

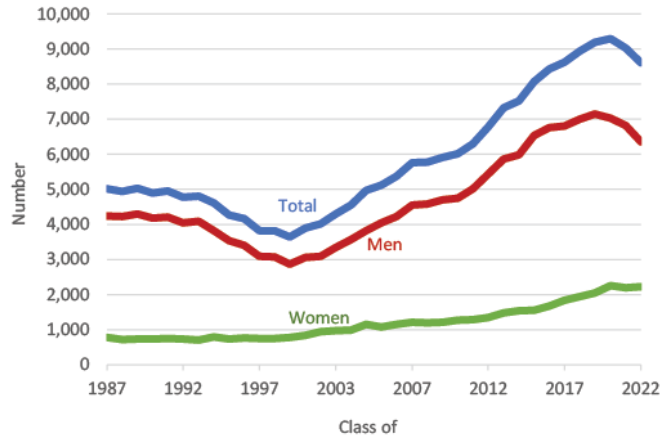
# The Physics and Astronomy Education and Career Landscape

Data from [www.aip.org](http://www.aip.org)

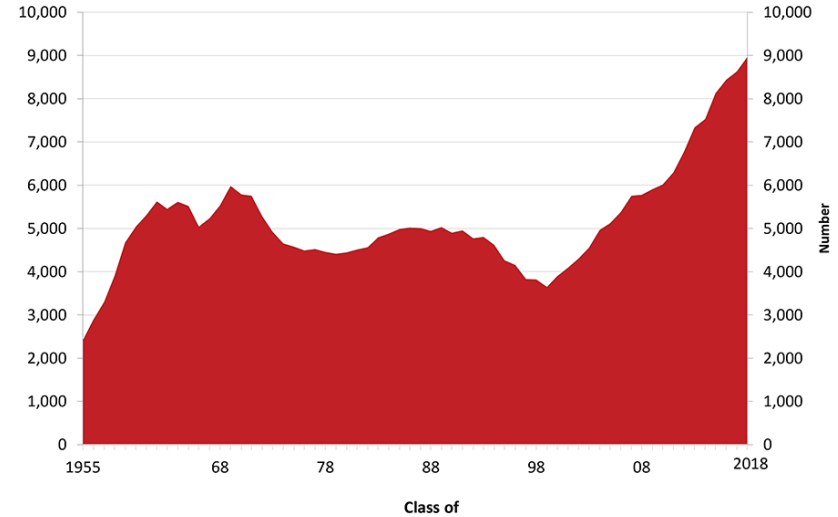
Presented by  
Dr. Mike Strauss  
For REU Program

# Physics Bachelor Degree Numbers

## Number of Bachelor's Degrees Earned in Physics, Classes 1987 through 2022



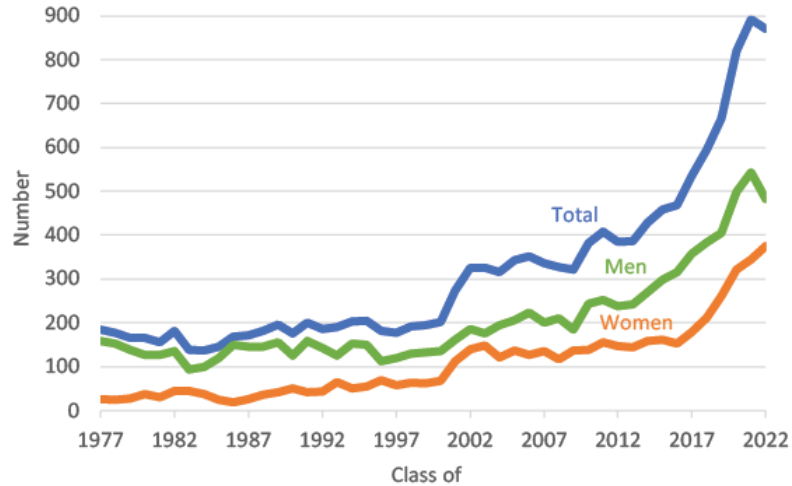
## Physics Bachelor's Degrees Awarded



Physics departments reported 0.3% of their physics bachelor's degree recipients in the class of 2022 identify as a gender other than man or woman.

# Astronomy Bachelor Degree Numbers

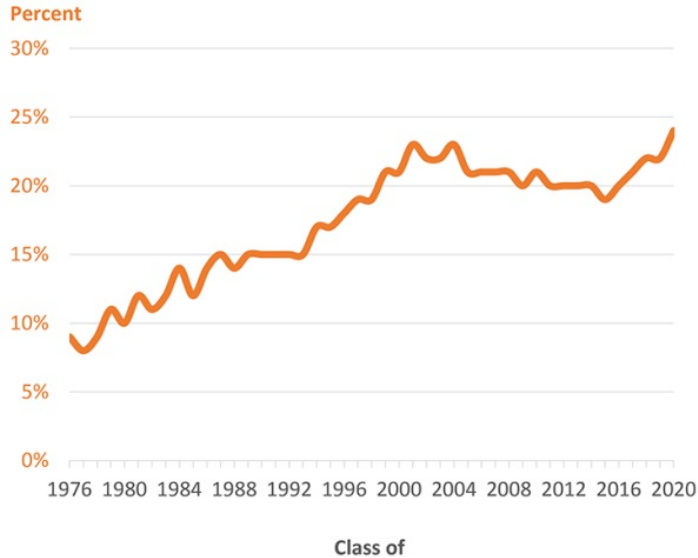
Number of Bachelors Earned in Astronomy,  
Classes 1977 through 2022



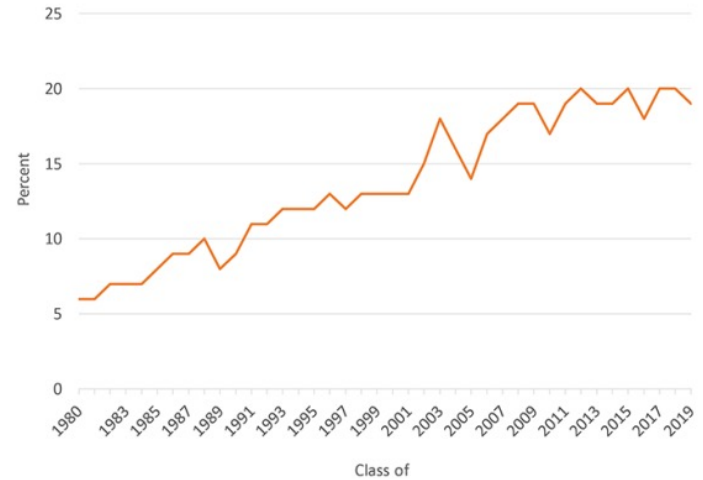
Astronomy departments reported 1% of their astronomy bachelor's degree recipients in the class of 2022 identify as a gender other than man or woman.

# Women in Physics

Percent of Physics Bachelor's Earned by Women,  
Classes of 1976 to 2020

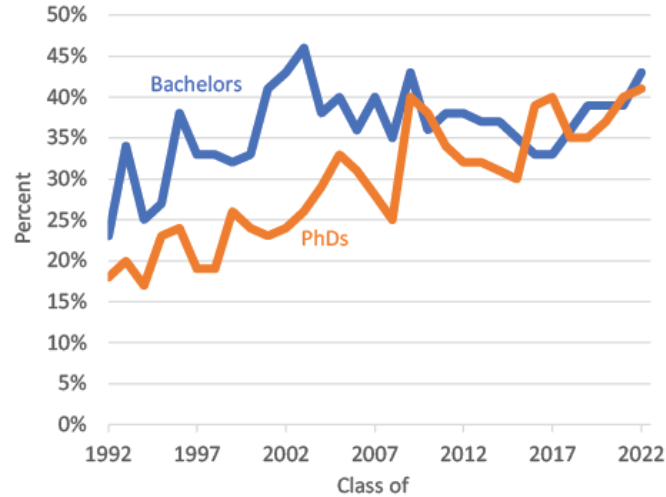


Percent of Physics PhDs Earned by Women,  
Classes 1980 through 2019



# Women in Astronomy

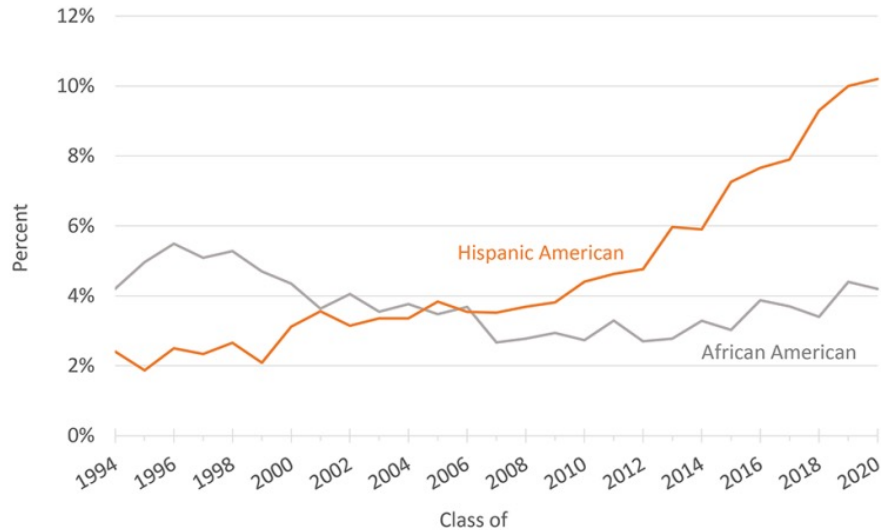
**Percent of Bachelor's Degrees and Doctorates in Astronomy Earned by Women, Classes 1992 through 2022**



Astronomy departments reported 1% of their astronomy bachelors and 0% of their astronomy PhDs in the class of 2022 as having a gender identity other than man or woman.

