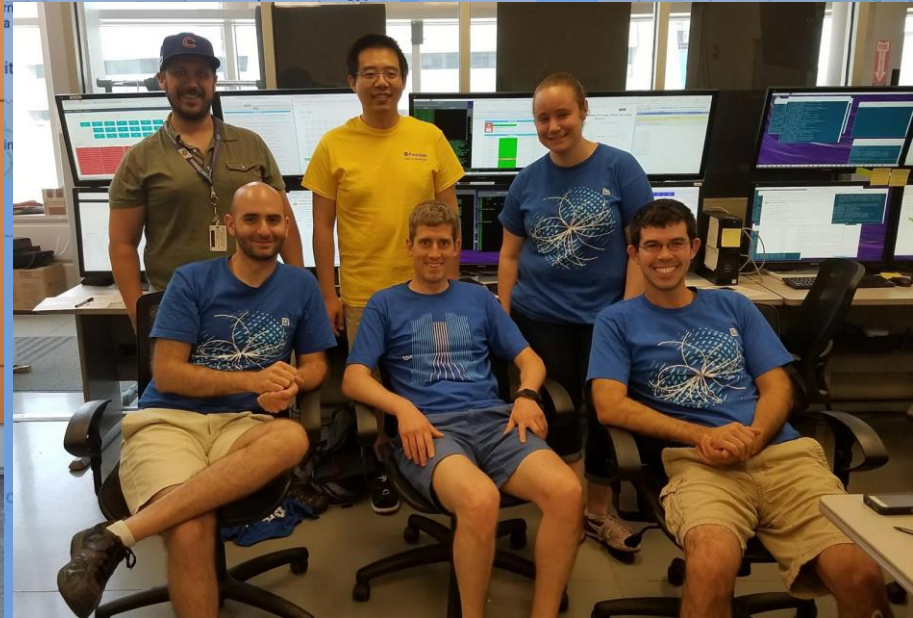
- We are all different. We learn differently, and we have different styles.
- If something I say today resonates, with you, great!
- If something doesn't work for you, no problem! I won't be offended if you ignore it.
- I think it is a good idea to take a lot of input from a variety of people, see what themes emerge and construct your own worldview.

What is this talk?

- Data is being presented here for everyone's awareness and education
- This talk is an attempt to help provide you with knowledge and resources
- This talk is *not* an attempt to discourage you from any particular career path, or to push you towards any particular career path
- Some slides have content that APS Career Mentors Program wants to communicate (marked with footer of slide)
- Other slides are my personal opinions and lessons learned



My Career Path



My Career Path

- 1998-2002: BS in Engineering Physics from UIUC
 - Broad educational experience, homework sets
 - REU experience in Physics Education Research Group
 - Joined NPL group and worked on developing scintillators for MuLan experience
- 2003-2011: MS, PhD in Physics at UIUC
 - Hardware experience with wire chambers, scintillators + PMTS, gaseous TPCs
 - Physics Monte Carlo and Data Analysis
- 2011-2012: Postdoc at University of Washington
 - Gained experience writing publication-level physics papers, scientific communication
 - Worked on characterization and selection of SiPM for segmented calorimeter
- 2012-2016: Lederman postdoctoral fellow at Fermilab
 - Outreach events, talks, tours, used communication skills
 - Constructed super-uniform magnetic field, precision Nuclear Magnetic Resonance measurements

My Career Path

- 2016-present: Scientist at Fermilab

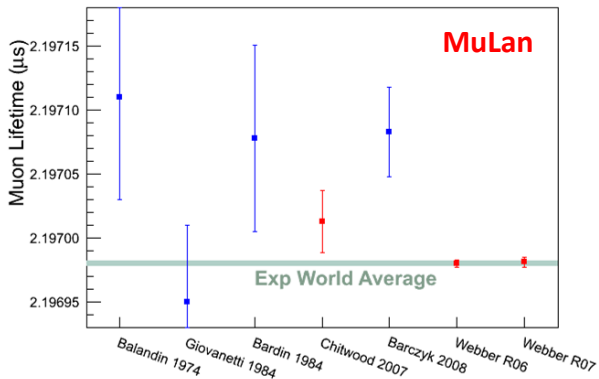
- Scientific judgement,
- Problem solving with detectors, electronics,
- Analyzing odd effects in data
- Developing new analysis techniques
- Leadership opportunities
 - Technical (Installation+Integration Coordinator)
 - Operations (Run Coordinator)
 - Analysis (Field Analysis Coordinator)
- Communication with large team of scientists
- Organization skills, project management

- 2021-present: Muon Dept Head

- Interpersonal communication, conflict resolution with staff
- Scientific communication (result papers, white papers @ Snowmass)
- Grant writing (Field work proposals, LDRD)
- Developing new hardware for measurements
- Administrative communication, working within lab structure, regulations, rules
- Budget proposals and managing resources
- Hiring committees (fellowship and postdocs)
- Analysis working group leaders
- Mentoring Postdocs
- Enabling early career scientists to do awesome science
- Identifying problems to solve

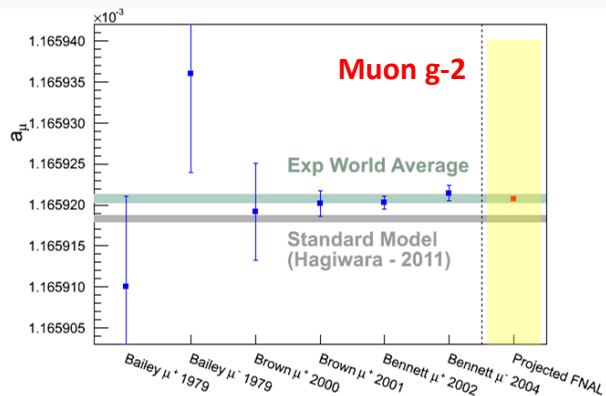
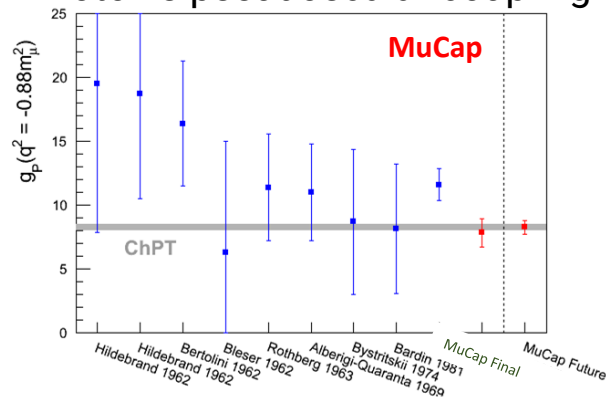
My Career Scientific Theme: The Evolution of Precision

Strength of Weak Interaction

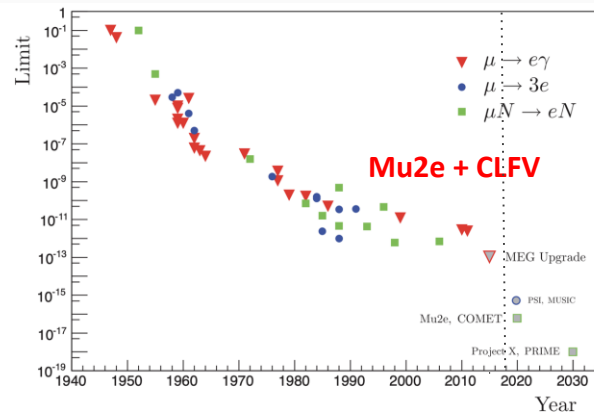


Precision measurements of Standard Model quantities

Proton's pseudoscalar coupling



Standard Model or New Physics?



Priorities and Career Goals Will Likely Evolve

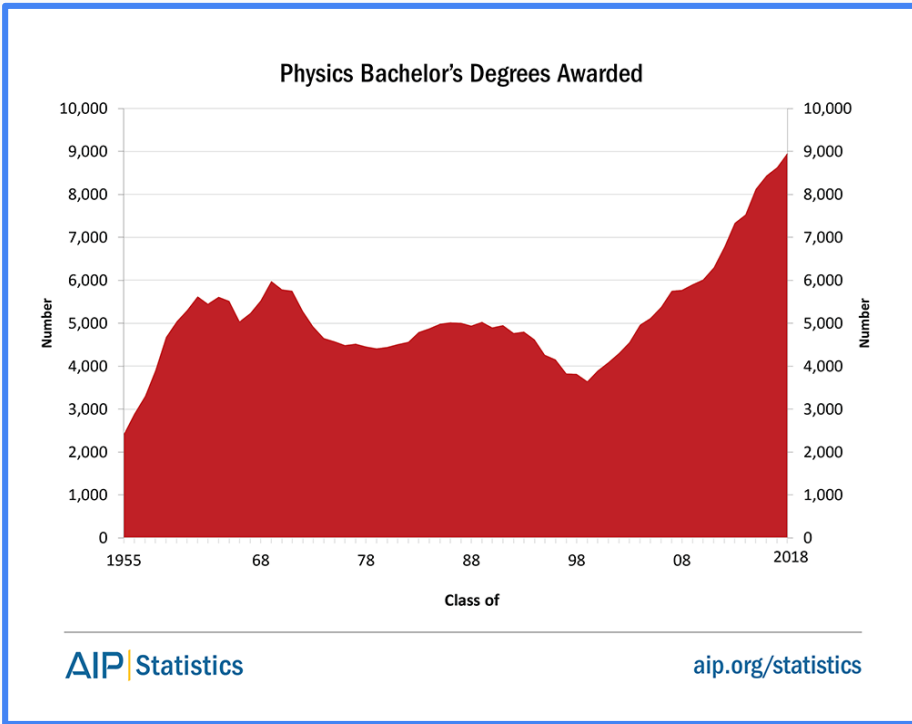
- Quality of life, job satisfaction, family, geography, opportunities, money, and more all can factor into your career goals
- You should expect that your priorities and even goals will evolve!
 - In 2002, my plan was grad school in California → UIUC
 - In 2008, I was stuck in hard analysis problems and felt like I needed to finish and leave academia and get a data science job
 - 2009-2011, Experienced joy and satisfaction pushing through hard problems
 - 2015, Prioritized geography & family, accepted flexibility on research area and venue, as long as I could apply my skills

Take care of your health!

- Your physical and mental wellbeing are important. Really important!
 - The most important and rewarding aspect of my career has been the human relationships and interactions with my colleagues
- College and graduate school can be very stressful times
 - Aiming for balance will help prepare you for the most challenging moments
 - Avoid burnout
 - Taking the time to take care of yourself will pay for itself
- My own experience
 - Working “all the time” for extended periods, followed by periods of complete shutdown
 - Worrying excessively about things → untreated anxiety
 - As a postdoc, channeled the focused work in bursts, developed more balance inside and outside the lab and still got significant things done

Data on Physics Degree Holders in the US

How many Physics Bachelor's are there?

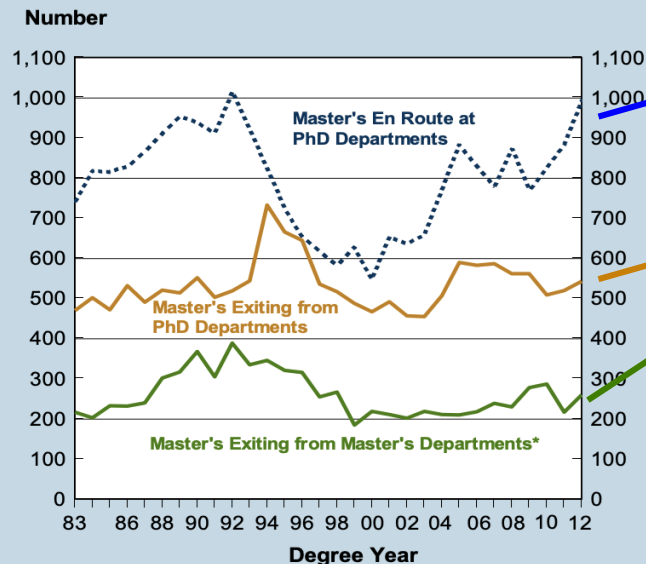


> **8500** Physics Bachelor's degrees are awarded annually

Data from AIP (2018)

How many Physics MS holders are there?

Physics Master's Degrees Conferred by Type of Degree and Department, 1983 through 2012.



