Physics Doctorates: Initial Employment
Data from the degree recipient follow-up survey for the classes of 2015 and 2016

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Physics PhDs receive training in both general physics principles and methods, as well as the specific subject matter of their dissertation. Through this process they become experts in how to conduct research, think critically, solve problems, and advance knowledge in their area of research. This combination of skills and knowledge opens a wide spectrum of employment opportunities for new degree recipients. This focus on shows the different employment choices that new physics PhDs made while securing employment in a variety of fields and work environments. It will also examine how long-term career goals help shape the initial positions that PhDs accept.

We categorized the types of employment new physics PhD recipients pursue into three groups: potentially permanent positions, postdoctoral fellowships (postdocs), and other temporary positions. While postdocs and other temporary positions have a set end date, potentially permanent positions do not.

Almost half (47%) of physics PhD recipients in the combined classes of 2015 and 2016 held a postdoc in the winter following the year they received their PhD (Figure 1). Postdocs are temporary positions with a defined period of mentored training in research where individuals acquire professional skills and research independence. Forty percent of the new PhDs were working in potentially permanent positions. The least common initial post-degree employment category, other temporary positions (7%), are similar to postdocs in that they have a specified ending date and tend to be concentrated in academic settings but are more focused on teaching. Additionally, some recent PhDs (6%) indicated that they were unemployed and seeking a job in the winter following receiving their degree.
The tables and figures in this *focus on* represent physics PhDs who received their PhD from a US institution and were residing in the US in the winter following the academic year in which they received their degree. For the combined classes of 2015 and 2016, non-US citizens comprised 47% of the physics PhDs conferred. Our survey response data indicates that 9% of US citizens and 19% of non-US citizens left the US after receiving their doctorates. The most common type of initial employment for both US and non-US citizens that left the US was a postdoctoral fellowship.
Some clear and consistent patterns in sector of employment appear when we take a closer look at the sector of employment type. Postdocs were predominantly (75%) employed in academia. Most of the remaining postdocs were employed in the government sector, and many of these were at national laboratories (Table 1). Almost half of all the postdocs were two-year appointments; about a third were three-year appointments. Most of the remaining postdocs were one year in length.

The majority (73%) of new physics PhDs that held potentially permanent positions were working in the private sector. These positions were spread across the for-profit sector, spanning small startup companies to the largest corporations. About 1 in 6 of the new PhDs holding potentially permanent positions were employed in an academic setting. Many of these positions had job titles such as assistant professor or lecturer.

Like postdocs, PhDs holding other temporary positions were primarily (70%) employed in academia. These positions often came with the title of visiting professor or guest lecturer. The majority (60%) of these positions were one year in length. These other temporary academic
positions provide valuable teaching experience for PhDs hoping to continue their careers teaching in a college or university setting.

**Figure 2**

Employment Field of New Physics PhDs, Classes of 2015 & 2016 Combined

<table>
<thead>
<tr>
<th>Employment Field</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employment in physics - same subfield</td>
<td>12</td>
</tr>
<tr>
<td>Employment in physics - different subfield</td>
<td>19</td>
</tr>
<tr>
<td>Employment in other fields</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other Fields</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computer software</td>
<td>23</td>
</tr>
<tr>
<td>Engineering</td>
<td>14</td>
</tr>
<tr>
<td>Business or finance</td>
<td>11</td>
</tr>
<tr>
<td>Other sciences</td>
<td>9</td>
</tr>
<tr>
<td>Education</td>
<td>3</td>
</tr>
<tr>
<td>Medical services</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>5</td>
</tr>
</tbody>
</table>

Note: Employment in physics means an individual's primary or secondary employment field was in physics or astronomy. Data includes only US-educated PhDs who remained in the US after earning their degrees.

There is a relationship between the type of employment a new physics PhD holds and whether they were working in the field of physics (Figure 2). Almost 90% of physics PhDs in postdoctoral fellowships were working in the field of physics, with the majority working in their dissertation subfield. In contrast, only about a third of the physics PhDs who were employed in potentially permanent positions were working in the field of physics. The most common non-physics employment field for this group was computer software, with almost a quarter of the potentially permanently employed working in the field. Engineering and business or finance comprised most of remaining non-physics fields that the physicists in potentially permanent positions held.

