AIP American Institute of Physics

focus on

A publication of the AIP Statistical Research Center
www.aip.org/statistics

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October 2011

Physics Doctorates: Skills Used & Satisfaction with Employment

Data from the degree recipient follow-up survey for the classes of 2007 and 2008

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REPORTS ON PHYSICS DOCTORATES

Physics Doctorates, One Year Later (November 2010)

Physics Doctorates, Initial Employment (June 2011)

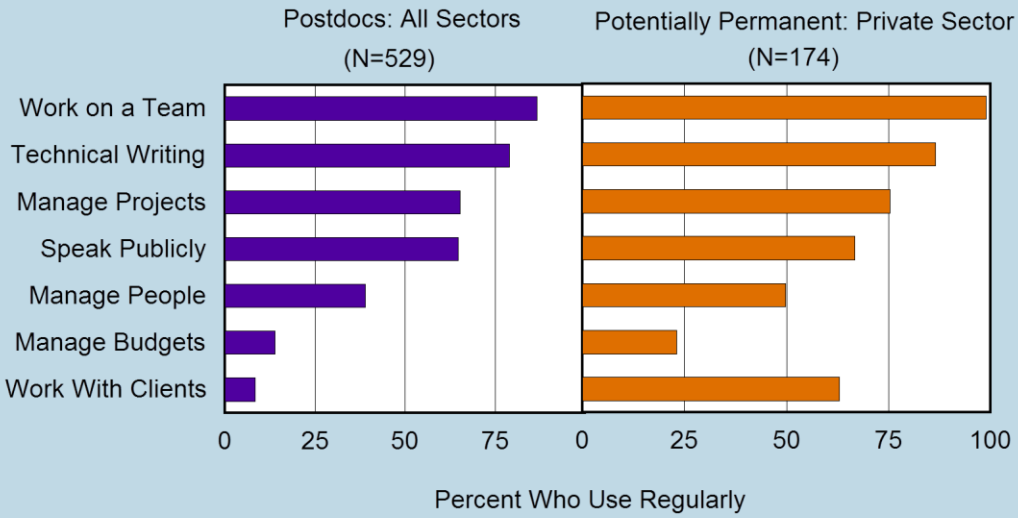
Physics Doctorates, Skills Used & Satisfaction with Employment (October 2011)

The skills used by new physics PhDs in their first positions can vary greatly depending on their type of employment. There are also skills that are universally used regardless of the type of employment or sector of economy in which new PhDs find themselves.

The skill sets that new PhDs use fall into two main categories: "Scientific and Technical Knowledge" and "Interpersonal and Management." By the nature of the subject matter, acquiring certain technical skills comes as function of a physics education. But, interpersonal and management skills are not necessarily taught or acquired as part of earning a physics PhD.

Figure 1

Interpersonal and Management Skills Regularly Used by New Physics PhDs, Classes of 2007 and 2008 Combined.



Note: 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 are limited to PhDs who earned their degrees from a US institution and remained in the US.