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

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

~1,000 Masters conferred to Physics PhD candidates

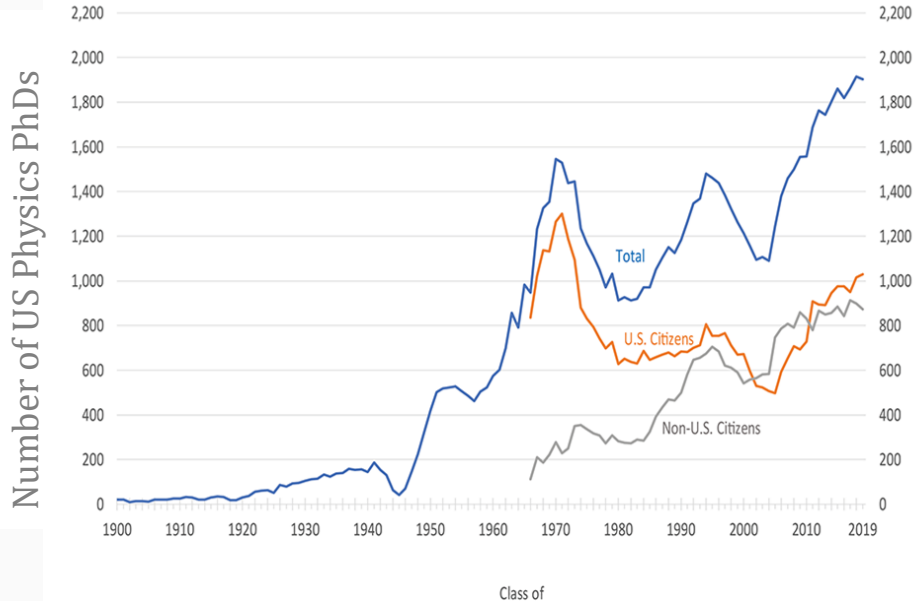
~800 Masters in Physics in 2012
~950 Masters in Physics in 2018 (AIP update)

About half continue in higher education
About half enter workforce

Data from AIP (2012,2021)

How many Physics PhDs are there?

Physics PhDs Conferred in the US, 1900 through 2019



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

AIP Statistics

aip.org/statistics

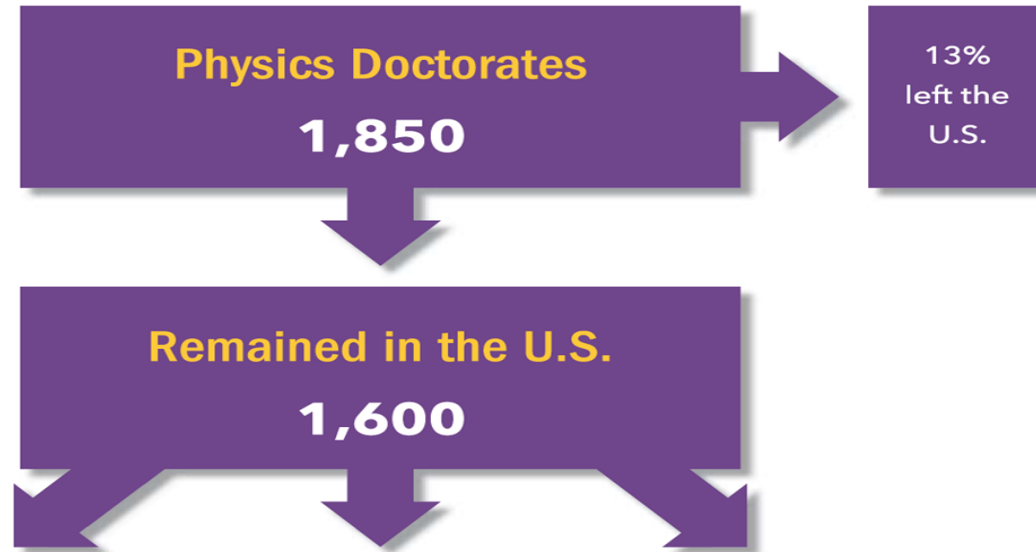
The number of Physics PhDs granted in the U.S. has almost doubled over the last two decades!

~2000 PhDs per year

Data from AIP (2021)

How many Physics PhDs are there?

Study: 2015-2016 graduates: 1 year after PhD



Data from AIP (2018)

AIP Statistics

@AIPStatistics

aip.org/statistics

~1600 Physics PhDs go into the job market every year

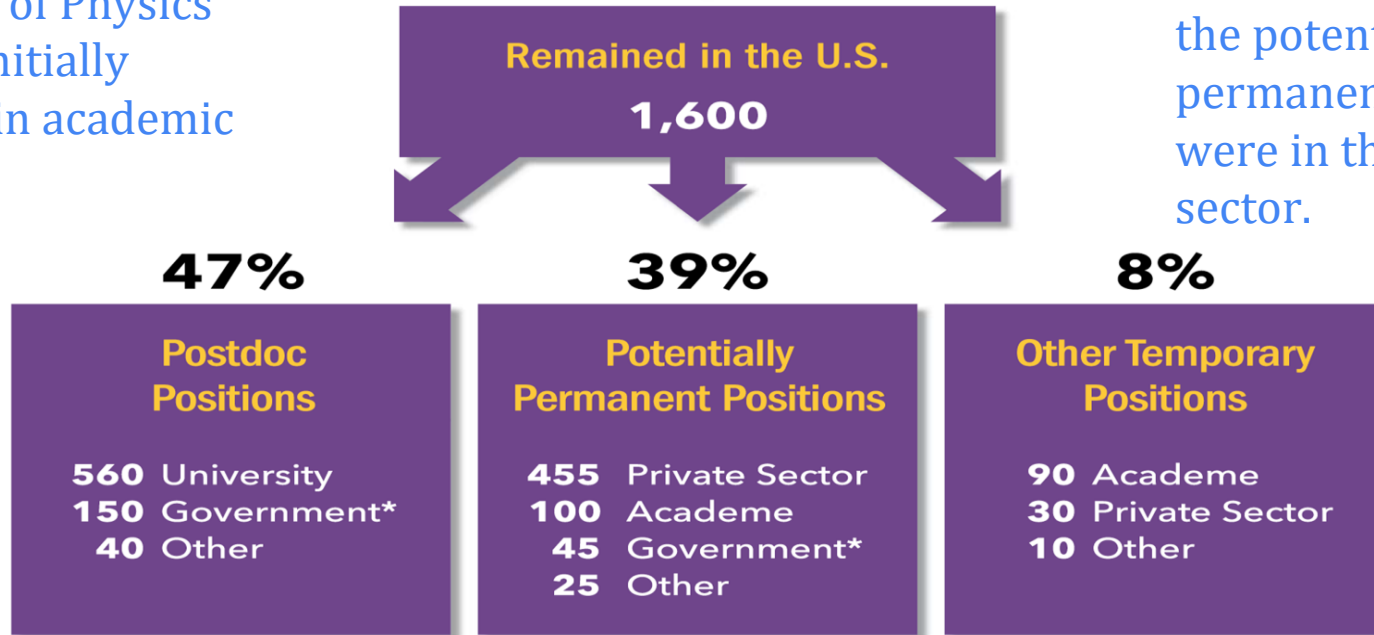
Employment Sectors of Physics Degree Holders

What jobs are Physics PhDs taking?

Study: 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 taken were in the private sector.



What jobs are Physics PhDs doing later?



Education



Business



Government

4-year colleges and universities

2-year and pre-college institutions

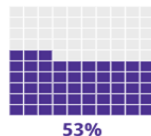
For-profit companies

Non-profit organizations

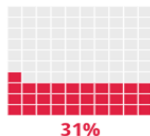
Federal government

State & local government

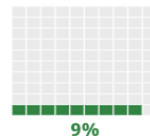
1 - 4 years since receiving degree



5

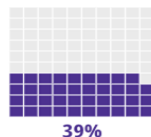


3%

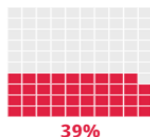


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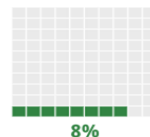
5 - 9 years since receiving degree



6%

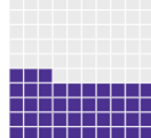


4%

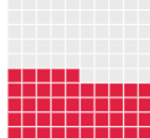


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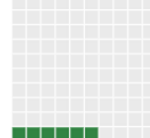
10 - 14 years since receiving degree



5

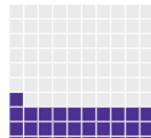


6%

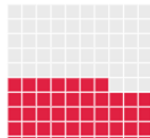


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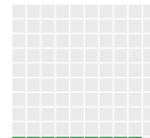
15+ years since receiving degree



5%



8%



1%

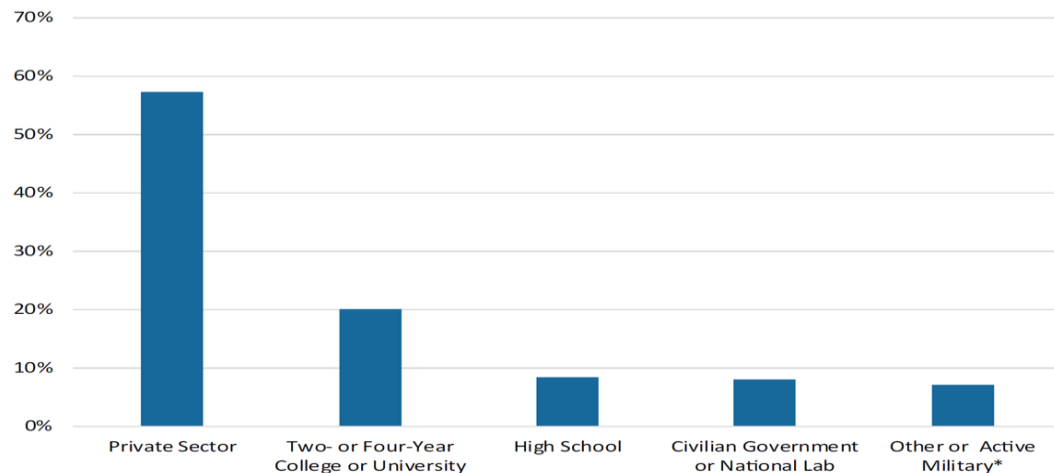
A majority work in the private sector

15+ years, 36% academia 55% private

Data from NSF, Survey of Doctoral Recipients, 2001-2013

What jobs are they doing? (Masters Degree)

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.

AIP | Statistics

aip.org/statistics

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

~20% find jobs at colleges or universities

Data from AIP (2021)

What jobs are they doing? (Bachelors Degree)

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



Figure based on 5764 individuals

AIP Statistics

aip.org/statistics

About **half** go straight
into the workforce

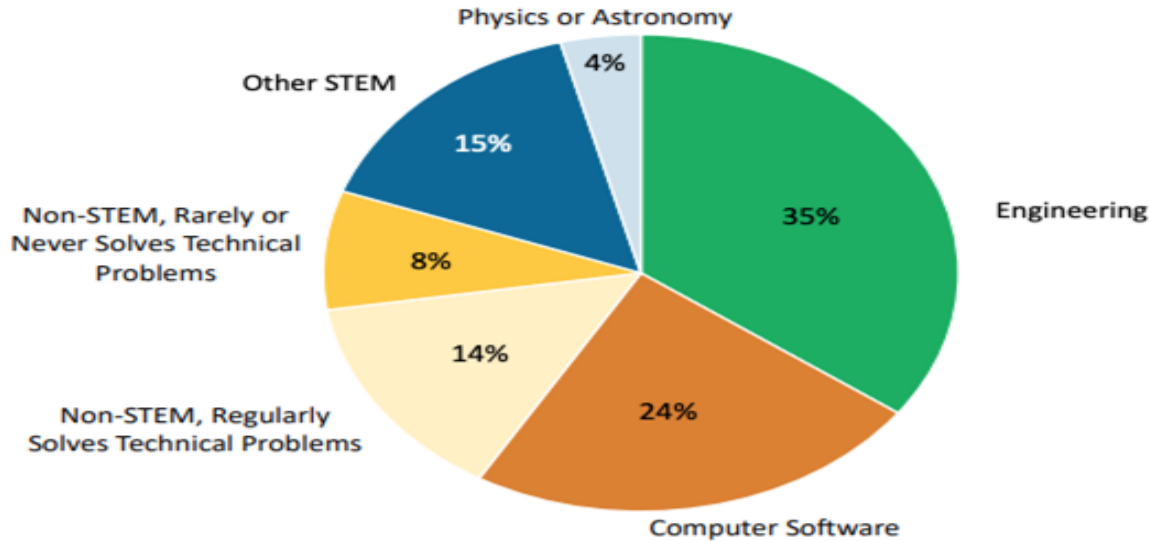
Largely finding
employment in the
private sector

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%

What jobs are they doing? (Bachelors Degree)

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

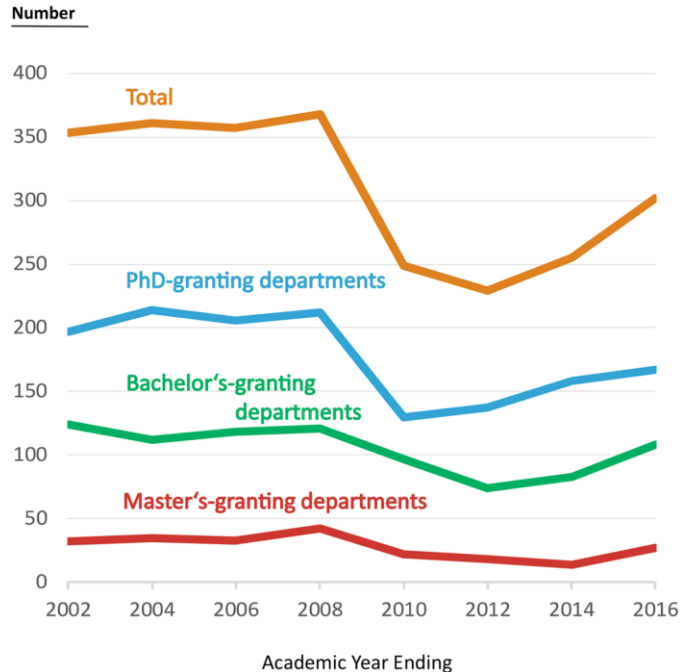
Majority working
in STEM jobs

Data from AIP
(2021)

