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focus on

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One Physics Ellipse • College Park, MD 20740 • 301.209.3070 • stats@aip.org

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Physics Doctorates: Skills Used & Satisfaction with Employment

Data from the degree recipient follow-up survey for the classes of 2013 and 2014

Jack Pold and Patrick Mulvey

REPORTS ON PHYSICS DOCTORATES

Physics Doctorates, One Year Later (January 2016)

Physics Doctorates, Initial Employment (March 2016)

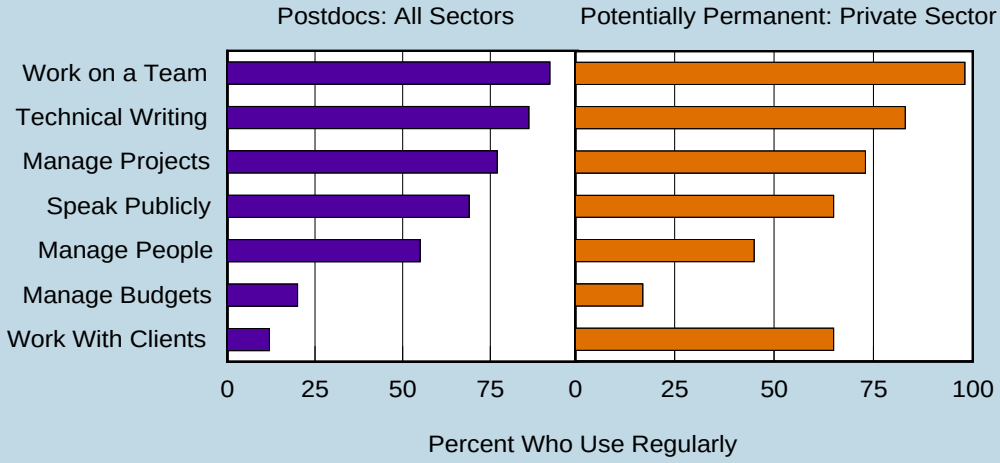
Physics Doctorates, Skills Used & Satisfaction with Employment (July 2016)

The skills and knowledge used by new physics PhDs fall into two main categories: "interpersonal and management" and "scientific and technical". Both PhDs who accepted a postdoc and who held potentially permanent employment in the private sector were very similar in how often they used interpersonal and management skills **(Figure 1)**. An exception to this similarity was that PhDs working in potentially permanent positions in the private sector were considerably more likely to indicate that they "work with clients" than their postdoctoral counterparts.

"Working on a Team" and "Technical Writing" are skills that are regularly used by physics PhDs.

Figure 1

Interpersonal and Management Skills Regularly Used by New Physics PhDs, Classes of 2013 & 2014 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 physics PhDs who remained in the US after earning their degrees. Data are based on the responses of 405 postdocs and 202 physics PhDs working in potentially permanent positions in the private sector.

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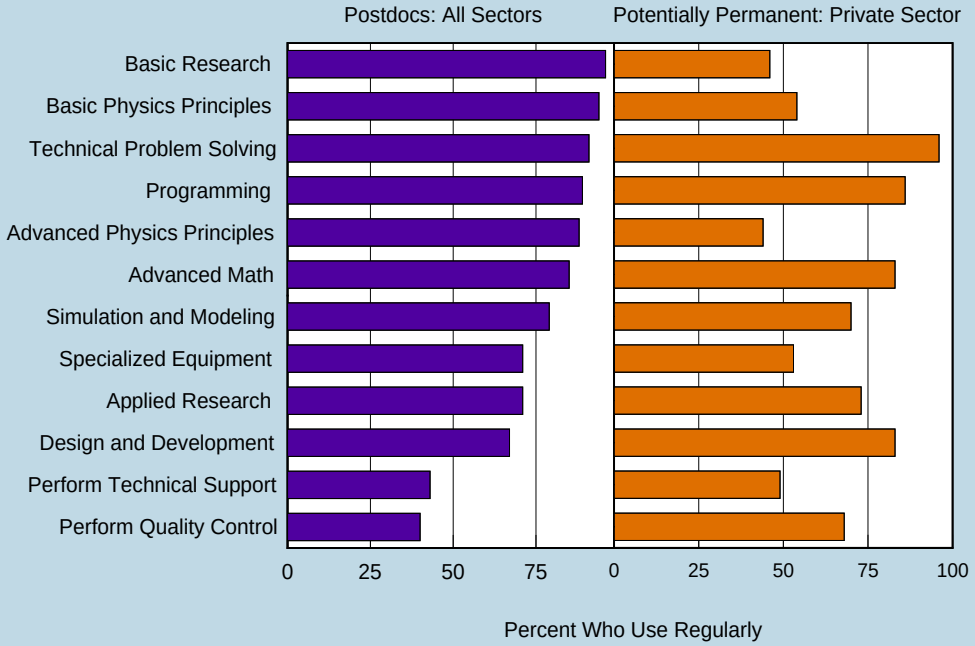
THE 2013 AND 2014 FOLLOW-UP SURVEYS OF PHYSICS DOCTORATES

We contact physics doctorate recipients in the winter following the academic year in which they receive their degrees. They are asked to share both objective and subjective information concerning their employment.