For more insight into the types of potentially permanent positions accepted by new physics PhDs, visit AIP’s Statistical Research Center’s resource “Who’s Hiring Physics PhDs?” The data for the resource pulls together 5 years of PhD follow-up survey responses, dividing them into 10
self-identified fields of employment. It provides the names of the employers that hired new physics PhDs to work in fields such as engineering, business, physics, computer software and hardware, etc. The employer name listings include links to the company’s websites. The resource includes the starting salary ranges, job titles, and skills used for each field.

Figure 3

Starting Salaries for New Physics PhDs, Classes of 2015 & 2016 Combined

Data represents only US-educated PhDs who remained in the US after earning their degrees. 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. 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 (214) and in universities and 4-year colleges (30), postdocs in government labs (78) and universities and UARIs (257), and “other temporary positions” in universities and 4-year colleges (24).
Starting salaries for physics PhDs differ based on type of position accepted and sector of employment (Figure 3). Those employed in potentially permanent positions in the private sector typically had significantly higher starting salaries than the other employment types, with a median of $105,000 and a very wide range. The median starting salary for physics PhDs working in potentially permanent university and 4-year college positions was $58,000. About 60% of these academic positions were for 9-10 months of work.

There was considerable difference between the postdoc salaries being offered by government labs and universities. Physics PhDs that accepted a postdoc at a government lab had a median salary of $68,500, whereas PhDs with postdocs at universities (the sector employing the largest number of postdocs) had a median salary of $50,000. PhDs that accepted other temporary positions in academia also had a median starting salary of $50,000.

New doctorates were asked what employment sector they hoped to be working in 10 years in the future (Figure 4). A position in an academic setting was the most frequently cited, with 42% indicating it as their desired future sector. A smaller proportion (38%) indicated they aspired to a future position in the private sector. Fifteen percent were hoping to be employed by the government, most of these indicating the desire to work at a national laboratory. A similar proportion of men and women aspired to work in the academic and government sectors 10 years in the future. However, men were more likely to have a long-term desire to work in the private sector than women. Although hospitals and nonprofit companies represented a small proportion of the sectors that PhDs identified as having a long-term desire to work in, women were more likely than men to aspire to such positions.
The type of initial employment position a new physics PhD accepts is likely the result of a number of factors. The decision may be influenced by professional goals, personal circumstances, and available positions. When those who accepted postdocs were asked why they accepted a postdoc, the most frequently cited reason was that it is a “necessary step to get a future position.”
Looking at future career goals of new physics PhDs by the type of initial employment they accepted shows some clear patterns (Figure 5). New physics PhDs that had a desire to be working in academia or for the government in 10-years’ time were three-and-a-half times more likely to have accepted a postdoc as their first post-PhD position than those hoping to be working in the private sector. This is understandable, as successfully completing a postdoc is typically seen as a prerequisite for such a position, especially at research universities.

Physics PhDs with a desire to be working in the private sector in the future were far more likely to have accepted a potentially permanent position as their first post-degree position, with most of these positions already located in the private sector. Overall, the employment sectors that new physics PhDs were currently working in closely reflected the sector in which they hoped to be working in the future.

The AIP Statistical Research Center has also published other reports on Physics PhD employment. Please visit https://www.aip.org/statistics/employment/phds for further reading on the topic.
Survey Methodology

Each fall the Statistical Research Center conducts a 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 counts of recent degree recipients. At the same time, we ask for the names and contact information for recent degree recipients. This degree recipient information is used to conduct our follow-up survey in the winter following the academic year in which respondents received their degrees. The post-degree outcome data in this focus on come from that survey.

Recent degree recipients can be difficult to reach because they tend to relocate after receiving their degrees. Departments often do not provide or do not 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 information obtained from the advisors is limited to citizenship, gender, employment status, sector of employment, location (in or out of the US), and subfield of dissertation for the PhDs.

The follow-up surveys for the classes of 2015 and 2016 were administered in a web-based format. Those who did not respond were contacted up to five times with invitations to participate in the survey. The physics PhD classes of 2015 and 2016 consisted of 1,860 and 1,819 individuals, respectively. We received post-degree information on 44 percent of these degree recipients. Sixty-five percent of these responses came from the PhD recipients themselves, while the other 35 percent came from advisors. 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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