Academic Sector Demand

Number of Faculty Hired by Physics Departments

Tenured and Tenure-Track Positions Only



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

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

Recall: **~1600** PhDs conferred each year

~800 PhDs entering postdocs

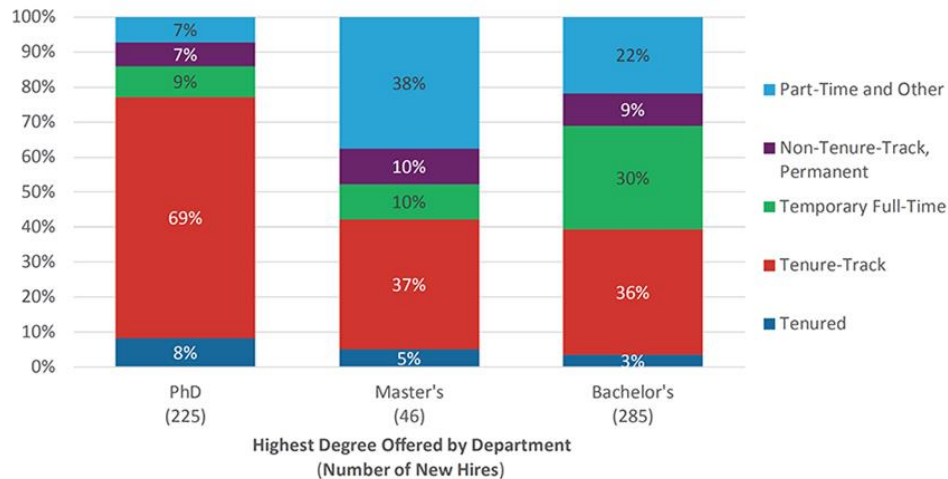
~800 PhDs entering private

sector job market

Data from
AIP (2018)

Academic Sector Demand

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



Faculty position types vary widely by institution.

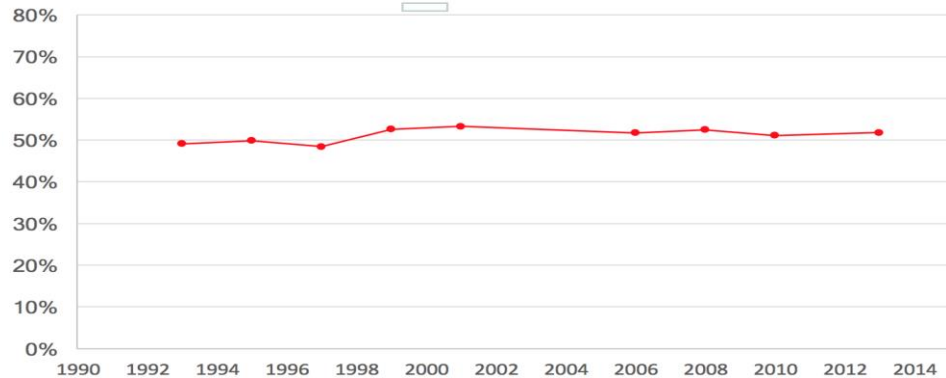
Total of 556 new faculty hires (including all position types).

With 1,600 PhDs per year, and about 800 entering postdocs per year, supply outweighs demand for the academic career path

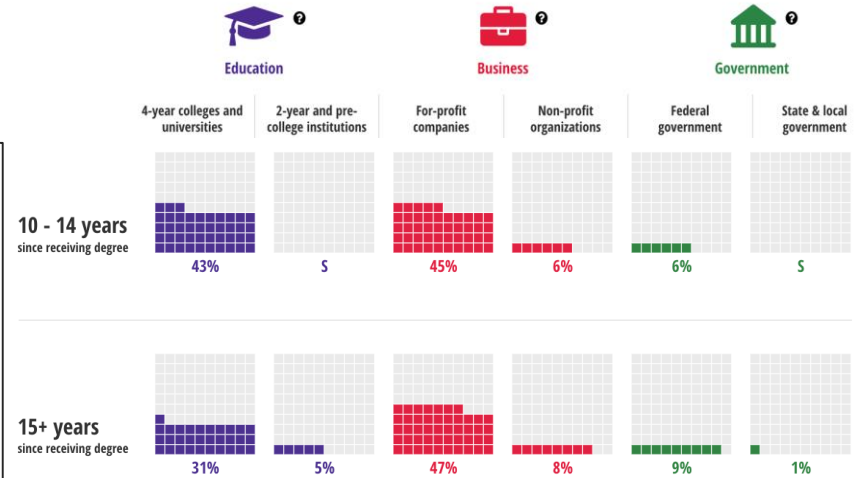
Data from AIP (2021)

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%.

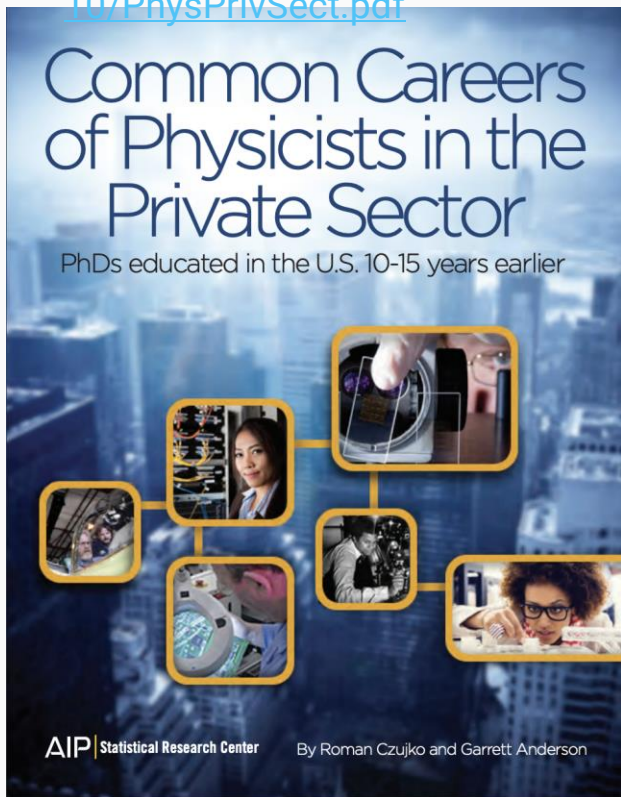


Data from NSF, Survey of Doctoral Recipients, 2001-2013

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

Common Careers of Physicists in the Private Sector

Excellent Report in 2015: <https://www.aip.org/sites/default/files/statistics/phd-plus-10/PhysPrivSect.pdf>



CONTENTS

Acknowledgments	2
Highlights of Findings	5
Chapter 1 Introduction	6
Common Types of Careers in the Private Sector	6
Cautionary Comments	7
Demographic Profile of Respondents	8
Chapter 2 Comparisons of Types of Careers across the Private Sector	9
Postdoctoral Experience	11
Qualitative Measures	13
Chapter 3 A Guide to the Profiles of Each Type of Career	17
Chapter 4 Physicists Who Were Self-employed	18
Chapter 5 Physicists in the Private Sector: Finance	22
Chapter 6 Physicists in the Private Sector: Government Contractors	26
Chapter 7 Industrially Employed Physicists: Primarily in Engineering	30



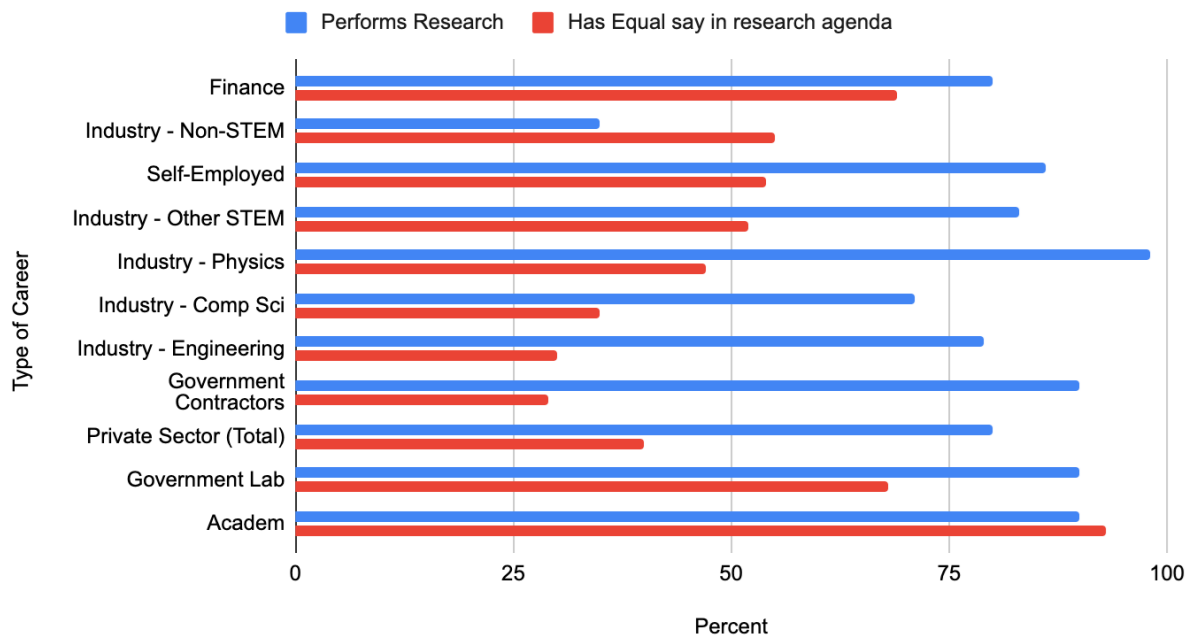
CONTENTS Continued

Chapter 8 Industrially Employed Physicists: Primarily in Computer Science	34
Chapter 9 Industrially Employed Physicists: Primarily in Physics	38
Chapter 10 Industrially Employed Physicists: Primarily in Other STEM Fields	42
Chapter 11 Industrially Employed Physicists: Non-STEM Fields	46
Appendix	50
Finding PhD Physicists in the Private Sector	50
Selection into the Primary Types of Careers	50
PhD Physicists we Contacted	51
Tapping Existing Networks to find Fellow Alumni	51
PhD Physicists who Responded	52
Why we Extended Data Collection	53
Likelihood of Leaving the U.S.	54



What type of work are Physics PhD doing later?

Research Agenda Autonomy Rated by Physicists, 10-15 Years after PhD



Data from AIP, PhD+10 report (2015)

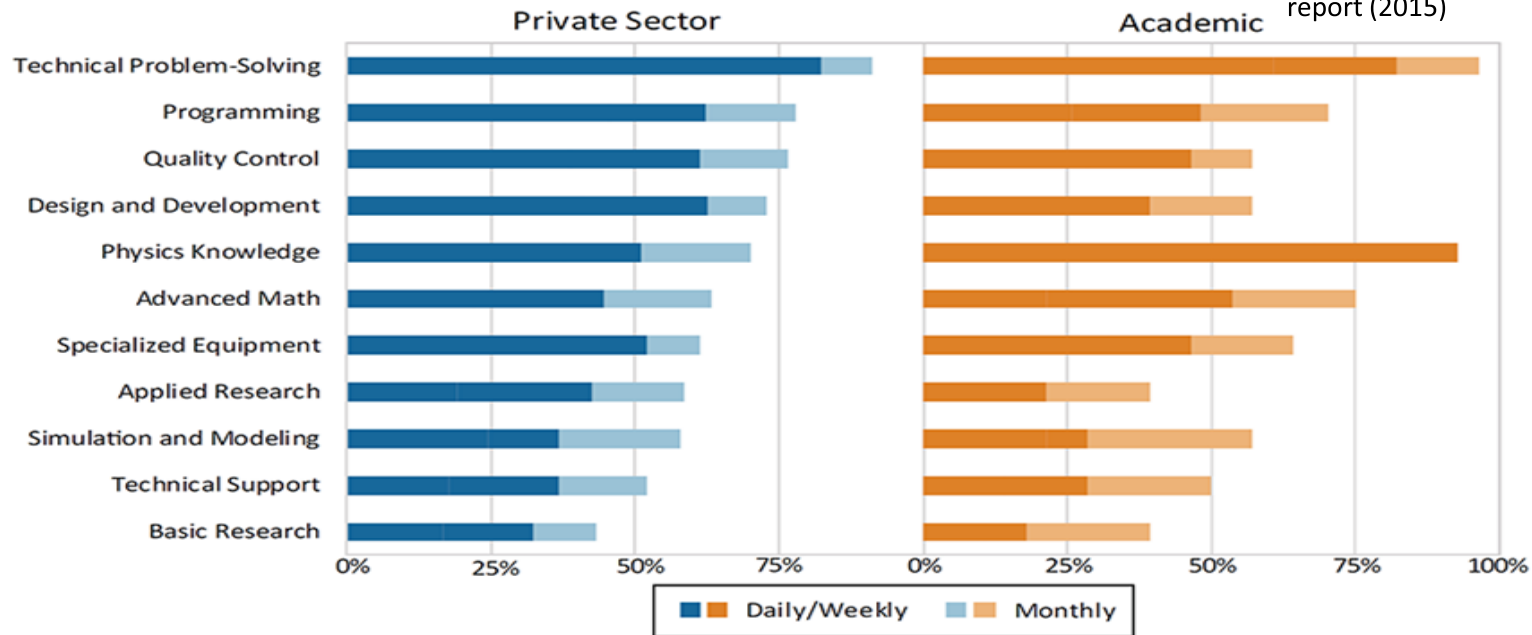
Most still perform research in private sector jobs!