Figure 2

Scientific and Technical Knowledge Regularly Used by New Physics PhDs, Classes of 2013 & 2014 Combined.



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New physics PhDs in postdocs and potentially permanent positions in the private sector heavily rely on programming, technical problem solving skills, and advanced math.

Over three-quarters of PhDs holding postdocs or potentially permanent private sector positions indicated that they regularly used technical problem solving, programming, and advanced math in their positions (**Figure 2**). However, skills used by physics PhDs varied somewhat depending on the positions they held and the sectors in which they were employed. PhD recipients employed in potentially permanent positions in the private sector performed quality control and engaged in design and development more often than their postdoctoral counterparts. In contrast, postdoctoral fellows were more likely to use both basic and advanced physics principles, and engage in basic research. Both groups were equally likely to perform applied research.

Table 1

Qualitative Aspects of Initial Employment for Physics PhDs in the Classes of 2013 & 2014 Combined.

Percent who felt:	Postdoc %	Potentially Permanent %
A physics PhD is an appropriate background for this position.	95	77
I am satisfied with this position.	82	87
This position is professionally challenging.	87	75
I consider myself underemployed in this position.	22	22

The percentages represent the two positive responses on a 4-point scale such as: Very appropriate, Appropriate, Not very appropriate, and Not at all appropriate. Data are based on the responses of 415 postdocs and 293 PhDs in potentially permanent positions.

Data only include US-educated physics PhDs who remained in the US after earning their degrees.

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Both postdocs and potentially permanently employed PhDs indicated high levels of satisfaction with their positions.

About a fifth of physics PhDs reported feeling underemployed.

Physics PhD recipients who accepted a postdoctoral fellowship were more likely to indicate that a physics PhD was an appropriate background for the positions they held than PhDs in potentially permanent positions. They were also more likely to report that their positions were professionally challenging. A similar proportion of both postdocs and PhDs in potentially permanent positions indicated that they considered themselves underemployed in their positions (**Table 1**).

Overall, most new physics PhDs with potentially permanent employment reported they were satisfied with their initial employment.

Table 2

Qualitative Aspects of Initial Employment for Physics PhDs Working in Potentially Permanent Positions, Classes of 2013 & 2014 Combined.

Percent who felt:	Potentially Permanent Employment	
	Academic*	Private Sector
A physics PhD is an appropriate background for this position.	88	75
I am satisfied with this position.	90	87
This position is professionally challenging.	78	73
I consider myself underemployed in this position.	25	20

The percentages represent the two positive responses on a 4-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.

Data are based on responses of 60 PhDs in the academic sector and 202 in the private sector.

*The academic sector includes universities, two- and four-year colleges, and university affiliated research institutes (UARIs). The most common job titles in this group were "assistant professor," "professor" and "research associate," who were mostly employed in two- and four-year colleges.

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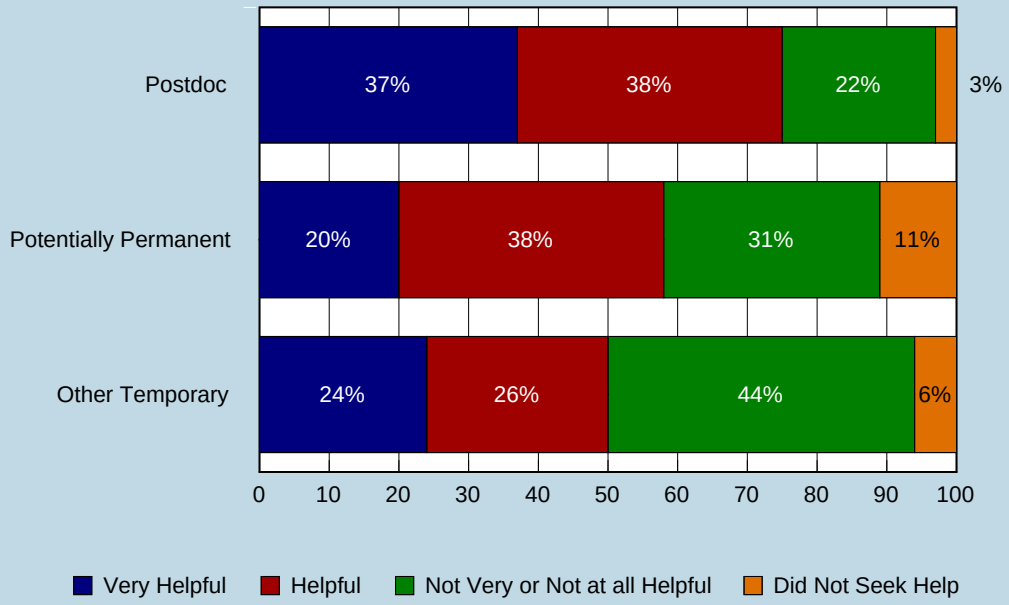
Physics PhDs in potentially permanent positions were employed in a variety of sectors of the economy. PhDs with potentially permanent employment in the academic sector were more likely to report that a physics PhD was an appropriate background for their position than PhDs with potentially permanent employment in the private sector. A similar proportion of the potentially employed PhDs in the academic and private sectors considered themselves underemployed (**Table 2**).