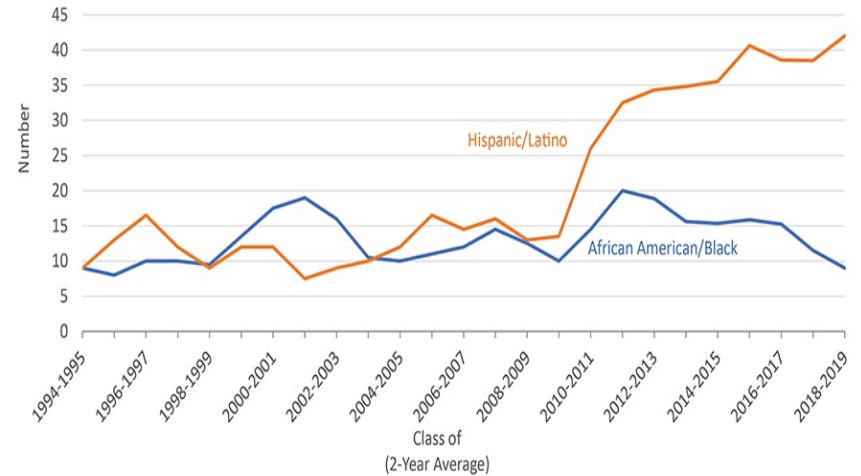
# Under-represented groups in Physics

## The Proportion of Physics Bachelor's Degrees Awarded to African Americans and Hispanic Americans, Classes 1994 to 2020



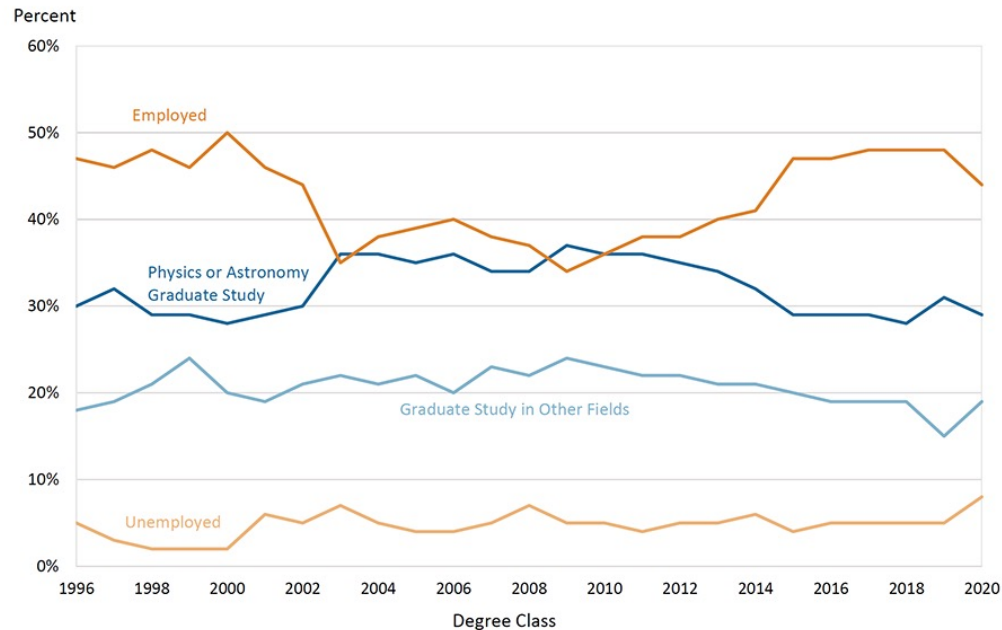
Note: Between 5% and 11% of physics bachelors were awarded to non-US citizens over this time period. The percent of physics bachelor's degrees awarded to African-Americans and Hispanic Americans are based on US citizens only.

## Number of African American and Hispanic People Earning a Physics Doctorate, Classes of 1994 through 2019



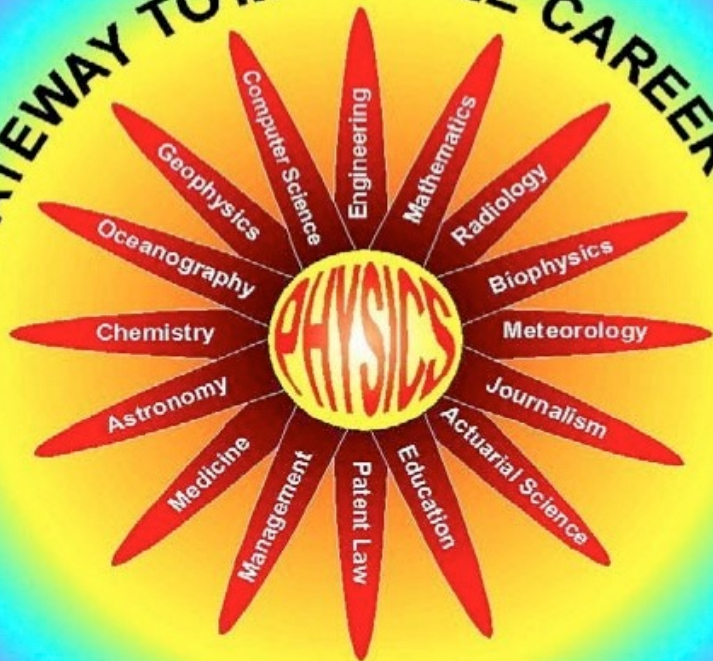
# What are new graduates doing?

Status of Physics Bachelors One Year After Degree,  
Classes 1996 through 2020



# PHYSICS:

## YOUR GATEWAY TO MULTIPLE CAREER OPTIONS



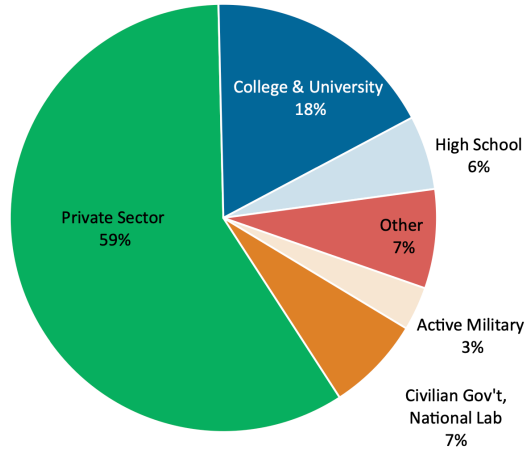
A degree in physics leaves one poised to enter many professions that include but are not limited to traditional physics. The discipline of physics teaches skills that are transferable to those professions. These transferable skills include: mathematical modeling, problem solving, designing experiments, interpretation of experimental data, reflecting on answers before trusting them, research experience, laboratory technique, communication skills. Study physics and maximize your options!



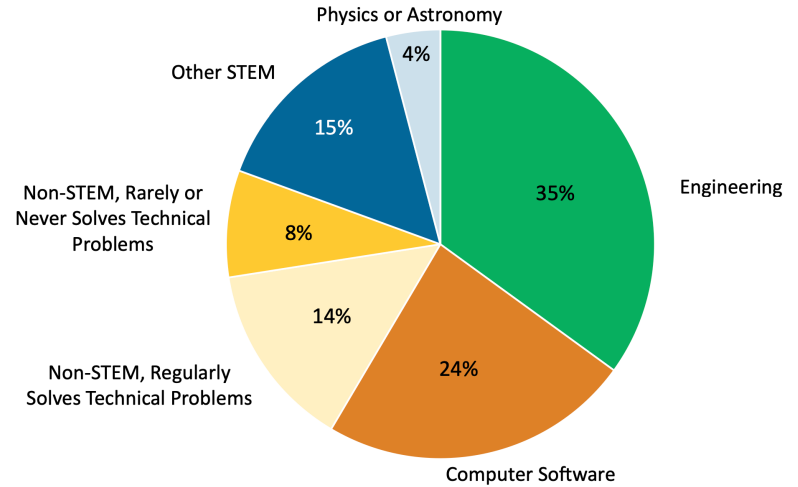


# Employment Where and What?

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



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".

# Common Job Titles for New Physics Bachelors

## Engineering

Systems Engineer  
Engineering Technician  
Electrical Engineer  
Project Engineer  
Mechanical Engineer  
Test Engineer  
Process Engineer  
Production Engineer  
Design Engineer  
Manufacturing Engineer  
Application Engineer  
Data Engineer  
Scientist

## Research and Technical

Research Assistant  
Researcher  
Research Technician  
Junior Specialist  
Patent Examiner  
Accelerator Operator  
Physicist  
Scientist

## Education

High School Physics Teacher  
High School Math Teacher  
Middle School Science Teacher  
Tutor

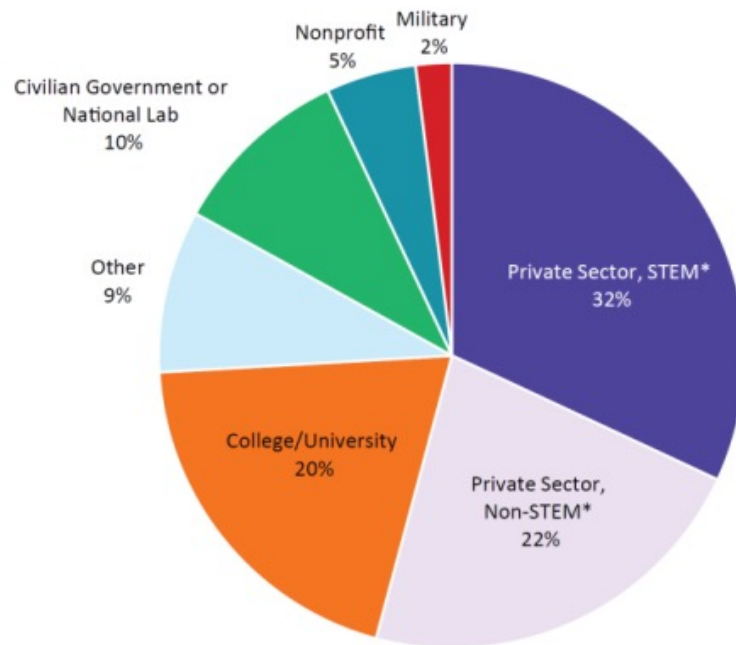
## Programming/Software

Software Engineer  
Software Developer  
Application Developer  
Data Engineer  
Data Analyst  
Data Scientist  
Machine Learning Engineer  
Consultant

## Finance/Business

Data Analyst  
Research Analyst  
Project Manager  
Investment Banker

## Employment Sectors for New Astronomy Bachelors, Classes of 2018, 2019, and 2020 Combined



The "Other" category is mostly comprised of middle and high schools, medical facilities, and museums.