[Source: AIP Statistical Research Center Report Common Careers of Physics PhDs in the Private Sector, June 2015](https://www.aip.org/statistical-research-center-report-common-careers-of-physics-phds-in-the-private-sector)

Use of Skills

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

Data from AIP, PhD+10 report (2015)

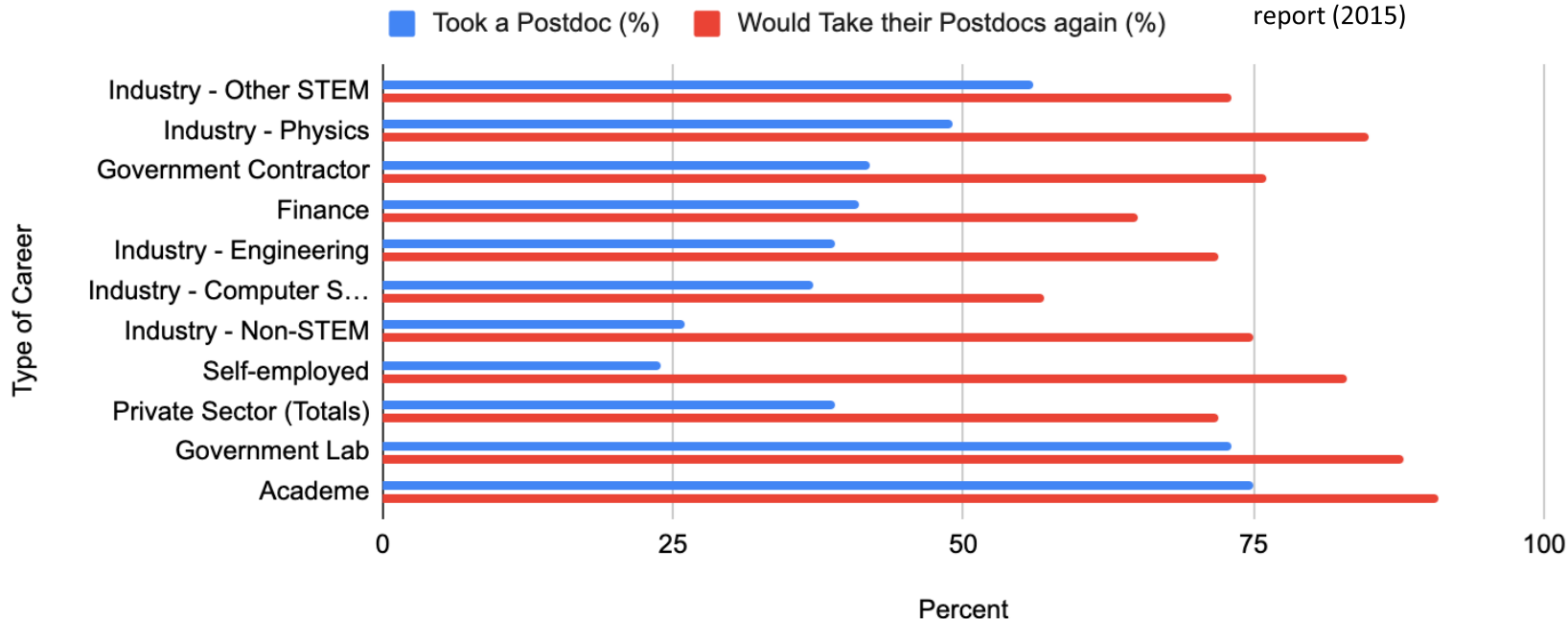


Most MS physicists use similar skills in academic and private sector jobs

Postdoctoral Experience based on job, 10-15 years after PhD

Postdoc Taking by Physicists - Q: "If you could go back in time, would you still accept your postdoc?"

Data from AIP, PhD+10 report (2015)



Most PhD physicists that took a postdoc job, would do so again

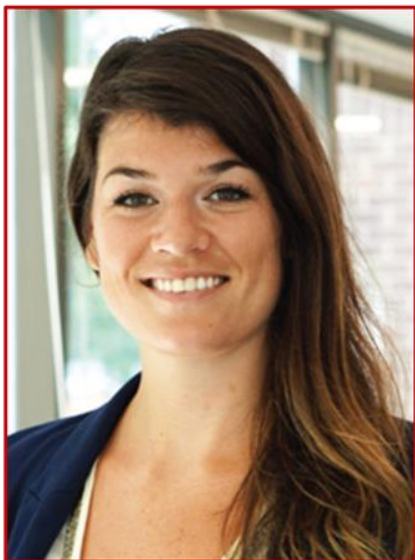
Examples of Successful Physicists' Careers

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

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.”

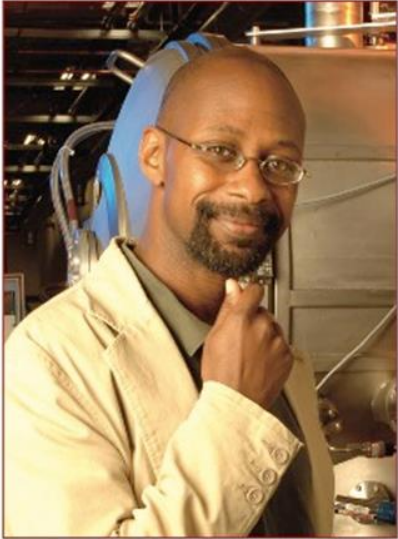
Currently, Maggie’s consultant role ranges from technical to strategic, falling anywhere in the process of raw materials making it all the way to finished, marketable products.

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



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



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.

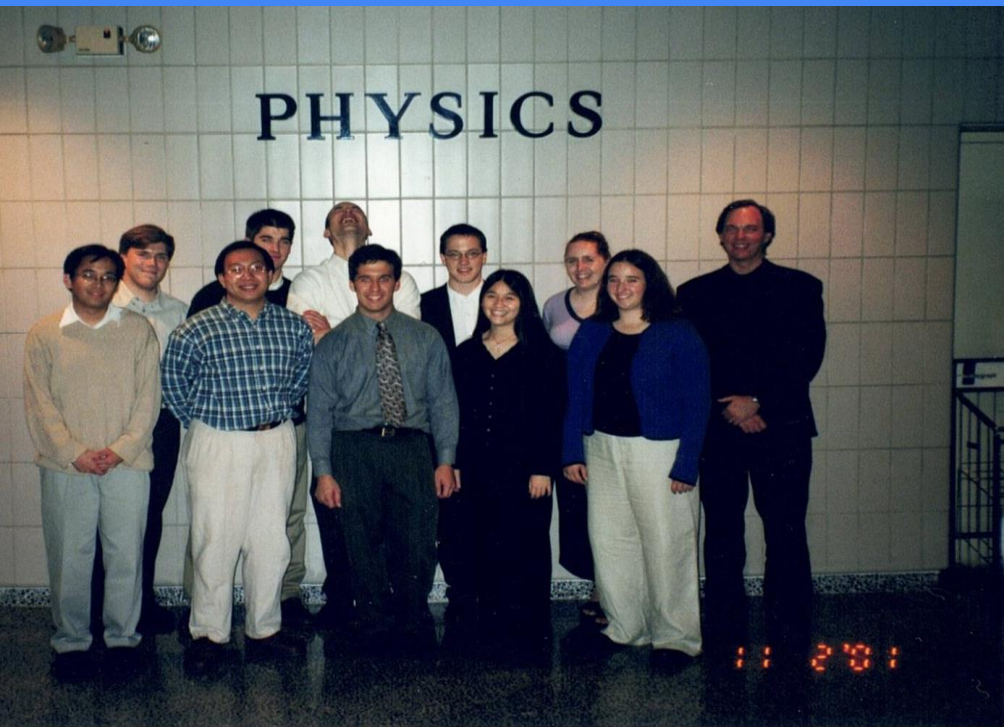
Advice for students: Try new things and make time for a hobby.



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

Examples of Illinois Bachelor's Students (Class of 2002)

Subset of my UIUC Undergrad Class of 2002



2002 UIUC Physics Peers... Today(ish)



2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2023



PhD, UIUC Postdoc UW Lederman postdoc Fellow Fermilab Wilson Fellow Fermilab Scientist Fermilab



PhD, Stanford Audio Systems Engineer, Plantronics Audio Systems Engineer, Apple



PhD, Oxford (UK) QIS Startup Sci. advisor patent firm Patent prosecution / counseling Patent attorney Property law, biotech startup Perkin Elmer



UIUC PhD, Virginia Tech Senior research Data Scientist, Metron, Inc.



PhD, Stanford Postdoc Brookhaven National Laboratory (BNL) Professor, Oregon



PhD, CalTech Dicke postdoc Fellow Princeton Postdoc UChicago Senior lecturer, UKZN (South Africa) Associate Professor of Physics, McGill Univ. (Canada)



UIUC MRL @ ANL APS Scientific Assistant, Beamlines, ANL Argonne National Laboratory, (ANL) Principal Control System Applications Developer



MS, Boston Instructor, Westwood College Professor of Physics, Harper Community College



MS @ SIUE & Collinsville High School Teacher HS Dept Chair + Goshen Education Consulting Senior Researcher, Goshen Education Consulting



PhD, Cornell Postdoc CalTech KICP postdoc fellow UChicago Data Scientist (DS) Groupon DS @ Civis Analytics DS Director, Shoprunner DS@ AWS SDS Wayfair & Adv. Rallypoint



PhD, UIUC Postdoc, U Wisconsin Data Scientist, CTO, CTO Scanalytics

How Illinois Physics alumnus Daryl Achilles went from student experiences at Fermilab to intellectual property lawyer at the global biotech leader PerkinElmer

Bill Bell

for *Illinois Physics*



“It reopened my eyes to broader contexts and different ideas. I was still getting to learn, but I wasn’t in the lab. Before this, I had no idea that IP law was a career at all,” he recalls.

It was a big realization and a bit of a scary one.

“There was an assumption that you’d go to grad school, then post-doc, then faculty. That was the path in my head— it wasn’t ‘pure’ to do something else,” Achilles says. “But there are interesting, fulfilling, exciting careers out there. There are jobs that revolve around science that don’t require doing research in the lab. These folks with PhDs working in other areas outside of academia? They’re happy.”

Job Satisfaction of Physics PhDs

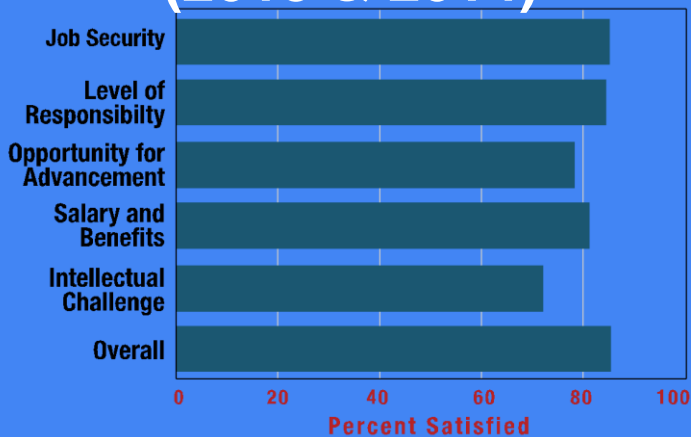
Subjective Aspects of Initial Employment for Physics PhDs Holding Potentially Permanent Positions by Sector, Classes of 2015 & 2016 Combined

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

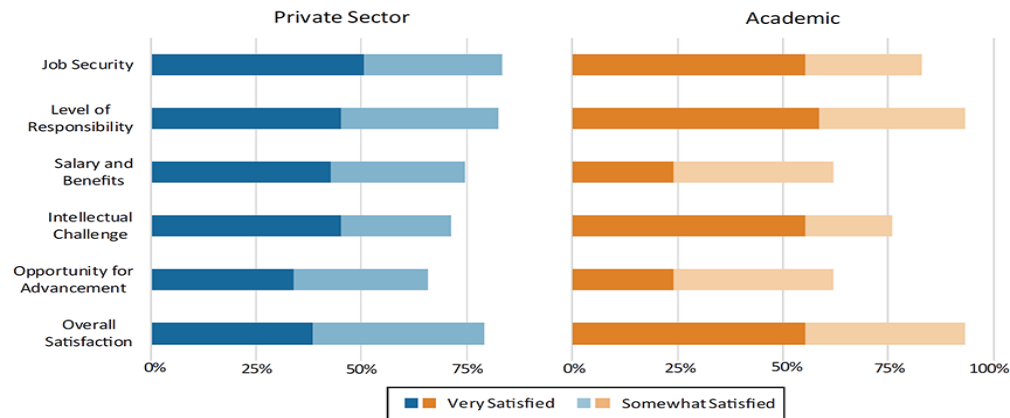
The percentages represent the two positive responses on a four-point scale such as: Very appropriate, Appropriate, Not very appropriate, and Not at all appropriate. Data only include US-educated physics PhDs who remained in the US after earning their degrees.