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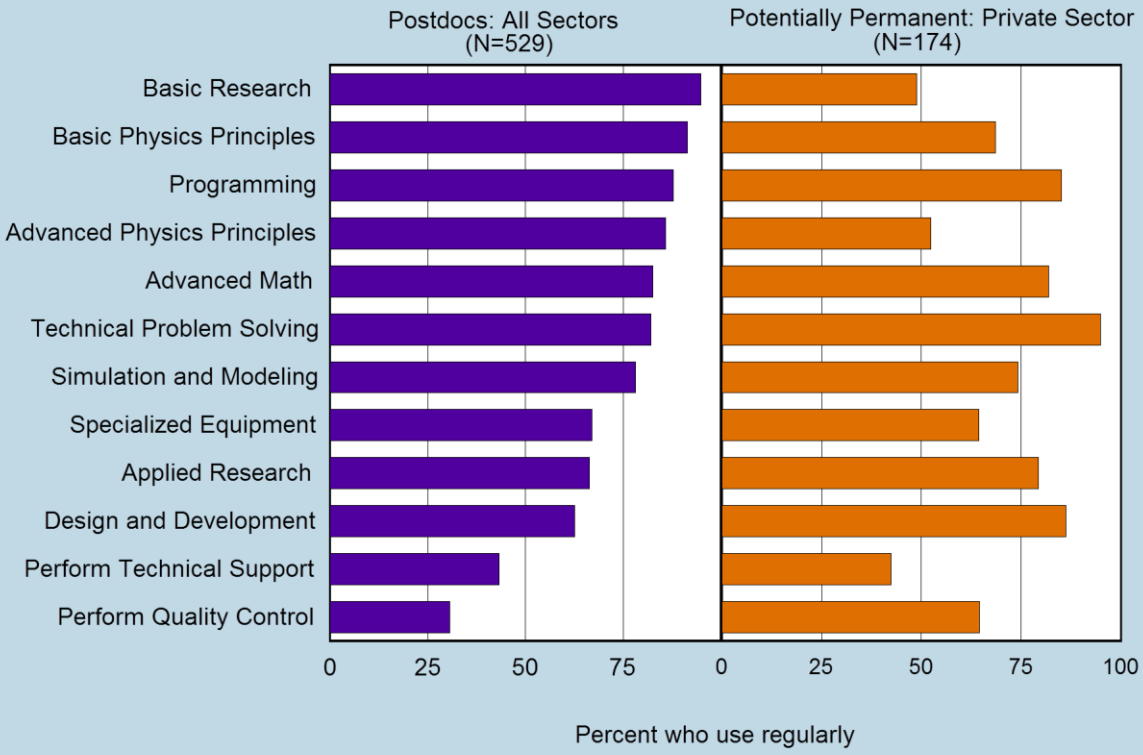
"Working on a Team" and "Technical Writing" are skills that are required of physics PhDs regardless of the type of employment they secure.

THE 2007 AND 2008 FOLLOW-UP SURVEYS OF PHYSICS DOCTORATES

Physics doctorate recipients were contacted in the winter following the academic year in which they received their degree.

Figure 2

Scientific and Technical Knowledge Regularly Used by New Physics PhDs, Classes of 2007 and 2008 Combined.



Note: Percentages represent the proportion of physics PhDs who chose "daily", "weekly" or "monthly" on a four-point scale that also included "never or rarely".

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Programming and technical problem solving skills are heavily relied upon by new physics PhDs regardless of initial career path.

There is a certain uniformity in work environment for new physics PhDs holding postdocs. Typically they are employed at a university or government facility doing physics research. These positions provide the opportunity to further develop their basic research skills and they use both advanced and basic physics principles. Many of these postdocs are continuing in the research area of their PhD, while some are using the opportunity to explore other areas.

The private sector employs well over half of the new PhDs who accepted potentially permanent positions and although they use many of the same skills as postdocs, there are some clear differences. As seen in **Figure 1**, well over half of the PhDs holding potentially permanent private sector positions have direct contact with clients. These private sector companies are involved in developing and selling products or services, and as a result, the PhDs are more focused on applied research and product design and development.

The data presented in Figure 1 and Figure 2 depict group norms for two common career paths. Clearly some of the skills and knowledge categories listed are used to some extent by virtually all new PhDs, regardless of position. Other skills and knowledge categories are typically used less frequently and vary by type of employment and work environment.

The data reported are the aggregate responses. Between any two positions, even with very similar occupations, the interpersonal and management skills that are required can vary greatly. The same is true for the types of scientific and technical knowledge that an individual may be called upon to use. Every job is different and different individuals bring something distinct to the positions they hold. What is required of them and what they bring to a position can vary greatly from what is typical.