\*STEM refers to positions in science, technology, engineering, and math.

# Employment & Salaries with Physics Bachelor's Degree (2023)

## Starting Salaries for Physics Bachelors

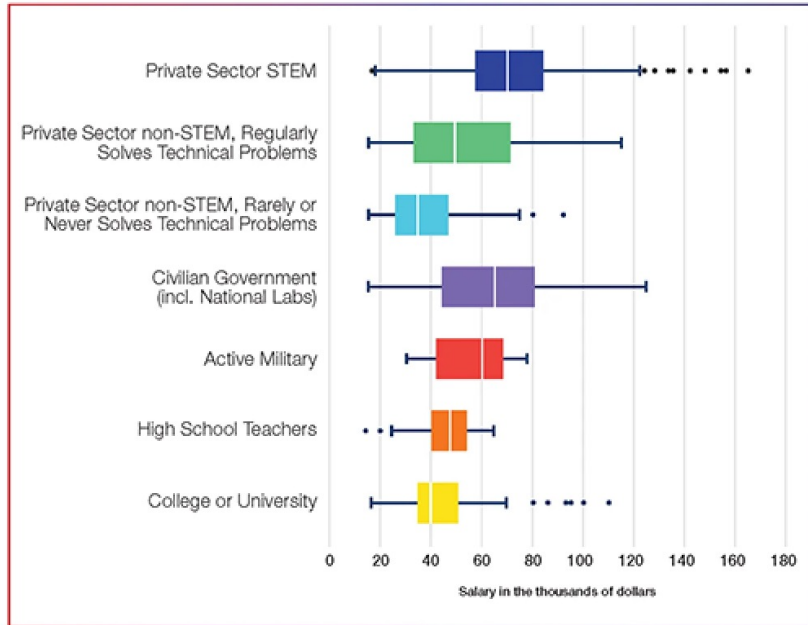
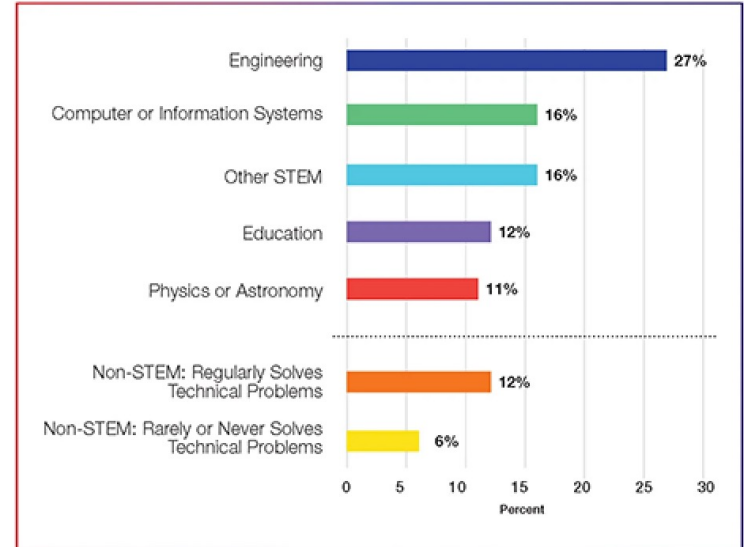


Figure only includes starting salaries for full-time employed, US educated physics bachelor's degree recipients from the classes of 2021 and 2022 combined. The box represents the middle 50% (25th to 75th percentile) of the salaries. The vertical line within the box represents the median salary. The full starting salary range, excluding outliers, is represented by the lines extending to each side of the box. The dots outside the lines are statistical outliers but actual salaries. STEM refers to positions in science, technology, engineering, and math.

## Field of Employment for New Physics Bachelors



- STEM refers to natural science, technology, engineering, and mathematics
- Regularly solves technical problems includes respondents who selected "Daily", "Weekly", or "Monthly" on a four-point scale that also included "Rarely or Never"
- Almost half of new physics bachelors were in the workforce in the winter after receiving their degree

Source: AIP Follow-up Survey of Physics Bachelors, the classes of 2021 and 2022 combined. Field of employment data is self-reported and reflects all sectors of employment.

# Salaries for Astronomy Bachelor's Degree

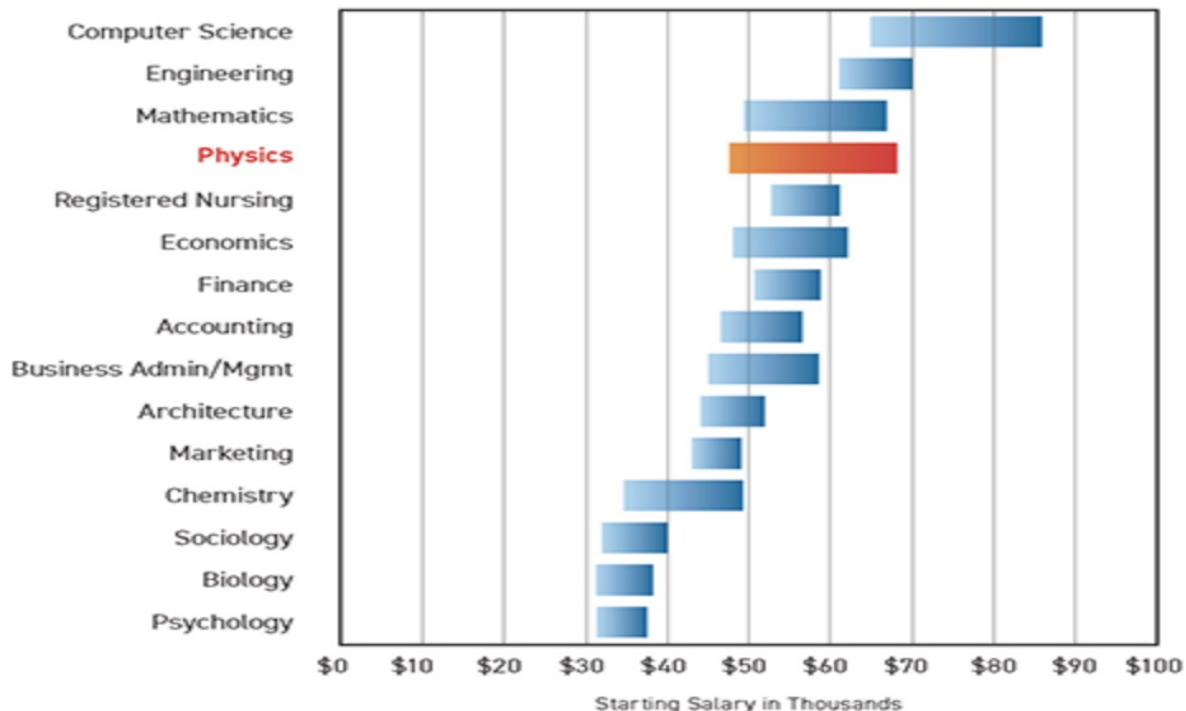
Starting Salary Ranges for New Astronomy Bachelors,  
Classes of 2018, 2019, and 2020 Combined



The full starting salary range is represented by the lines extending to each side. The box represents the middle 50% (25th to 75th percentile) of salaries. The vertical line within the box represents the median starting salary in the field. The dots outside of the lines represent statistical outliers. Figure is based on 45 salaries in private sector – STEM positions and 18 salaries in college or university positions.

# What Do New Bachelors Earn?

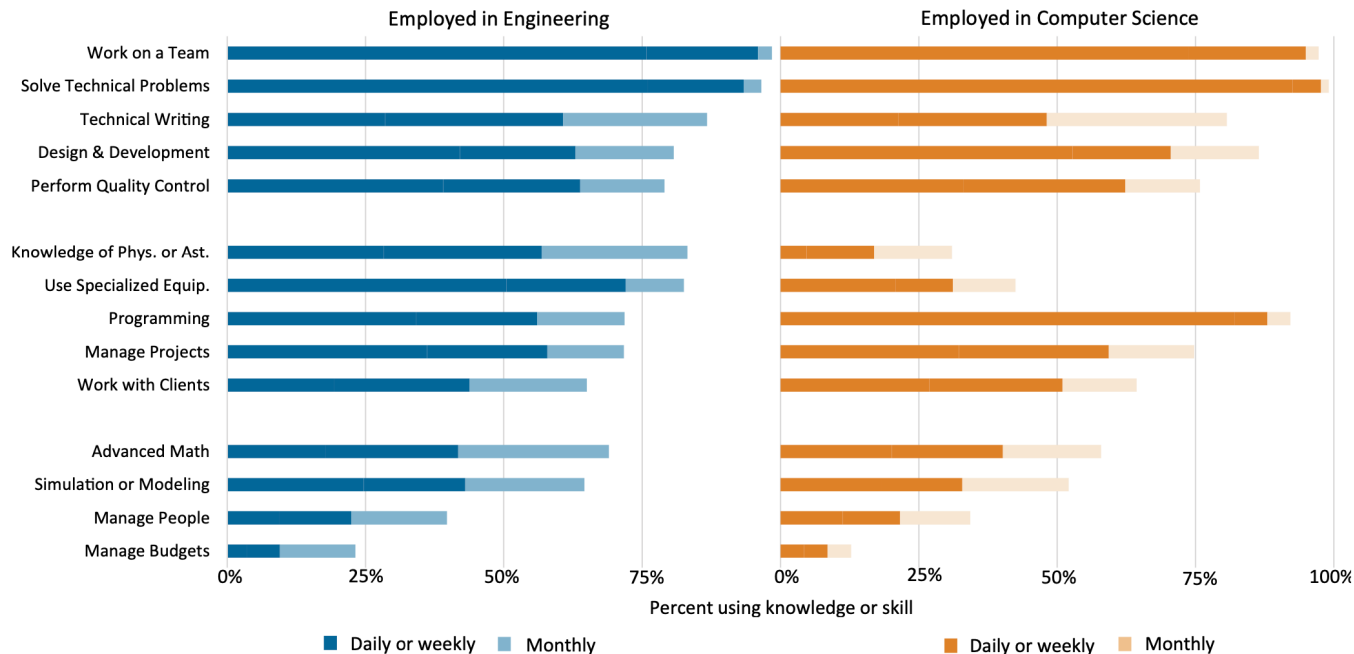
## Starting Salaries for the Class of 2018



Bars represent the middle 50% of salaries, i.e. between the 25th and the 75th percentiles.