Job Satisfaction Bachelors, Masters

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



Job Satisfaction of Exiting Physics Masters in Potentially Permanent Positions, Classes of 2016, 2017, & 2018 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 91 individuals in the private sector and 29 individuals in the academic sector.

<https://fermilab.jobs/>

Types of Careers at Fermilab



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We are strategic risk takers, innovators and collaborators. We are engineers, scientists, technicians, administrative professionals. We are 1,800 employees advancing knowledge for the benefit of humankind. Fermilab has been at the forefront of particle physics for more than 50 years. We build world-leading accelerators and detectors to conduct some of the most advanced particle physics experiments possible. We collect and analyze the data from those experiments with some of the most powerful computers in the world. We conduct this research on a 6,800-acre prairie 35 miles outside Chicago, a treasure that has been designated a National Environmental Research Park.

Interested? [Learn more about what we do at Fermilab >](#)

<https://fermilab.jobs/>

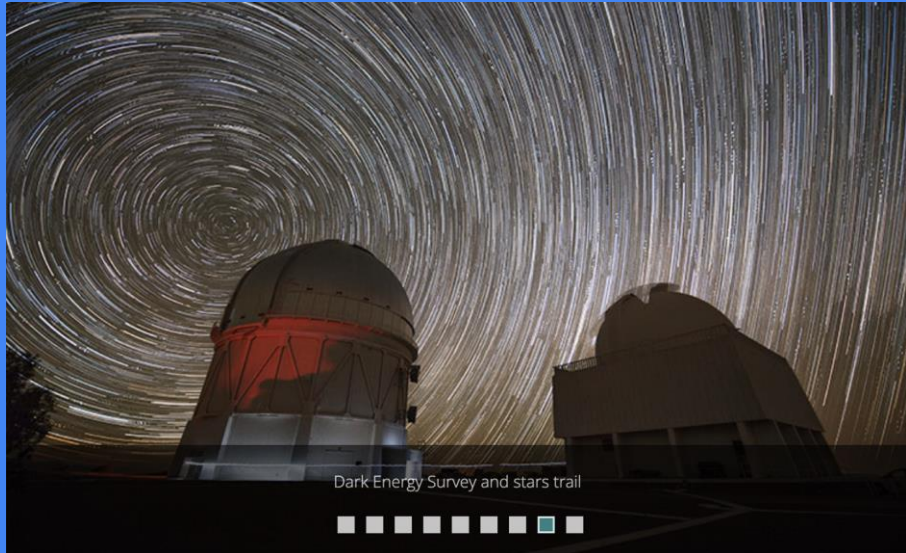
Science

More than 3,500 scientists worldwide use Fermilab and its accelerators, detectors and computers for their research. About 2,600 researchers from 44 countries collaborate on experiments at Fermilab, keeping the United States at the leading edge of the international field of particle physics.

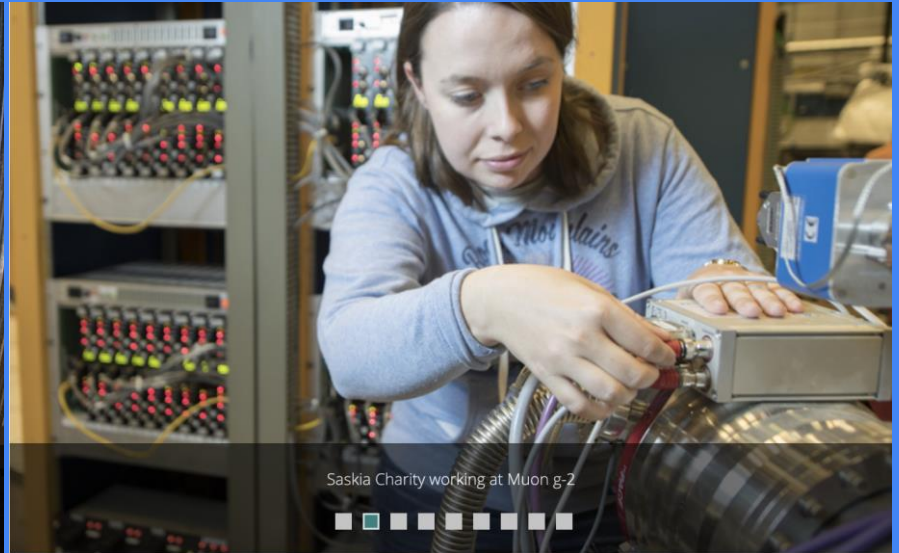
Fermilab produces the world's most intense beam of high-energy neutrinos, particles that may hold the key to understanding why the universe is made of matter.

Scientists from Fermilab and other U.S. institutions played key roles in the discovery of the Higgs particle at the Large Hadron Collider. They now are upgrading the LHC experiments to take data at higher energy.

Using the cosmos as a laboratory, Fermilab scientists explore dark matter and dark energy, which constitute 96 percent of the universe.



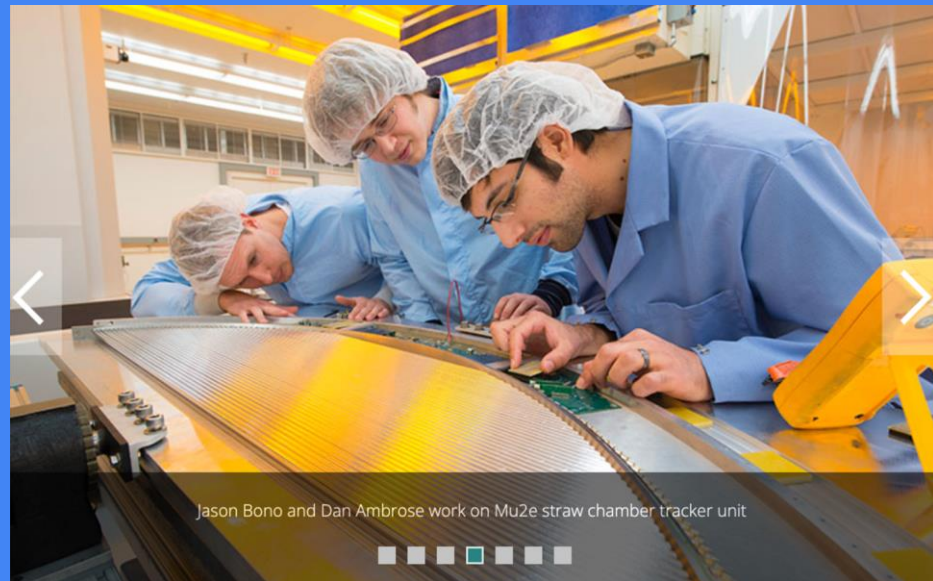
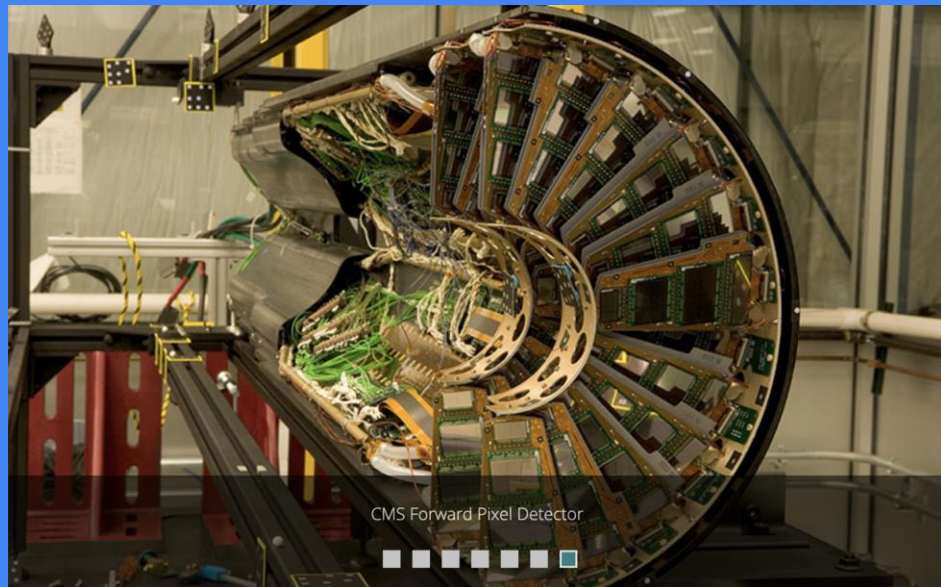
Dark Energy Survey and stars trail



Saskia Charity working at Muon g-2

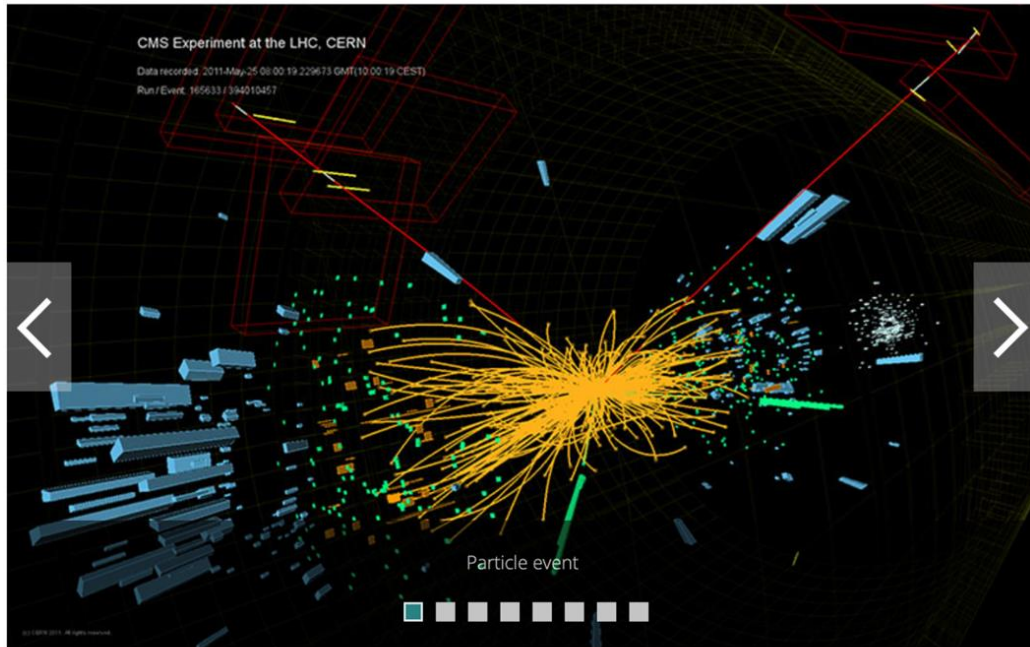
Engineering and Technology

The engineering process can be dynamic and fluid at the laboratory, involving frequent interaction between engineers and their clients. The development of specifications can begin as a discussion between scientific staff and the individual engineer or engineers and can evolve into a formal, detailed request. Fermilab engineers make scientific dreams and what-ifs a reality by providing safe, cost-effective and reliable engineering designs.