New PhDs who are interested in working in a particular sector or field and whose skill set and scientific knowledge areas differ from what is typical for that position can still succeed in that employment situation. When communicating with potential employers, new PhDs should stress the knowledge and skill sets that they have. They should consider highlighting the ones that are consistent with the data depicted in Figures 1 and 2.

Table 1

Qualitative Aspects of Initial Employment for Physics PhDs in the Classes of 2007 & 2008 Combined.

Percent agreeing with statement:	Type of Employment: All Sectors	
	Postdoc %	Potentially Permanent %
A physics PhD is an appropriate background for this position.	96	84
I am satisfied with this position.	85	83
This position is professionally challenging.	86	70
I consider myself underemployed in this position.	23	32
Number of respondents:	522	277

Note: The percentages represent the two positive responses on a 4-point scale: Very appropriate, Appropriate, Not very appropriate and Not at all appropriate.

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Overall, new physics PhDs felt positive about their employment.

Qualitative aspects of employment are very subjective and individuals who were generally unhappy with their employment answered many of the subjective questions reflecting that dissatisfaction. New PhDs were asked if they considered themselves underemployed. A notable proportion of both potentially permanent employed doctorates and postdocs indicated they felt underemployed. Postdocs who indicated they took the position because "other suitable employment was not available" and those who were not pleased with the amount of mentoring they received were more likely to report that they felt underemployed.

Regardless of the type of employment they held, non-US citizens were more likely than US citizens to feel underemployed. PhDs with potentially permanent employment in a field other than physics were also more likely than those in physics, to rate the qualitative aspects of their employment less favorably.

While there is considerable uniformity concerning satisfaction levels among postdocs, differences appear among new PhDs accepting potentially permanent positions. New PhDs holding potentially permanent positions in academia generally reported higher levels of satisfaction with their positions than PhDs working in government or the private sector. This may be related to the fact that the academically employed are more likely to work in physics than are their colleagues in government and the private sector.

Table 2

Qualitative Aspects of Initial, Potentially Permanent Employment for Physics PhDs, Classes of 2007 & 2008 Combined.

Percent agreeing with the statement:	Potentially Permanent Employment		
	Academic*	Private Sector	Government
A physics PhD is an appropriate background for this position.	97	81	79
I am satisfied with this position.	94	80	88
This position is professionally challenging.	79	70	74
I consider myself underemployed in this position.	20	33	27
Number of respondents:	69	178	30

Note: The percentages represent the two positive responses on a 4-point scale: Very appropriate, Appropriate, Not very appropriate and Not at all appropriate.

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*The academic sector includes universities and university-affiliated research institutes (URI's).

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Overall, PhDs responded positively concerning different aspects of their employment regardless of sector of employment.

Table 3

Opinions About the Postdoc Experience, PhD Classes of 2007 & 2008 Combined.

Percent agreeing with the statement:	Men	Women	All
I feel the knowledge and skills I was developing in my postdoc will be valuable in my future career pursuits.	94	94	94
I was pleased with the amount of mentoring I was receiving.	81	71	79
Number of respondents:	435	104	546

Note: The percentages represent the two positive responses on a 4-point scale: Strongly agree, Agree, Disagree and Strongly disagree.

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A postdoctoral experience was felt to be a valuable asset for future career pursuits.