Reprinted from the Summer 2019 Salary Survey, with permission of the National Association of Colleges and Employers, copyright holder.

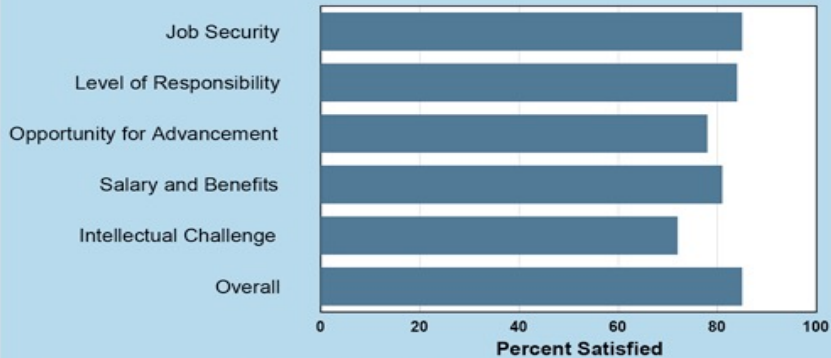
# Knowledge and Skills Used by New Physics Bachelors Employed in the Private Sector, Classes of 2019 & 2020 Combined



Percentages represent the physics bachelors who choose "daily", "weekly", or "monthly" on a four point scale that also included "never or rarely".

# Job Satisfaction of Physics Bachelor's Degree

## Job Satisfaction of Physics Bachelors in Private Sector STEM Positions, Classes of 2013 & 2014 Combined

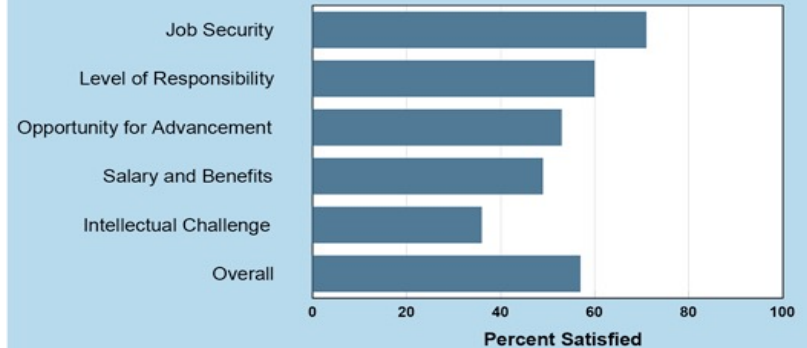


Percentages represent the physics bachelors who chose "very satisfied" or "somewhat satisfied" on a four-point scale that also included "somewhat dissatisfied" and "very dissatisfied." STEM refers to natural science, technology, engineering and math.

Figure based on the responses of 670 physics bachelors employed in private sector STEM positions.

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

## Job Satisfaction of Physics Bachelors in Private Sector Non-STEM Positions, Classes of 2013 & 2014 Combined



Percentages represent the physics bachelors who chose "very satisfied" or "somewhat satisfied" on a four-point scale that also included "somewhat dissatisfied" and "very dissatisfied." STEM refers to natural science, technology, engineering and math.

Figure based on the responses of 266 physics bachelors employed in private sector non-STEM positions.

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



# More than a Bachelor's Degree?

## Starting Salaries in the Private Sector

Physics Degree Recipients, Classes of 2019 & 2020

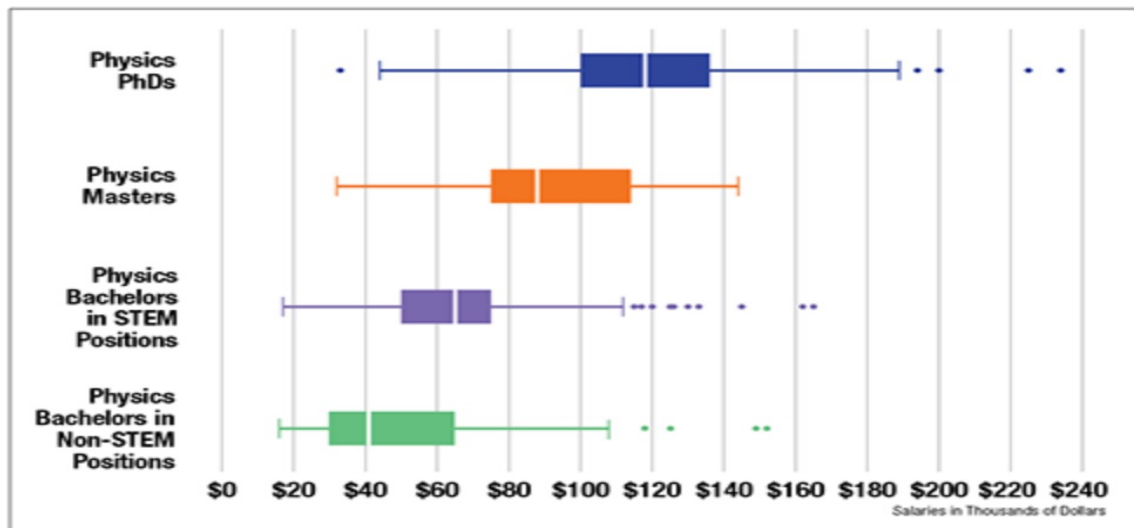


Figure includes only starting salaries for US educated physics degree recipients from the classes of 2019 and 2020 that were in full-time, newly accepted private sector positions in the US. The box represents the middle 50% (25th to 75th percentile) of the salaries. The full starting salary range, excluding outliers, is represented by the lines extending to each side of the box. The vertical line within the box represents the median salary. The dots outside the lines are statistical outliers but represent actual salaries. STEM refers to positions in science, technology, engineering, and math.

## Starting Stipends for New Physics Bachelors, Classes of 2019 & 2020 Combined

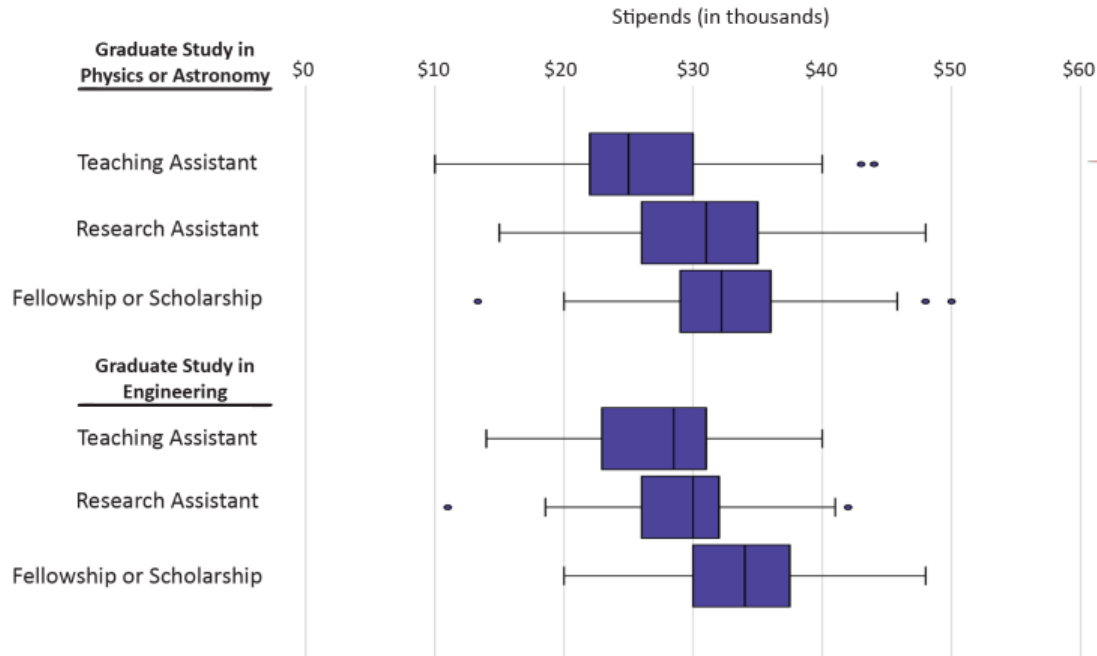


Figure includes only bachelors who are enrolled in graduate school as a full-time student. The full stipend range is represented by the lines extending to each side of the box. The box represents the middle 50% (25th to 75th percentile) of the stipends. The vertical line within the box represents the median starting stipend for the type of support. The dots outside of the lines are statistical outliers. Respondents were asked, "What was your annual base stipend or salary?"