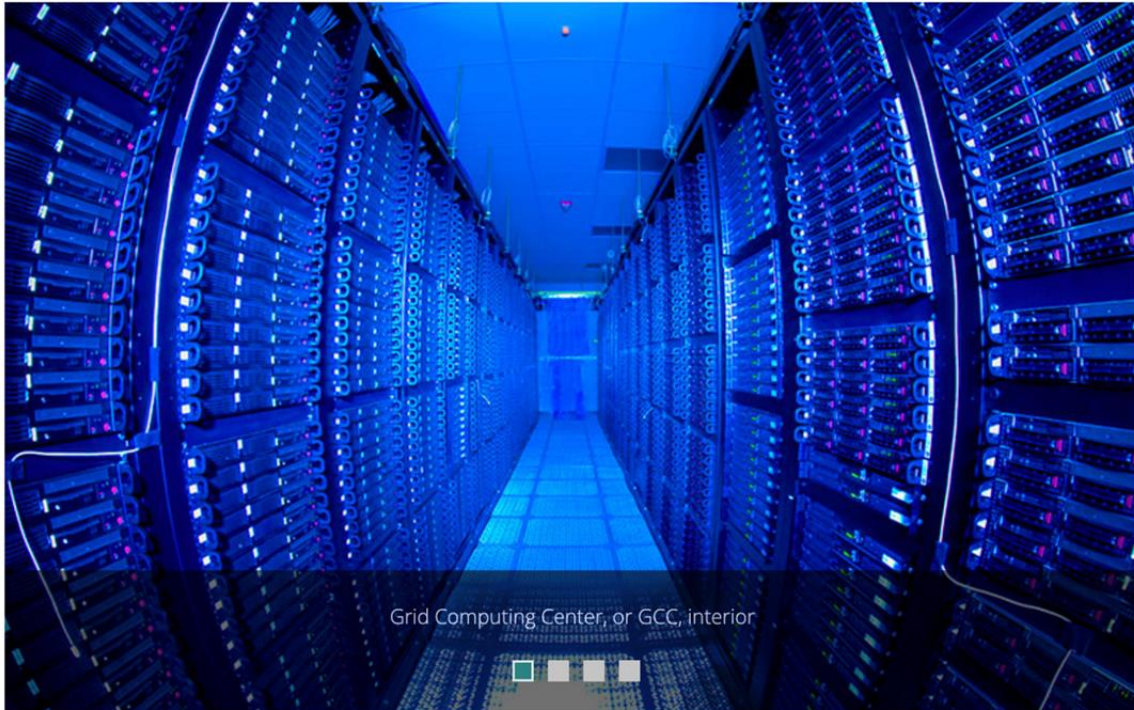
Scientific Computing

Research creates a lot of data. Gathering, storing, analyzing and interpreting these data requires experts and the right tools. Fermilab is home to one of the largest tape robotic systems available today and provides more than 500 petabytes of storage capability. Fermilab also has the technology and computing power to process these data in a timely fashion to facilitate scientific discoveries, which often lead to applications in other areas of society. Our experts work closely with experimenters and the scientific community at large to provide and facilitate the use of the cutting edge computing tools necessary for these discoveries.



Information Technology

Information technology professionals at Fermilab are responsible for all information technology operations activities, including computer operations, data and operations support. They provide expertise in system performance, capacity planning and continual assessments for process improvement to ensure process are well-documented, sustainable and scalable.



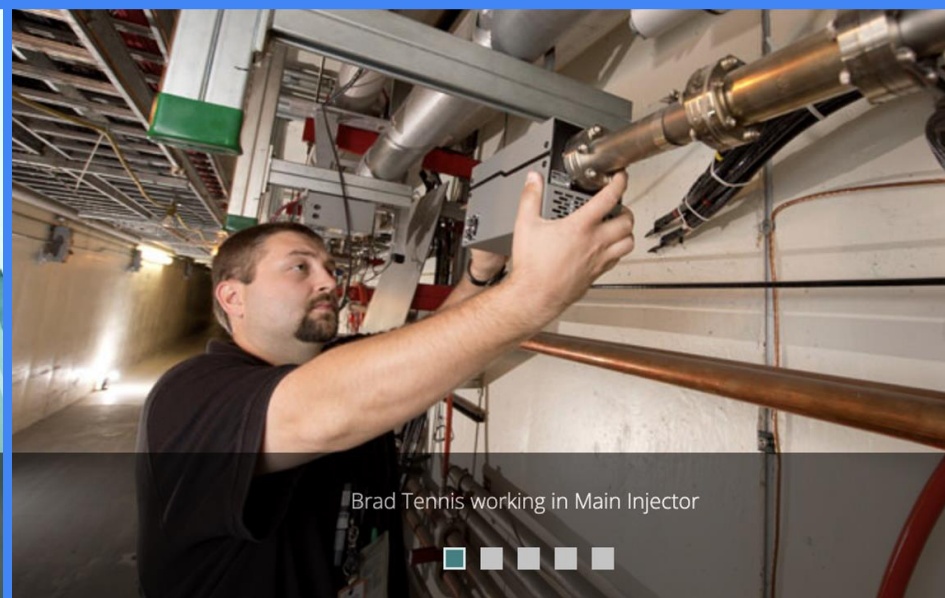
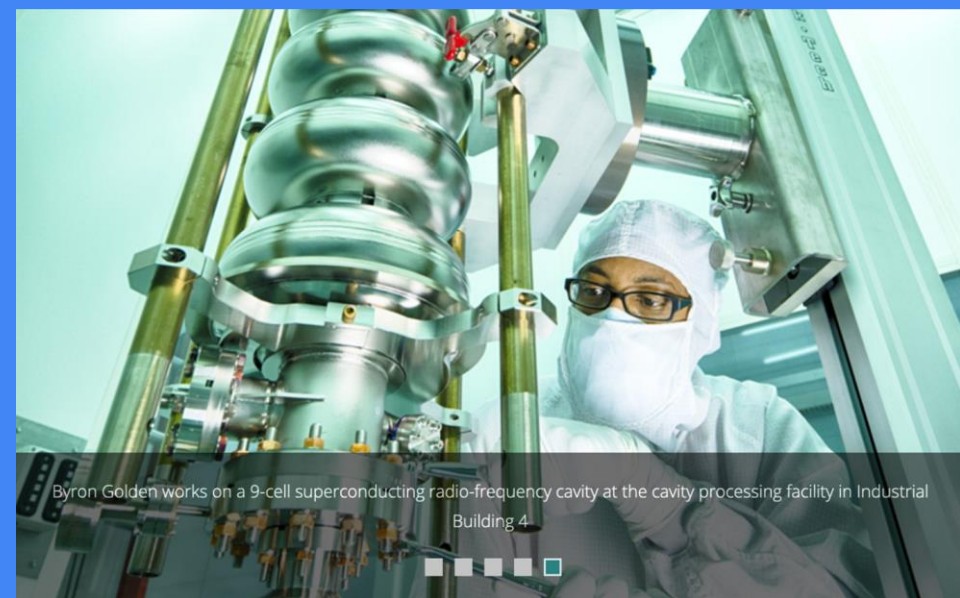
Grid Computing Center, or GCC, interior



Technical

Technical

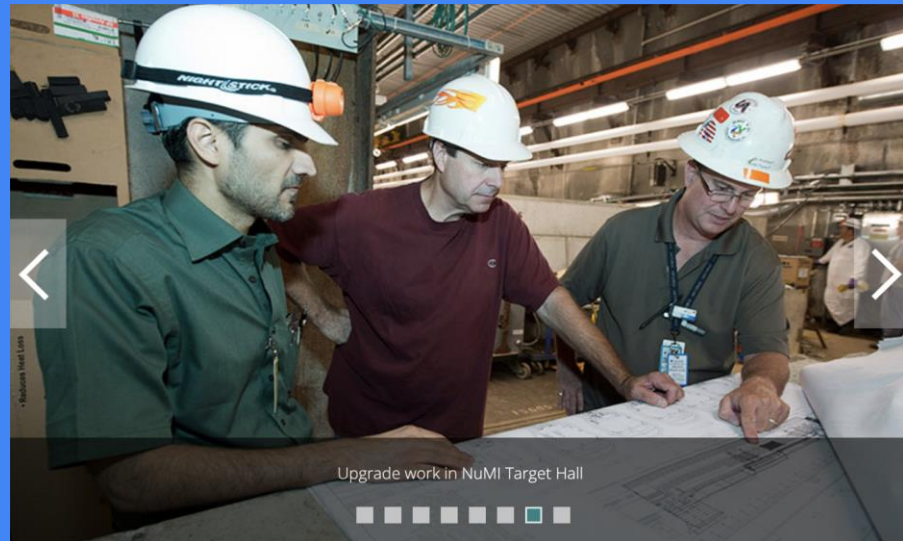
Wherever you look at Fermilab — in every experiment — you find teams of outstanding technicians at work. They build, operate, maintain, fix and develop the tools of particle physics research that make Fermilab a great physics laboratory.



Business Support and Operations

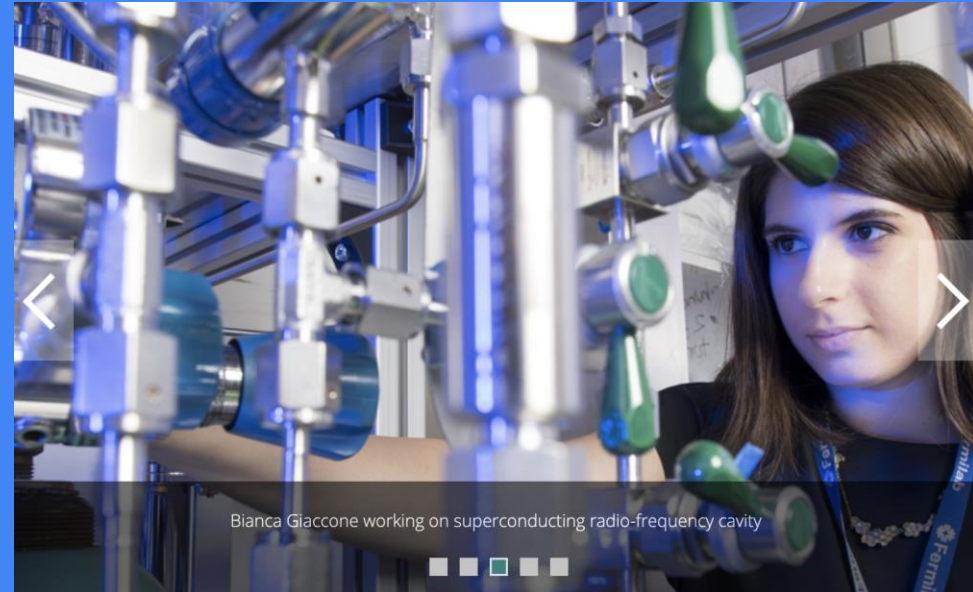
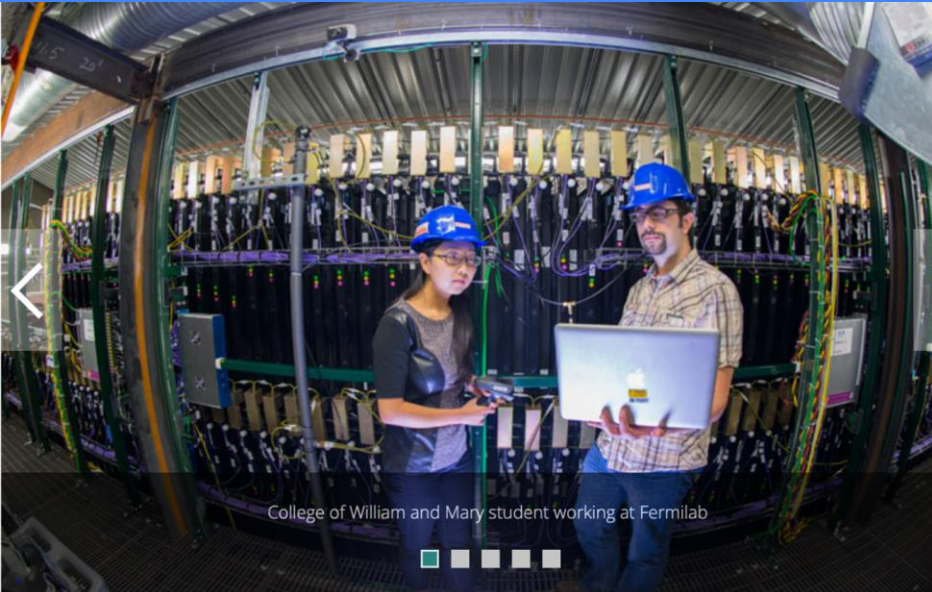
Business Support and Operations

Business support roles put out the inevitable fires that erupt within organizations while playing a critical part in maintaining our operations and allowing the organization to deliver the highest-quality service to our internal and external customers in the areas of facilities management, project management, safety, health, quality assurance, human resources, procurement and finance.



Postdoctoral Program

The postdoctoral program offers the opportunity for candidates to perform research in a scientifically rich R&D environment; presents and publish research; contributes to the overall research efforts at the laboratory; advances knowledge in the areas of basic and applied research; strengthens our national scientific and technical capabilities. We perform world-class research in experimental and theoretical particle physics.



Jobs at Fermilab

<https://fermilab.wd5.myworkdayjobs.com/en-US/FermilabCareers> or fermilab.jobs → Job Openings

Fermilab JOB OPPORTUNITIES

Search for jobs or keywords

Location ▾ Full/Part-time ▾ Job Family ▾ More ▾

155 JOBS FOUND

Health Physicist (Radiation Physicist I)
Batavia
Posted Today
R_006615

Senior Mechanical Technician
Batavia
Posted Today
R_006672

Health Physicist (Radiation Physicist IV)

155 openings now
in a broad set of
fields!