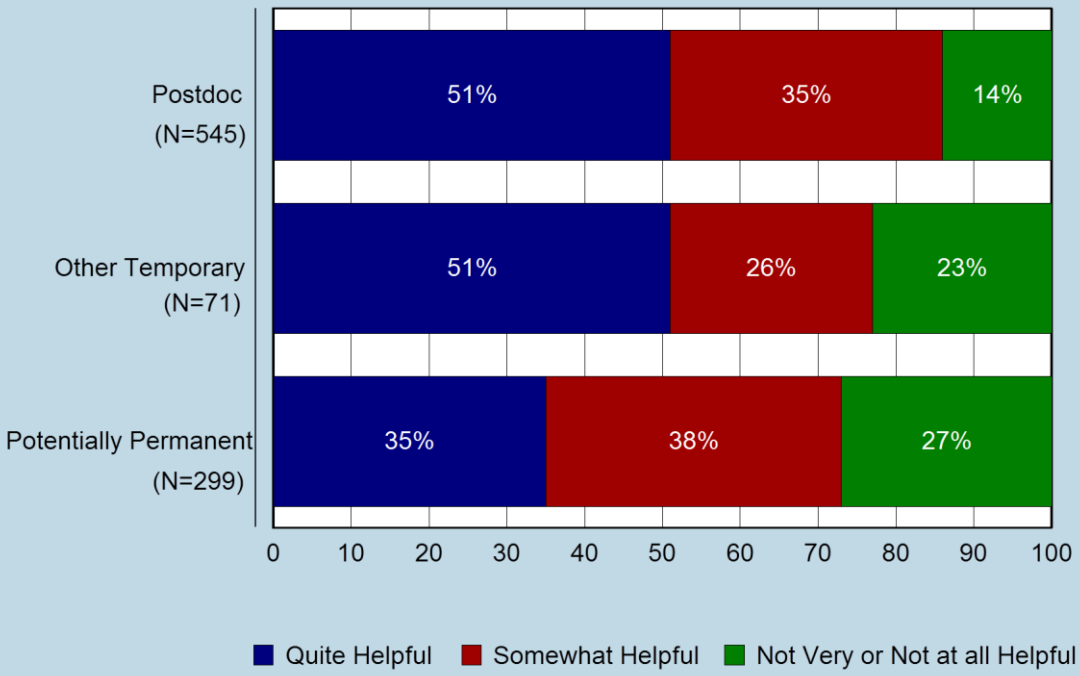
Over half (56%) of physics PhDs from the classes of 2007 and 2008 combined accepted a postdoc upon earning their PhD. A postdoc is meant to be a temporary period of mentored training, providing an opportunity to develop research independence and professional skills. With this in mind, we asked postdoc holders to what extent they agreed or disagreed with statements concerning their postdoc experience. Over three-quarters were pleased with the amount of mentoring they received. Men reported having a greater level of satisfaction with the amount of mentoring they received than women. The vast majority of postdoc holders felt their postdoc experience would be valuable in terms of furthering their careers.

PhDs who accepted postdocs and other temporary positions were more likely to indicate that their advisors were quite helpful in career planning than new doctorates accepting potentially permanent positions. Similar to postdocs, the majority of new PhDs holding other temporary positions are working in academia, many of whom are holding visiting professor or lecturer positions.

Both non-US citizens and US citizens (82% and 77% respectively) felt that their advisors were quite helpful or somewhat helpful in planning their careers, but non-US citizens rated their advisor "quite helpful" more often than US citizens (56% vs. 34%).

Figure 3

"Was Your Advisor Helpful in Your Career Planning?", PhD Classes of 2007 & 2008 Combined.



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Overall, 79% of the PhDs who entered the US job market felt their advisor was "Quite" or "Somewhat" helpful in career planning.

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 numbers of students they have enrolled and 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 this *focus on* come from that survey.

Recent doctorate recipients can be difficult to reach because they tend to relocate after receiving their degrees. The departments often 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.

The follow-up surveys for the classes of 2007 and 2008 were administered in a web-based format. Non-responding degree recipients were contacted up to four times with invitations to participate in the survey by both email and letter. The physics PhD classes of 2007 and 2008 consisted of 1,460 and 1,499 PhDs, respectively. We received post-degree information on 54% of these degree recipients. Thirty-one percent of our responses came from advisors, and the remainder came from the PhD recipients themselves. The information obtained from the advisors is limited to subfield of dissertation, citizenship, sex, employment status, sector of employment, and location (in or out of the US). PhDs who left the US after receiving their degrees are not included in the analyses.

In this *focus on*, "N" refers to the number of respondents that contributed.

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