## Field of Graduate Study for Physics Bachelors One Year After Degree, Classes of 2019 & 2020 Combined

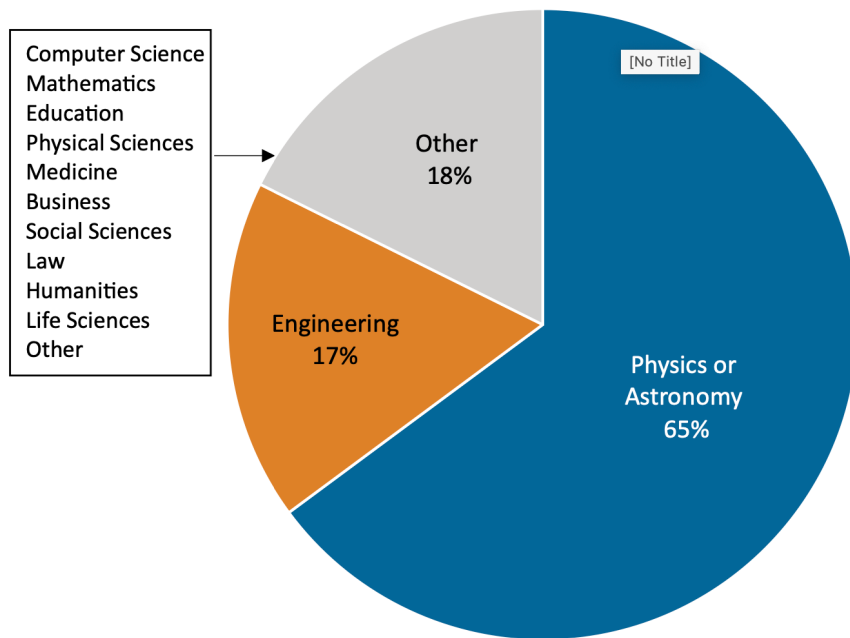
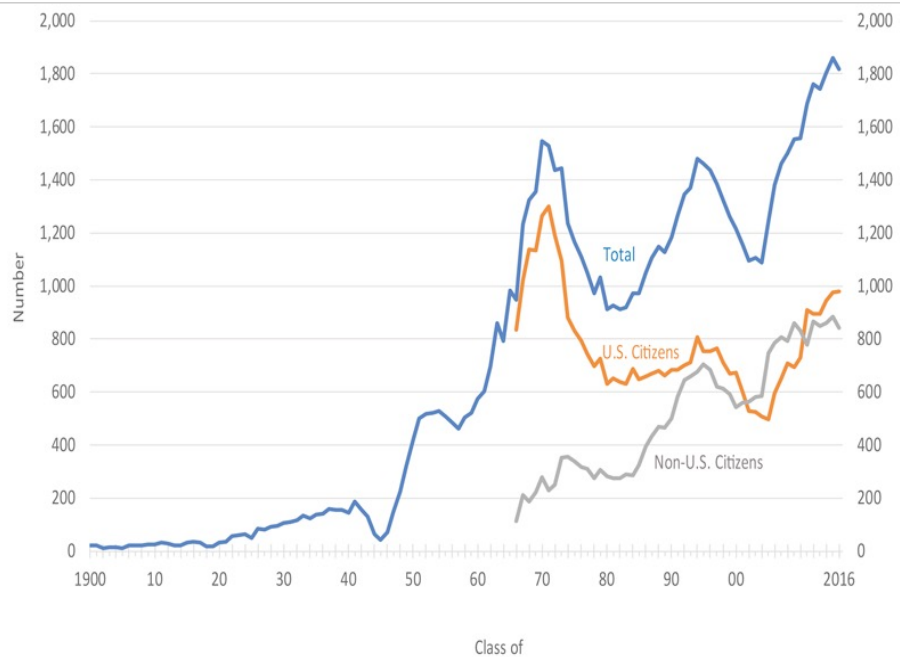


Figure based on responses from 2,593 physics bachelors degree recipients who indicated that they continued into graduate study.

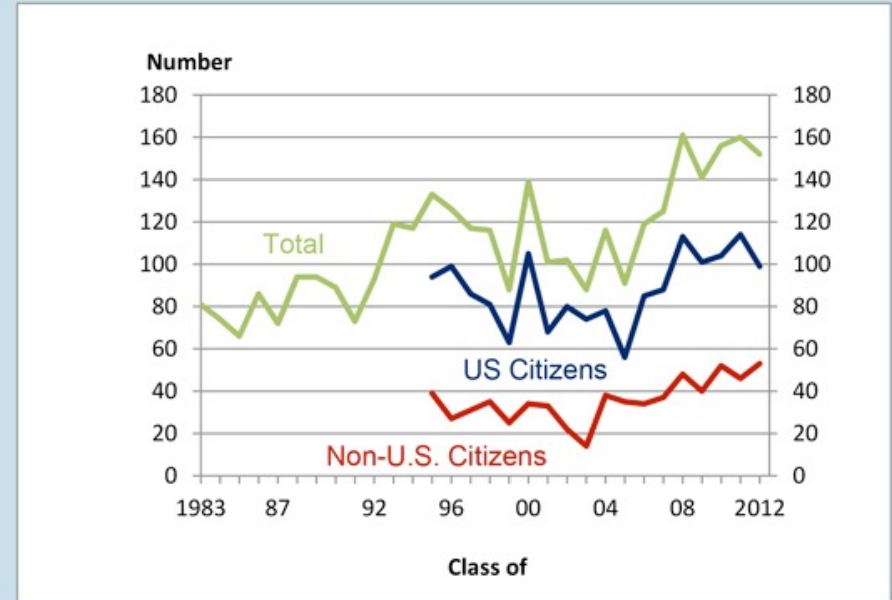
# Citizenship of Physics and Astronomy Ph.Ds

## Physics PhDs Conferred in the U.S., 1900 through 2016.



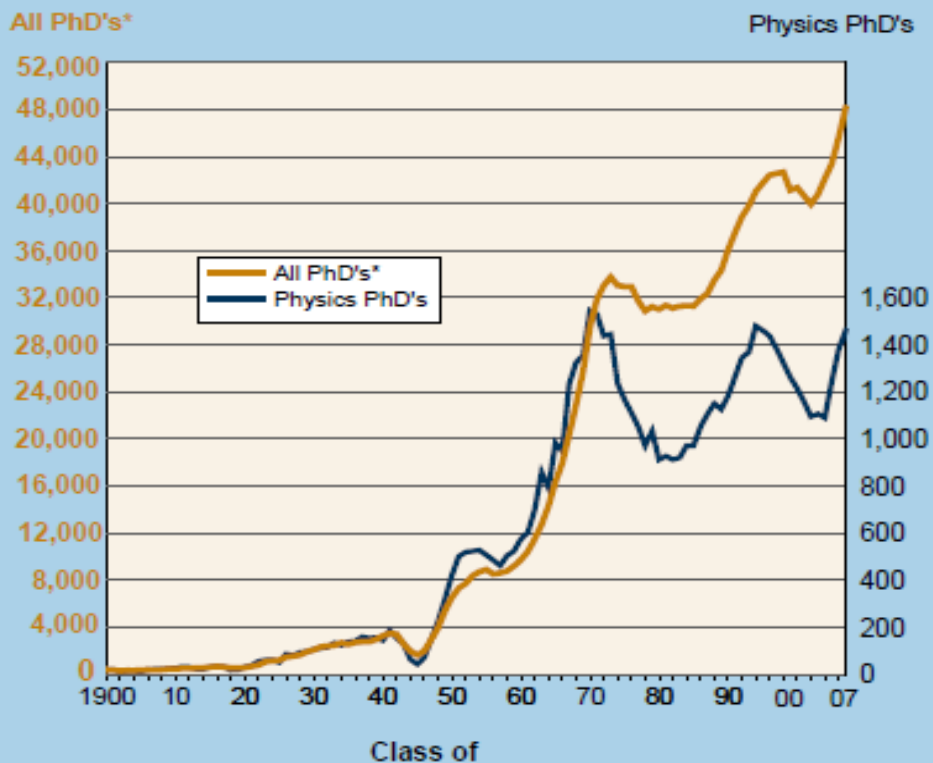
Sources: ACE (1900-1919), NAS (1920-1961), AIP (1962-2016)

## Astronomy PhDs Awarded by Citizenship, Classes 1983 through 2012.



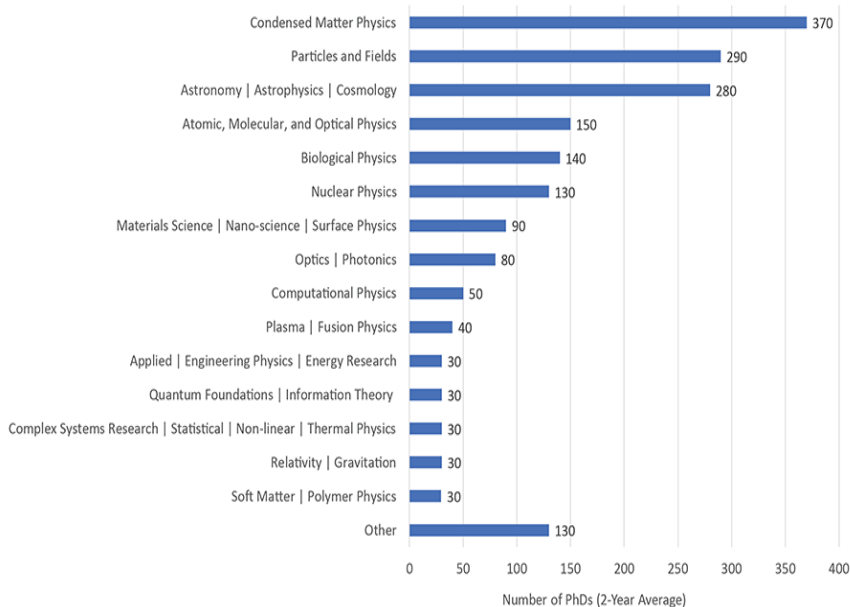
# Ph.D.s Conferred

Physics PhD's and all PhD's conferred in the US,  
1900 through 2007.