Health Physicist (Radiation Physicist IV)
Batavia
Posted Today
R_006659

Electrical Technician II
Batavia
Posted Today
R_006624

Computing Services Specialist
Batavia
Posted Today
R_006679

Energy Program Supervisor
Batavia
Posted Today
R_005739

Mechanical Technician II
Batavia
Posted Yesterday
R_006630

Engineering Physicist I
Batavia
Posted 13 Days Ago
R_006512

Deputy Site Services Manager
Batavia
Posted 13 Days Ago
R_006541

Fermilab QIS Summer Institute for K-12 STEM Educators
Batavia
Posted 14 Days Ago
R_006627

Research Associate
Batavia
Posted 14 Days Ago
R_006569

How to Prepare

How Can You Start Preparing?

Look inwards and 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

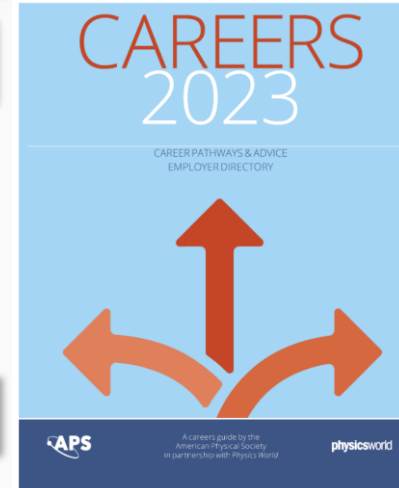
- Record your skills – technical and non-technical. These will be the building blocks of every resume you'll write.

How Can You Start Preparing?

APS Careers 2023 Guide

- Breadth of opportunities for physics graduates
- Advice from professionals
- List of companies hiring physicists
- E.g. Article: [Learning from your mistakes](#)

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/careerstoobox

APS Careers Website

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

aps.org/careers



How Can You Start Preparing?

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.
- Example:
 - *Engaging the Public through Science*
 - “Getting Involved in Public Engagement & Connecting with your Audience”
 - August 11, 2022
 - [Watch video](#)



View Webinars & Sign up:

aps.org/webinars

How Can You Start Preparing?

Build Your Network

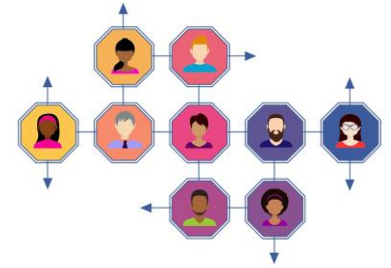
- Join LinkedIn
- Attend alumni mixers, career fairs, conferences, etc.
- Volunteer or Find internship

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 US policies affecting 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: aps.org/webinars

Employment Resources for International Members: aps.org/careers/guidance/international/index.cfm



My Experience with Academic Job Applications

- Have been on postdoc & fellowship hiring committees ~6 years
 - Read several hundred applications and letters of recommendations
 - Hired ~15 postdocs
- General Advice
 - Start early, ask people if they can write you a *good* letter, give them lots of notice
 - Show your application materials to trusted people in the sector you are applying to and address the weakness
 - If you think a reviewer might be concerned about something, address it in a positive way
 - Read the application carefully, key in on what they are looking for, meet the deadlines
 - Help the committee make the conclusion that you would like them to make
 - Put important stuff at the top - people should focus on whole package but you want to hook them early if they are in a long reading session
 - Your excitement for the physics, how your experience and skills prepares you for this opportunity, how leadership opportunities prepare you to make an impact, etc

Factors in getting an interview and a job

- Preparation

- Develop your skills in multiple categories: leadership, hardware, software, communication
- Look at where universities are hiring, and places that just hired
- Have conversations with places you might like to interview to understand their plans
- Be flexible about applying, including the timing
- Tell a story - connect with the interviewers and show them how your work interacts with your physics vision

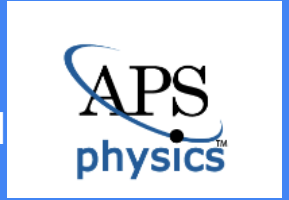
- Luck

- Many people prepare excellent applications
- Opportunities: Universities and Labs may or may not be hiring in your research area this year
- Committee members are human -- not all great applications lead to interviews
- Each individual application is unlikely to lead to an offer - apply to multiple jobs to increase your chances

- Attitude

- Work hard, stay positive, learn what you can from each attempt.

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

-
- Physics degrees prepare you for a wide range of rewarding career options
 - Spend time thinking about your priorities and goals and taking actions that will help you meet your goals
 - Communicate with your trusted team about your goals (e.g. peers, mentors) and learn from people in the jobs that are interesting to you
 - We are all different, so feel empowered to pick and choose advice that works best for you.
 - Take care of yourselves and have fun!

APS Career Mentoring Fellows Request

Survey Link:

<https://docs.google.com/forms/d/e/1FAIpQLSfAW9D1dJ7Ehlo3mSfacwR0Kn817pCUcnjPDNrwMRDvjvkJIA/viewform>

Or

<https://tinyurl.com/5776n2w2>



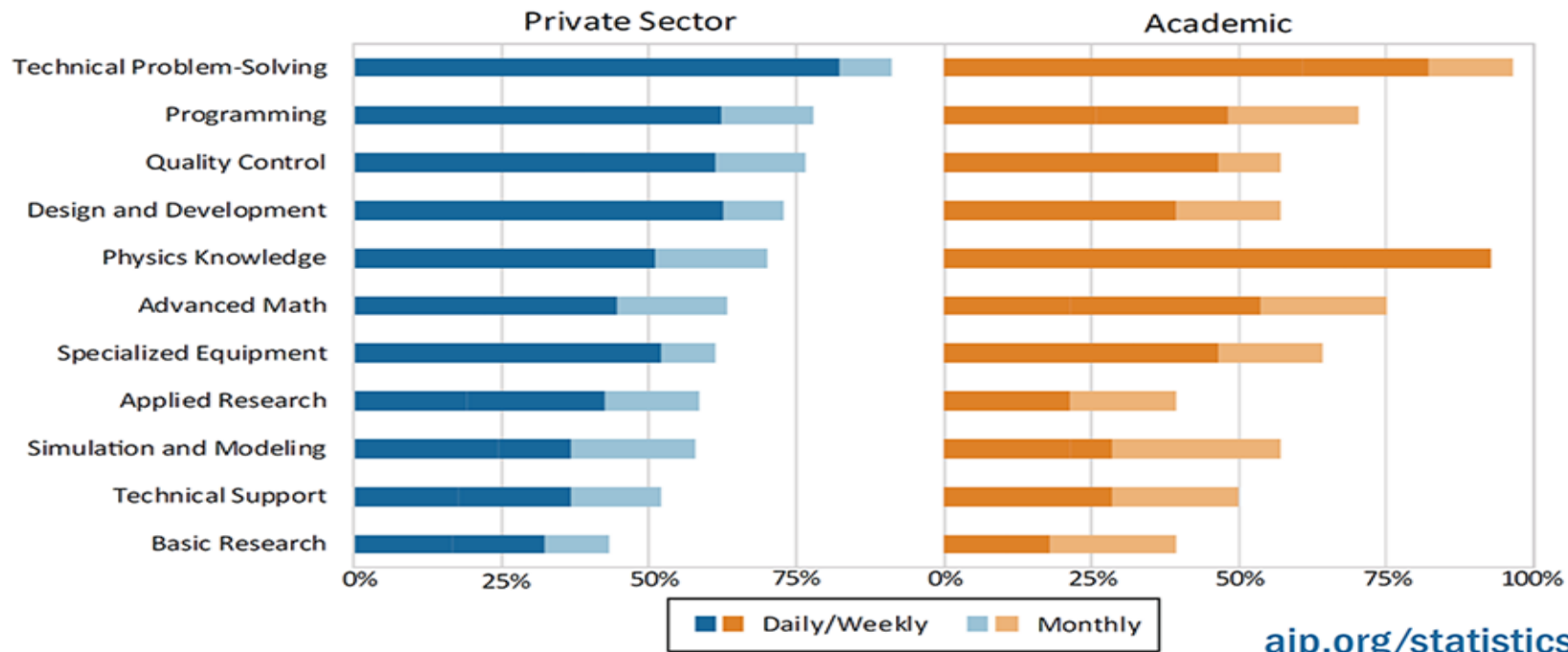
Acknowledgments and Resources

- Thank you for your time!
- UIUC - Career Seminar Series Opportunity
- American Physical Society Career Mentoring Fellows:
<https://www.aps.org/careers/guidance/mentoring.cfm>
 - Training
 - Several slides built by APS Careers team
- Most data from: American Institute of Physics:
<https://www.aip.org/statistics>

Template slides and backups

What are they doing (Master's)?

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

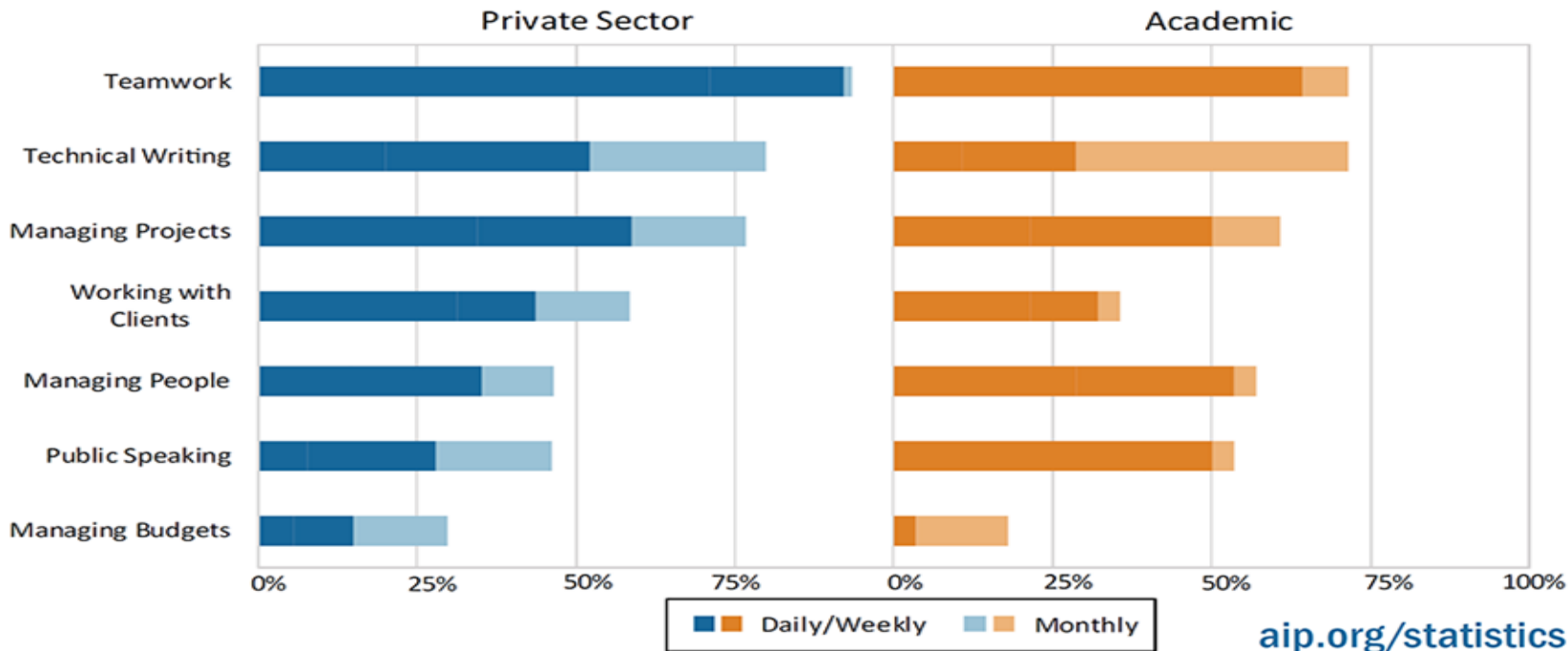


Kindergarten report card to success

Uses time and resources wisely
et...