Figure 3

"Was Your Advisor Helpful in Your Career Planning?"
PhD Classes of 2013 & 2014 Combined.



Data only include US-educated physics PhDs who remained in the US after earning their degrees. Figure is based on the responses of 422 postdocs, 297 PhDs in potentially permanent positions, and 88 PhDs in "other temporary positions."

"Other temporary positions" include PhDs who indicated they were in non-permanent positions such as visiting professor, sabbatical replacement, lecturer, and research scientist.

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As a group, the PhDs in other temporary positions had the lowest proportion reporting that their advisor was helpful in planning for their career.

Advisors play a key role in the experience of physics PhDs, and a positive interaction between the two can be helpful as new doctorates transition into the workforce (**Figure 3**). Three-quarters of postdocs and more than half of potentially permanently employed physics PhDs reported that their advisors were helpful in their career planning.

It is not surprising that PhDs in postdoctoral positions reported the highest levels of helpfulness from their advisors. In many cases, faculty have more established contacts with other universities and government labs (who often employ postdocs) than they do with industry.

The vast majority of postdocs feel that their positions give them valuable knowledge and skills for their future pursuits.

Table 3

Opinions about the Postdoc Experience, PhD Classes of 2013 & 2014 Combined.

	Percent agreeing with the statement:
I feel the knowledge and skills I was developing in my postdoc will be valuable in my future career pursuits.	92%
I was pleased with the amount of mentoring I was receiving.	82%

The percentages represent the two positive responses on a 4-point scale: Strongly agree, Agree, Disagree and Strongly disagree. Data only include US-educated physics PhDs who remained in the US after earning their degrees. Data are based on the responses of 415 postdocs.

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When asked about their postdoctoral experience, the majority of postdocs responded positively in regards to the amount of mentoring they received and the knowledge and skills they were developing through their postdoctoral fellowships. The vast majority (92%) of postdocs said that they felt that the skills they were obtaining through their fellowships would be helpful in their future careers (**Table 3**). US and non-US citizens reported similar levels of both satisfaction with the skills they were gaining and the amount of mentoring they were receiving.

Table 4

Attitudes Concerning Getting a Physics PhD, Classes of 2013 & 2014 Combined.

Would you get your physics PhD again?	US Citizens %	Non-US Citizens %	Overall %
Yes, at the same institution	72	51	64
Yes, at a different institution	13	24	17
No, I would get a PhD in a different subject	7	17	11
No, I would not get a PhD	8	8	8
	100%	100%	100%

Data only include US-educated physics PhDs who remained in the US after earning their degrees. Figure is based on the responses of 488 US citizens and 293 non-US citizens to the question "if you had to do it over again, would you still get a PhD in physics?"

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US citizens were more likely than non-US citizens to indicate that they would repeat their physics PhD experiences.

The majority (64%) of physics PhDs indicated that they would repeat getting their physics PhD at the institution from which they received their doctorates. US citizens were more likely than non-US citizens to indicate that they would repeat the physics PhD process at the same institution. If given the opportunity to do it over again, non-US citizens were more likely to indicate that they would pursue a physics PhD at a different institution (24%) or that they would pursue a PhD in a different subject (17%).

Survey Methodology

Each fall the Statistical Research Center conducts its Survey of Enrollments and Degrees, which asks all degree-granting physics and astronomy departments in the US to provide information concerning the number of students they have enrolled and the counts of recent degree recipients. In connection with this survey, we ask for the names and contact information for their recent degree recipients. This degree recipient information is used to conduct our follow-up survey in the winter following the academic year in which they received their degrees. The data in the *focus on* comes from that follow-up survey.

Recent degree recipients can be very difficult to reach because they tend to move after receiving their degrees. Additionally, many departments do not provide or don't have accurate contact information for their alumni. To assist us in determining outcome information and to help obtain updated contact information, we contact the advisors of non-responding degree recipients when possible.

The follow-up surveys for the classes of 2013 and 2014 were administered in a web-based format. Non-responding doctorates were contacted up to four times with invitations to participate in the survey. The physics PhD classes of 2013 and 2014 consisted of 1,743 and 1,803, respectively. We received post-degree information on about 48% of these degree recipients. About 54% of these responses came from PhD recipients themselves, while the other 46% came from advisors. The information obtained from advisors is limited to subfield of dissertation, US citizenship, sex, employment status, sector of employment, and location (in or out of the US). PhDs who left the US after receiving their degrees were not included in the analysis.

We thank the many physics and astronomy departments, degree recipients, and faculty advisors who made this publication possible.

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