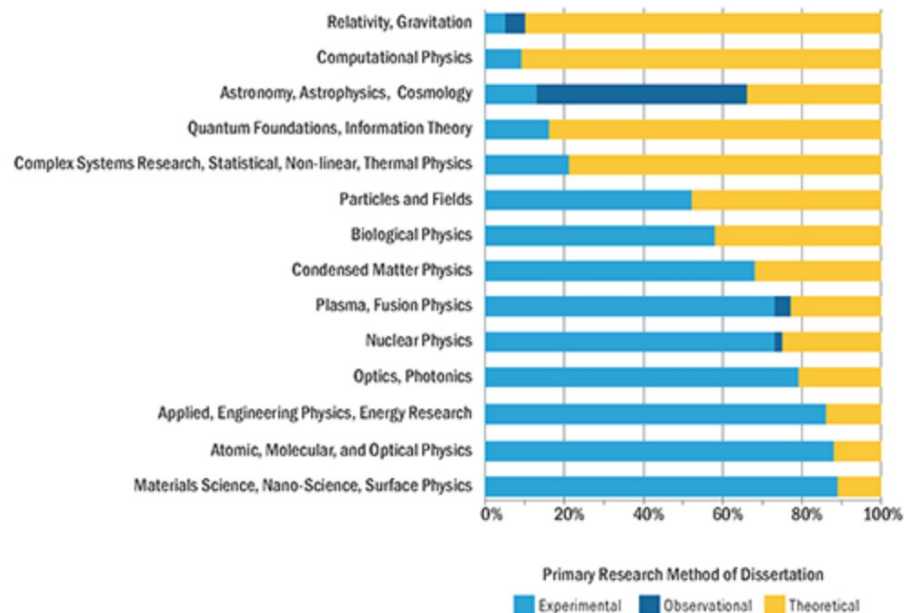
# Subfields of Physics

Average Number of PhDs Granted by Subfield from Physics Departments  
Annually, Classes of 2017 and 2018 Combined



Note: These data are estimated from responses to the AIP Follow-up Survey of Physics PhDs and total 1,900 individuals. Additionally, there was an average of 180 astronomy PhDs conferred at departments that offer an astronomy degree.

# Dissertation Research Method by Subfield of Dissertation



# After Physics Graduate School?

**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%

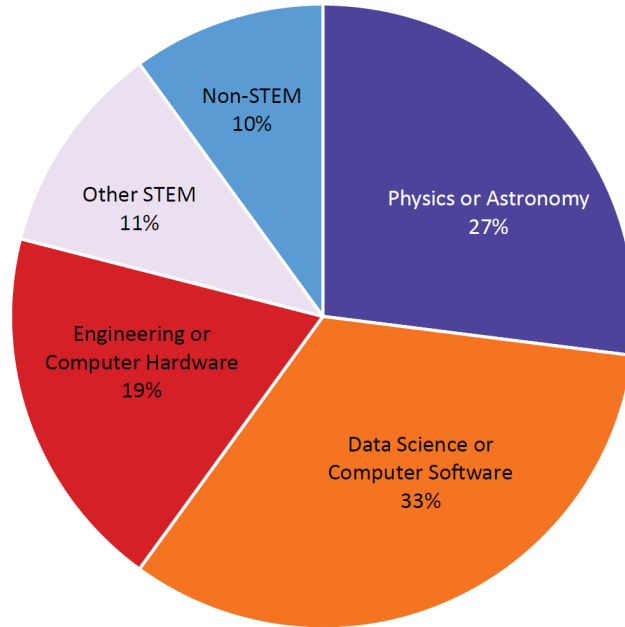
Note: Data includes only US-educated physics PhDs who remained in the US after earning their degrees. Data are based on the responses of 809 postdocs, 650 individuals working in potentially permanent positions, and 99 individuals working in "other temporary positions."

Type of Employment of New Astronomy PhDs by Employment Sector,  
Classes of 2018, 2019, and 2020 Combined

Sector of Employment	Postdoc %	Potentially Permanent %
Academic	79%	21%
Private	0%	63%
Government	12%	10%
Other	9%	6%



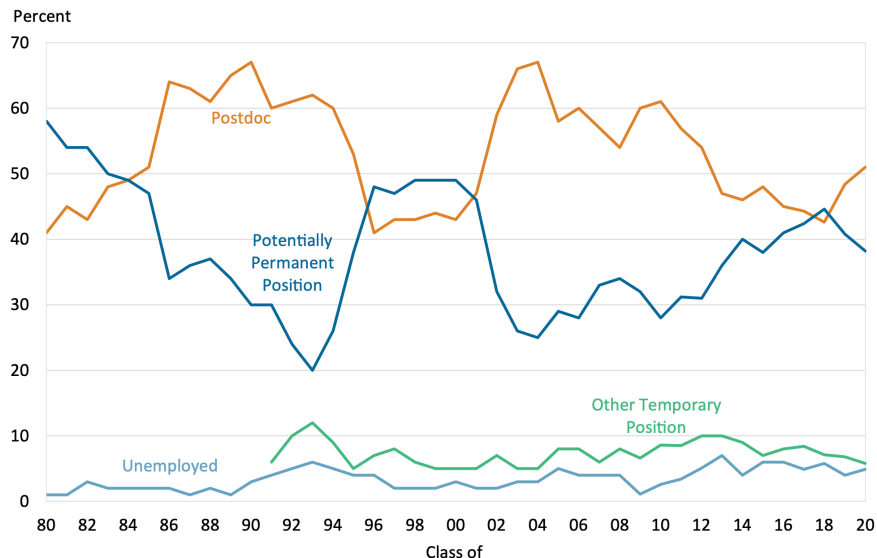
## Employment Fields for New Astronomy PhDs in Potentially Permanent Positions, Classes of 2018, 2019, and 2020 Combined



STEM refers to positions in science, technology, engineering, and mathematics.

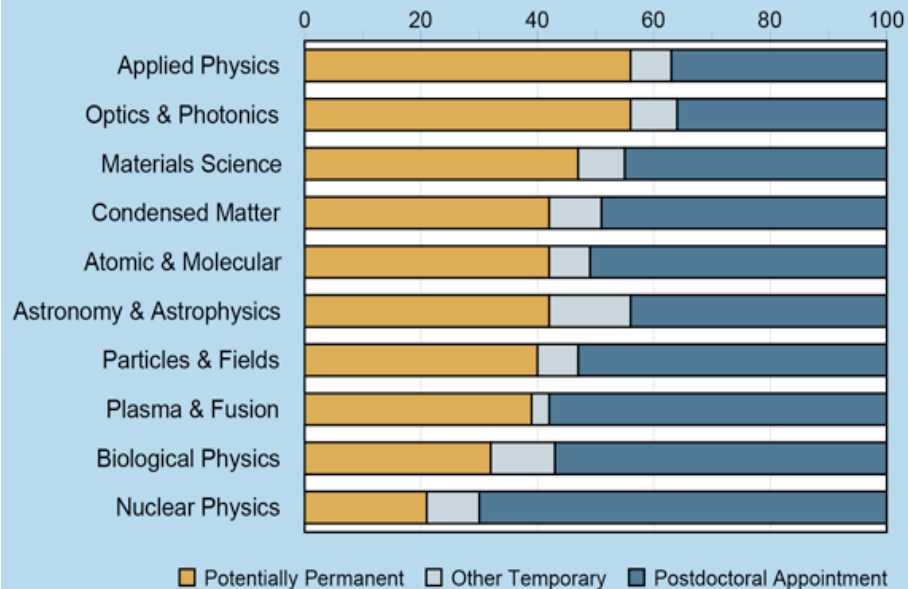
# After Physics Graduate School?

## Initial Employment of Physics PhDs, 1980 through 2020



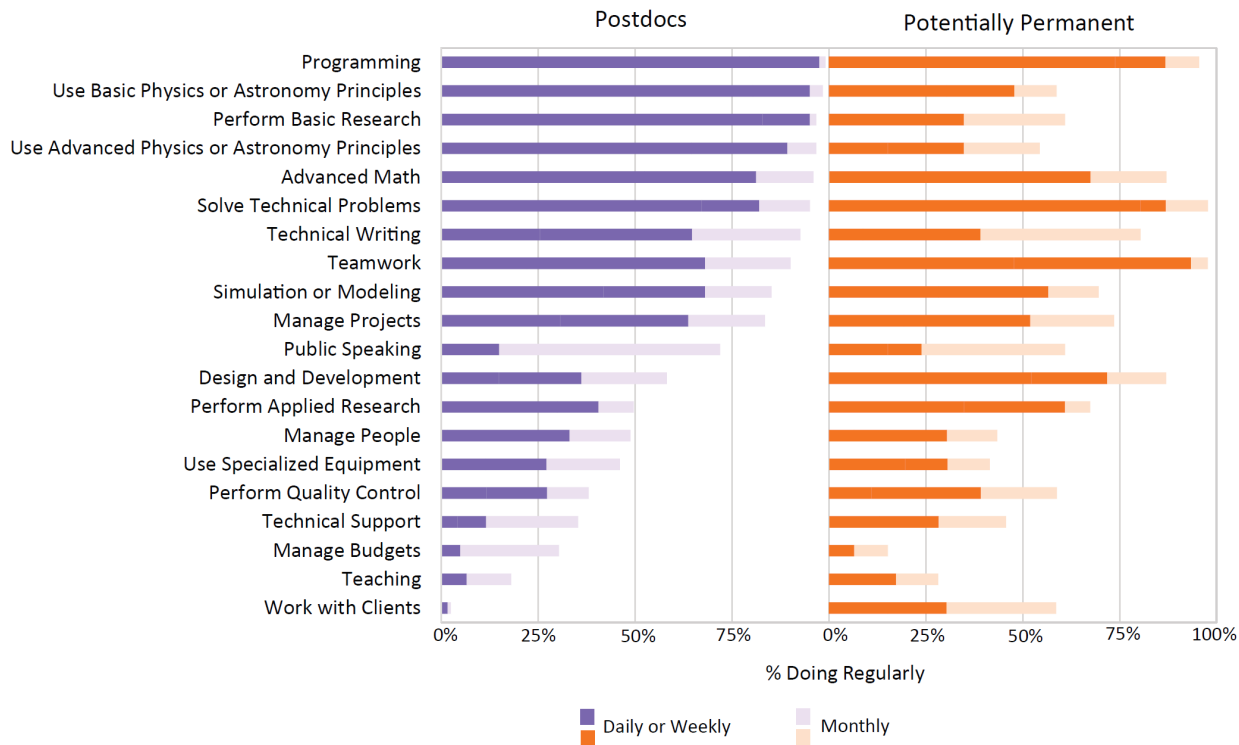
In 1991, the survey questionnaire was changed to measure "other temporary" employment as a separate category. Data are limited to PhDs who earned their degrees from a US university and remained in the US.