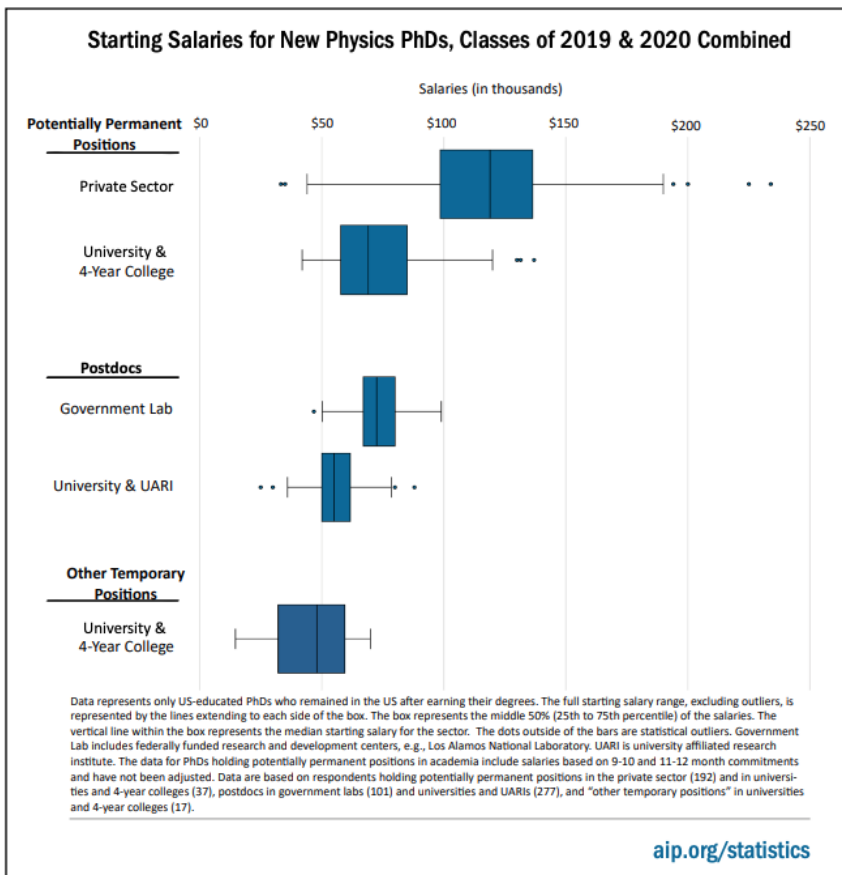
What are they doing (Master's)?

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



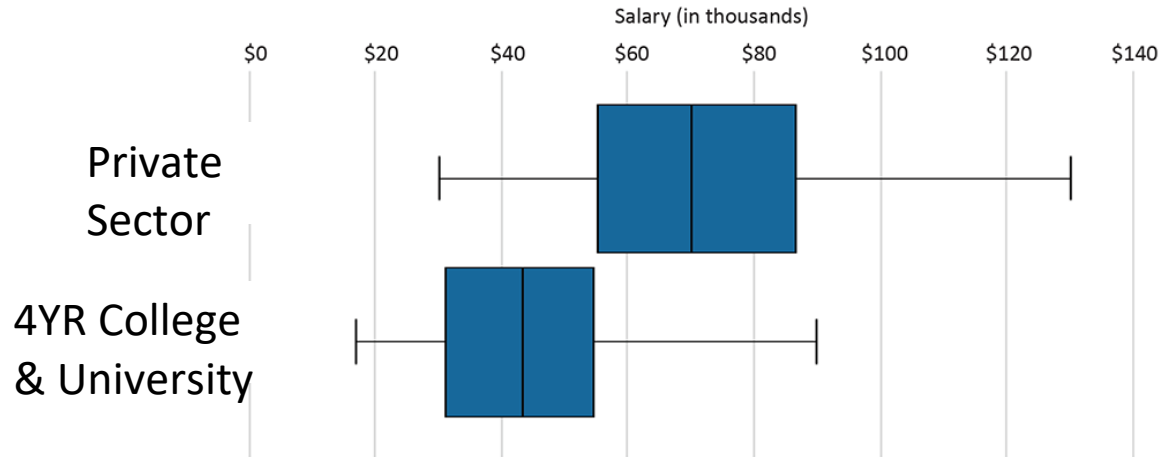
aip.org/statistics

Typical Starting Salaries of New Physics PhDs



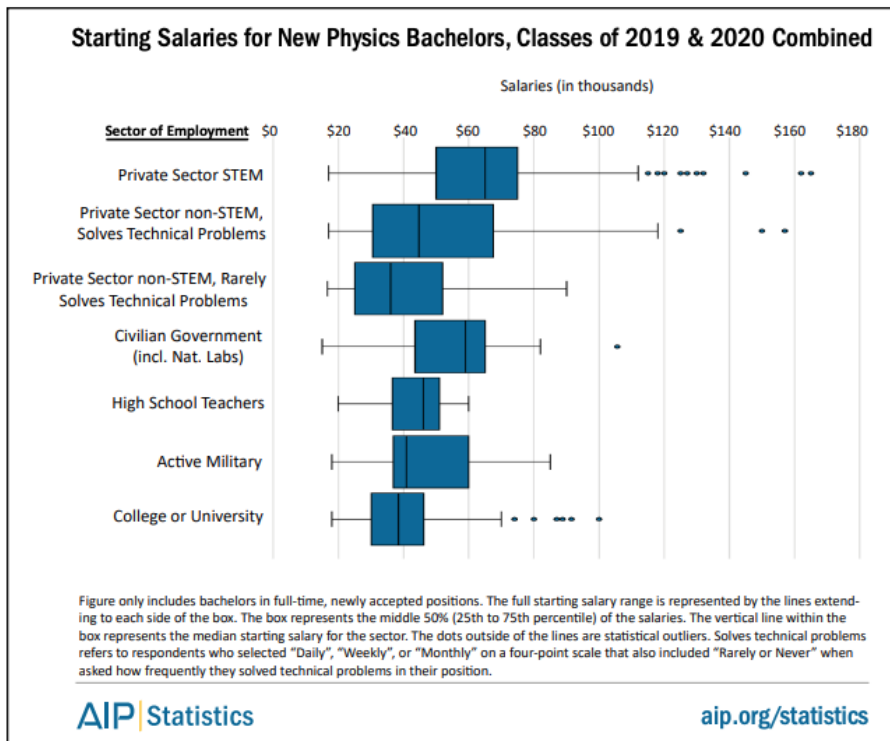
How much do physics Master's earn?

Starting Salaries of Exiting Physics Masters One Year After Degree,
Classes of 2016, 2017, & 2018 Combined



The full starting salary range is represented by the lines extending to each side of the box. The box represents the middle 50% (25th to 75th percentile) of the salaries. The vertical line within the box represents the median starting salary for the sector. Figure does not include salaries for masters holding part-time positions or salaries for respondents who reported starting their employment more than a year prior to earning their master's degree. The College or University category includes two-year colleges, four-year colleges, universities, and university affiliated research institutes. Data are based on 80 private sector salaries and 20 college and university salaries.

How much do physics Bachelor's earn?



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

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%

About half of physics PhDs are initially employed in the academic sector. However, ~70% of the potentially permanent jobs are in the private sector.

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".

What are they doing (PhDs)?

2019-2020 graduates: 1 year after PhD

Type of Employment of New Physics PhDs by Employment Sector,
Classes of 2019 & 2020 Combined

Sector of Employment	Initial Employment Type			Overall %
	Postdoc %	Potentially Permanent %	Other Temporary %	
Academic	73	18	62	49
Private	1	70	30	32
Government	23	8	3	15
Other	3	4	5	4
	100%	100%	100%	100%

Note: Data includes only US-educated physics PhDs who remained in the US after earning their degrees. Data are based on the responses of 809 postdocs, 650 individuals working in potentially permanent positions, and 99 individuals working in "other temporary positions."

About half of physics PhDs are initially employed in the academic sector. However, ~70% of the potentially permanent jobs are in the private sector.

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

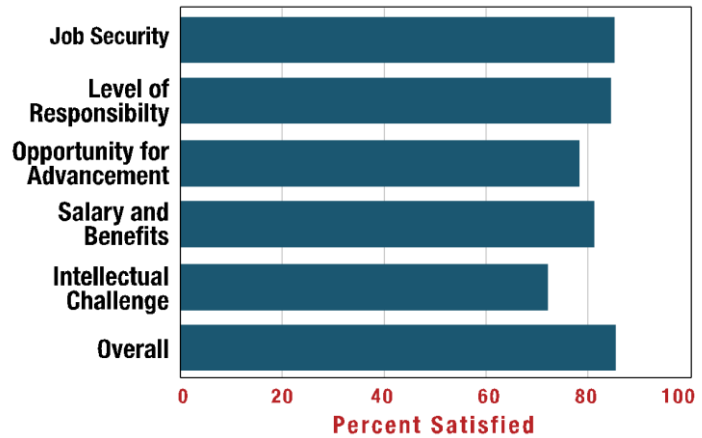
Note: The total headcount of faculty members is for the academic year of 2017–18. The total number of faculty members in this report differs from the total number reported in "The Number of Faculty Members in Physics Departments", which reported full-time equivalent (FTE) faculty totals, not headcount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

AIP | Statistics

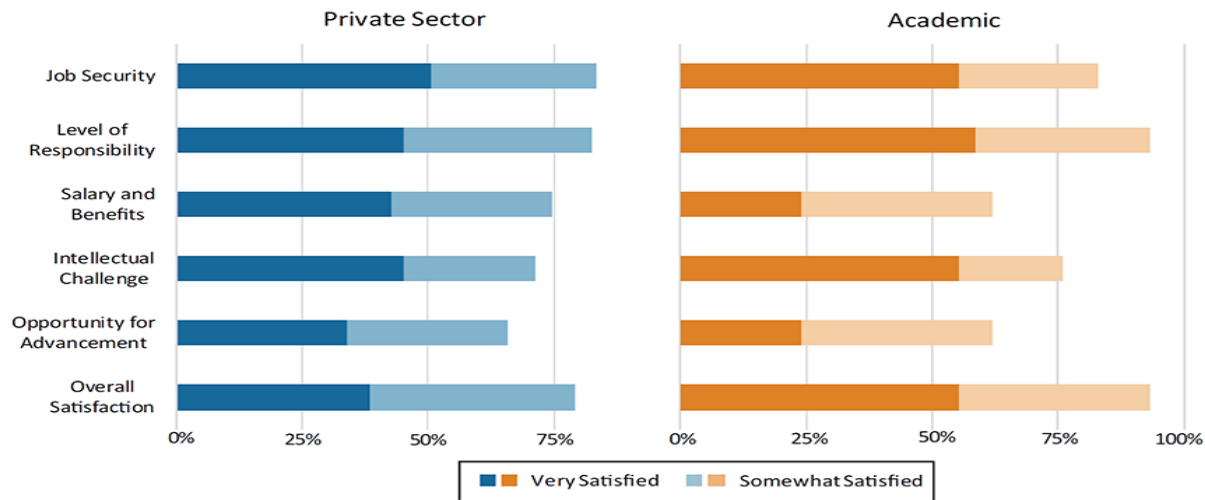
aip.org/statistics

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

aip.org/statistics



Job Satisfaction of Exiting Physics Masters in Potentially Permanent Positions, Classes of 2016, 2017, & 2018 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 91 individuals in the private sector and 29 individuals in the academic sector.

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 Anzenc · 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

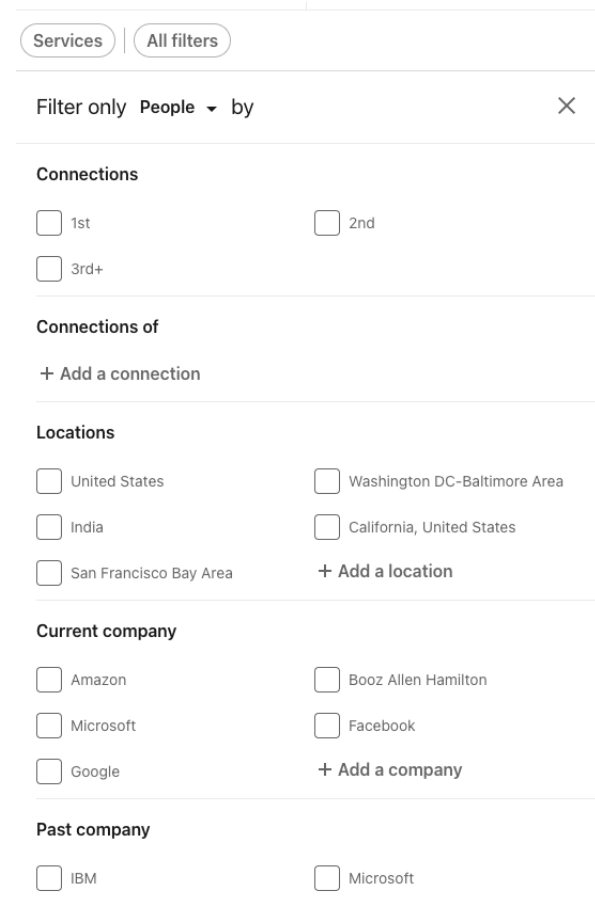
Using LinkedIn

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



The image shows a screenshot of the LinkedIn search filter interface. At the top, there are two tabs: 'Services' and 'All filters'. Below this is a filter bar that says 'Filter only People by' with a dropdown arrow and a close button (X). The main filter area is divided into several sections:

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

Tips on Resume Writing

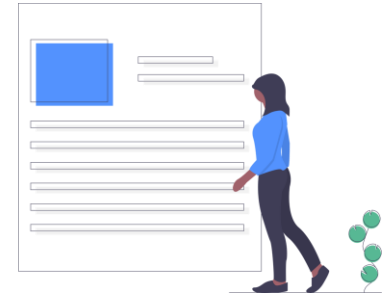
Resume vs. CV

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.