## Initial Employment of Physics PhDs by Subfield of Dissertation, Classes of 2013 & 2014 Combined.



Data are limited to PhDs who earned their degrees from a US university and remained in the US.

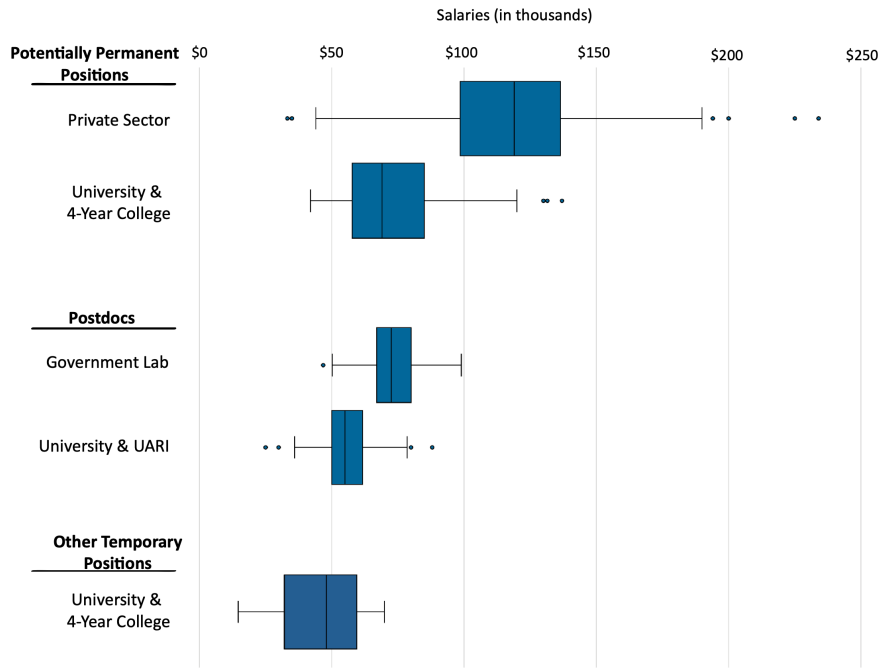
# Skills and Knowledge Used by New Astronomy PhDs, Classes of 2018, 2019, and 2020 Combined



Respondents were asked to indicate how regularly they perform or use each skill or type of knowledge on a scale that included “daily,” “weekly,” “monthly,” and “rarely or never.”

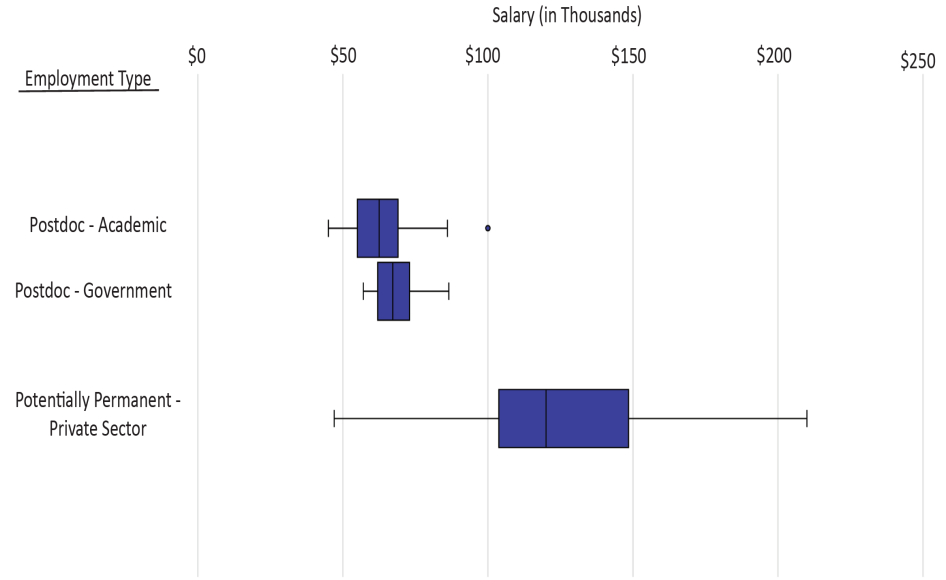
# Ph.D. Starting Salaries

## Starting Salaries for New Physics PhDs, Classes of 2019 & 2020 Combined



Data represents only US-educated PhDs who remained in the US after earning their degrees. The full starting salary range, excluding outliers, 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. The dots outside of the bars are statistical outliers. Government Lab includes federally funded research and development centers, e.g., Los Alamos National Laboratory. UARI is university affiliated research institute. The data for PhDs holding potentially permanent positions in academia include salaries based on 9-10 and 11-12 month commitments and have not been adjusted. Data are based on respondents holding potentially permanent positions in the private sector (192) and in universities and 4-year colleges (37), postdocs in government labs (101) and universities and UARIs (277), and "other temporary positions" in universities and 4-year colleges (17).

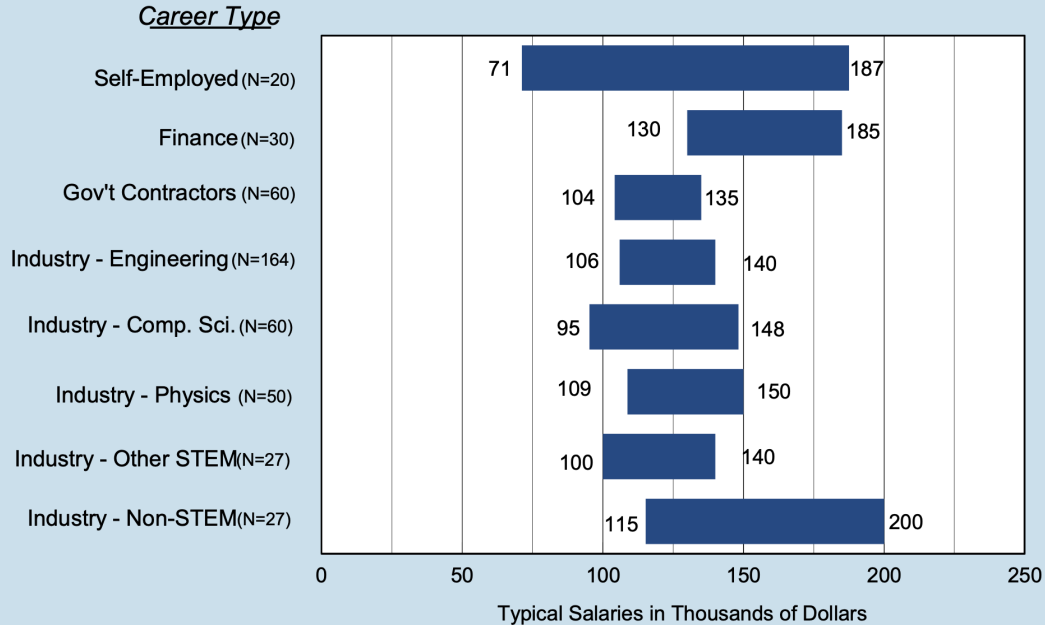
## Starting Salary Ranges for New Astronomy PhDs, Classes of 2018, 2019 and 2020 Combined



The full starting salary range is represented by the lines extending to each side. The box represents the middle 50% (25th to 75th percentile) of salaries. The vertical line within the box represents the median starting salary in the field. Dots outside of the lines represent statistical outliers.

# What Physicists Do (and get paid) in the Private Sector

## Physicists in the Private Sector Salaries by Career Type, 2011



Data include US-educated physicists who earned their PhDs 10-15 years earlier and were working full-time in the US in 2011. Respondents were asked to provide their current annual salary excluding bonuses, overtime, and additional compensation. Typical salaries are the middle 50%, i.e. between the 25th and 75th percentiles. "N" represents the number of physicists who responded to the survey, were full-time employed, and provided salary data.

# What Physicists get Paid in Faculty Positions

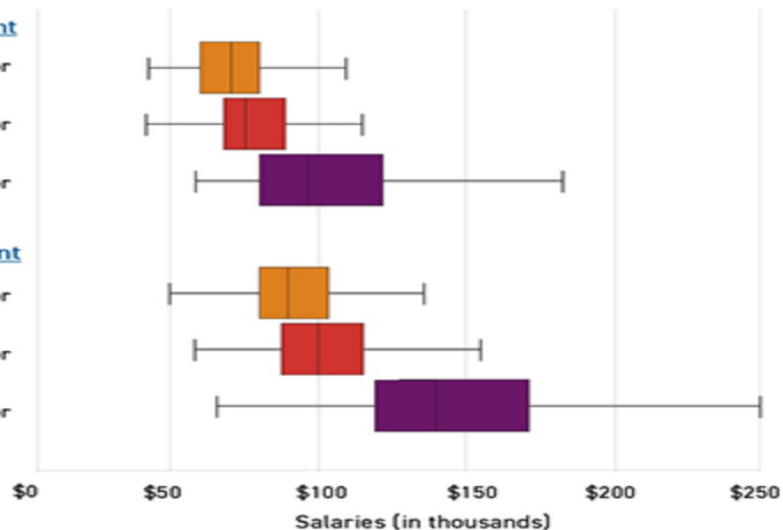
## Physics and Astronomy Faculty Member Salaries, 2021

### Bachelor's-Granting Department

Assistant Professor  
Associate Professor  
Full Professor

### PhD-Granting Department

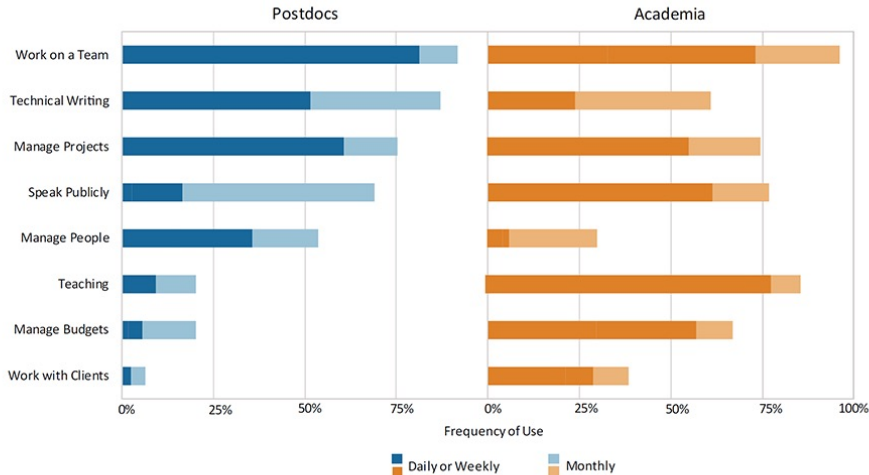
Assistant Professor  
Associate Professor  
Full Professor



The box represents the middle 50% (25th to 75th percentile) of all self-reported full-time salaries. The full starting salary range, less outliers, is represented by the lines extending to each side of the box. The data reported here do not account for whether faculty were on a 10- or 12-month employment contract. "Bachelor's-Granting" and "PhD-Granting" refers to the highest physics or astronomy degree offered by the department.

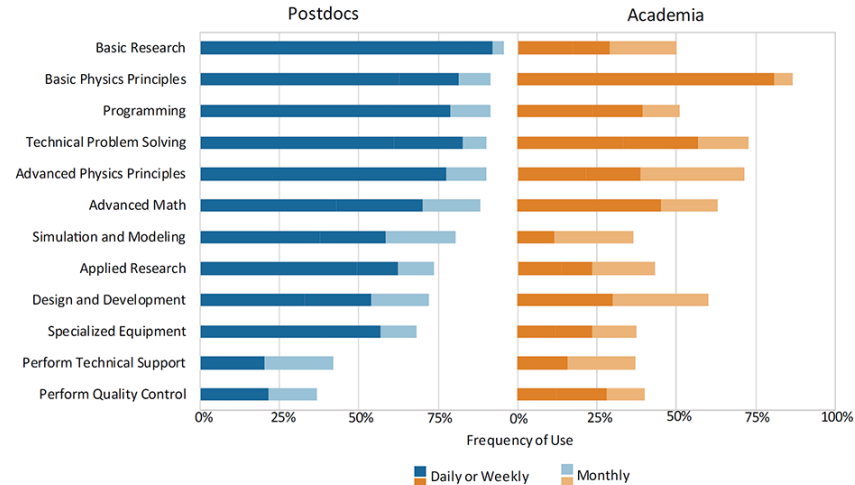
# Skills Used in Academia

Interpersonal and Management Skills Used by New Physics PhDs Holding Postdocs and Potentially Permanent Positions in Academia, Classes of 2015 & 2016 Combined



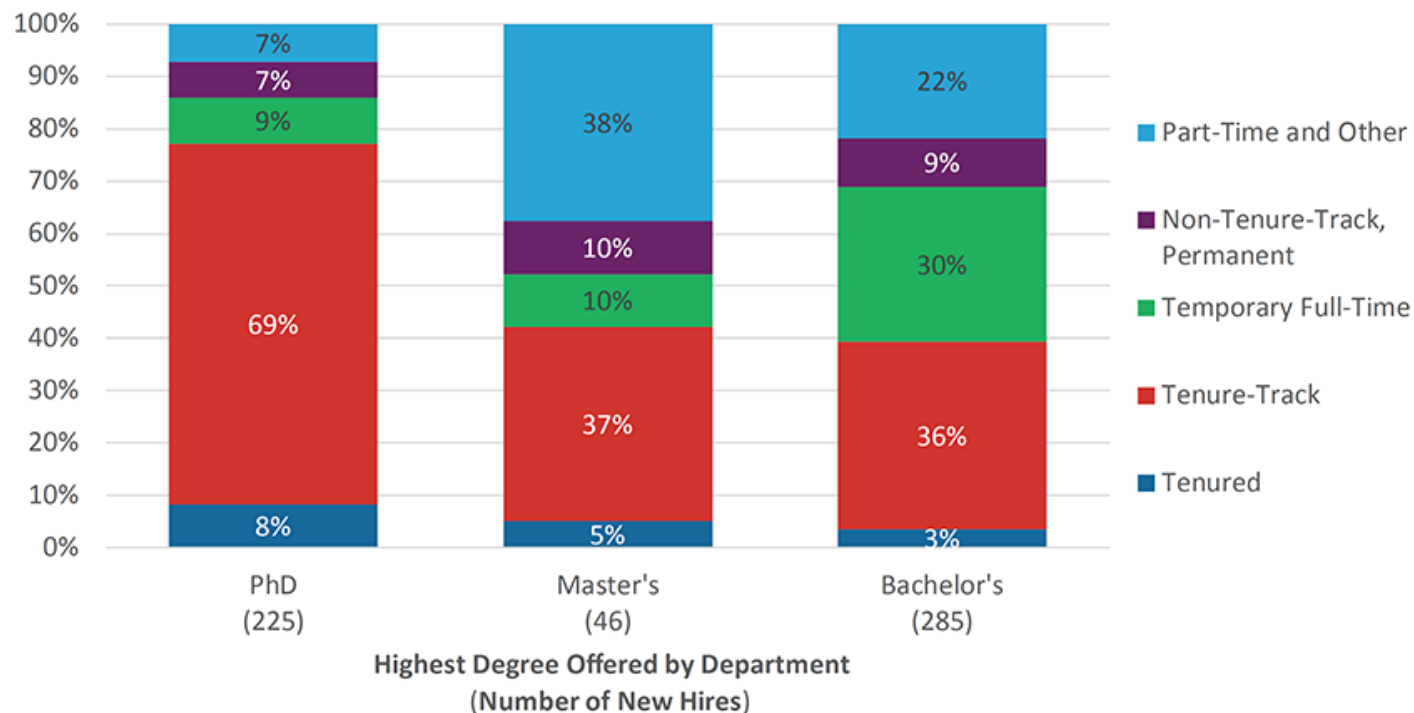
Percentages represent the proportion of physics PhDs who chose “daily,” “weekly,” or “monthly” on a four-point scale that also included “never or rarely.” Data only include US-educated PhDs who remained in the US after earning their degrees. Academia refers to physics PhDs holding potentially permanent positions in two- and four-year colleges or universities and university affiliated research institutes. Figure based on 380 postdocs and 52 potentially permanently employed PhDs in academia.

Scientific Skills and Technical Knowledge Used by New Physics PhDs Holding Postdocs and Potentially Permanent Positions in Academia, Classes of 2015 & 2016 Combined



Percentages represent the proportion of physics PhDs who chose “daily,” “weekly,” or “monthly” on a four-point scale that also included “never or rarely.” Data only include US-educated PhDs who remained in the US after earning their degrees. Academia refers to physics PhDs holding potentially permanent positions in two- and four-year colleges or universities and university affiliated research institutes. Figure based on 380 postdocs and 52 potentially permanently employed PhDs in academia.

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





# Ph.D. Preparation and Satisfaction

Subjective Aspects of Initial Employment for Physics PhDs by Type of Employment,  
Classes of 2015 & 2016 Combined

Percent who felt:	Postdoc (%)	Potentially Permanent (%)	Other Temporary (%)
A physics PhD is an appropriate background for this position.	97	84	80
This position is professionally challenging.	92	84	57
I consider myself underemployed in this position.	17	22	51
Overall, I am satisfied with this position.	85	87	64

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.

## Measurements of Position Satisfaction by Employment Type for Astronomy PhDs, Classes of 2018, 2019, and 2020 Combined

Percent who felt:	Postdoc	Potentially Permanent	Overall
A PhD was an appropriate background for my position	100%	78%	94%
My position is professionally challenging	93%	83%	90%
I consider myself underemployed in my position	6%	22%	12%
Overall, I am satisfied with this position	93%	80%	90%

Respondents were asked to indicate their level of agreement with each statement using a five-point scale that included options such as “very satisfied,” “satisfied,” “somewhat satisfied,” and “not at all satisfied.” Response option wording varied slightly by statement.

## Attitudes Concerning Getting a Physics PhD by Employment Type, Classes of 2015 & 2016 Combined

Would you get your Physics PhD again?	Postdoc (%)	Potentially Permanent (%)	Other Temporary (%)	Unemployed (%)
Yes, at the same institution.	70	58	42	38
Yes, at a different institution.	17	17	20	20
No, I would get a PhD in a different subject.	8	15	15	16
No, I would not get a PhD	6	10	22	27
	100%	100%	100%	100%

Data only include US-educated physics PhDs who remained in the US after receiving their degrees. Figure is based on the responses to the question: "If you had to do it over again, would you still get a PhD in physics?" Columns may not add to 100% due to rounding.

# Discussion/Questions