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focus on

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Trends in Exiting Physics Master's

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REPORTS ON ENROLLMENTS AND DEGREES

Trends in Exiting Master's Degrees (March 2014)

Trends in Physics PhDs (February 2014)

Largest Graduate Physics Departments (*Forthcoming*)

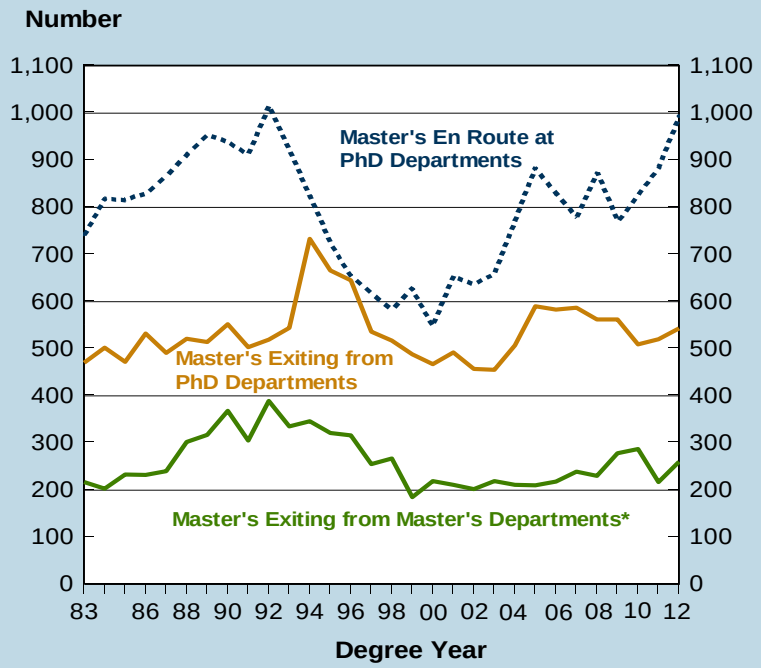
A physics master's degree provides the recipient with a variety of career options. Some master's recipients will continue their education at the graduate level in physics or another field, where others enter the workforce pursuing a wide range of employment opportunities.

This *focus on* provides an in depth analysis of physics master's production in the U.S. It presents detailed trends on the number of physics master's awarded in the U.S. including data on citizenship, women, and minorities.

In the academic year 2011-12, there were 257 departments in the U.S. conferring graduate physics degrees. Of these, 62 offer a master's as their highest degree.

Figure 1

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.**

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THE SURVEY OF ENROLLMENTS AND DEGREES

Degree-granting physics departments are contacted each fall and asked to provide the number of degrees they conferred the previous year.

THE FOLLOW-UP SURVEY OF PHD RECIPIENTS

Degree recipients are contacted in the winter following the academic year in which they received their degree.

Figure 1 presents trend data for two types of physics master's degrees: en route and exiting. A master's en route is an interim degree awarded to a student who is continuing on at the same PhD-granting department to pursue a physics doctorate. In recent years, the majority of physics master's degrees awarded in the U.S. were en route degrees. Not all physics PhD recipients receive an en route master's degree. This report's focus is on exiting master's degrees.

Departments that offer the master's as their highest physics degree averaged 4.1 exiting master's per year for the classes of 2010, 2011, and 2012 combined, where the doctoral-granting departments averaged 2.7 exiting master's.

For the purposes of this report exiting physics master's degrees include degree recipients who left their current physics department with a master's. Some exiting master's will continue their graduate education in a different department at the same institution or at a different institution, possibly in physics. In the academic year 2011-12, exiting master's degree were awarded at 62 physics departments where the master's was their highest degree offered and at nearly all of the 195 physics departments that offer a PhD.

A total of 801 exiting master's were awarded in the class of 2012, 68% of them were awarded at PhD-granting physics departments. Two doctoral-granting physics departments are at military academies: Naval Postgraduate School (CA) and the Air Force Institute of Technology (OH). These two departments have very specialized master's programs that traditionally award a large number of degrees. They were responsible for conferring 5% of all exiting physics master's degrees in the class of 2012.

Recent increases in in the number of individuals receiving a master's en route degree foretell of future increases in the number of physics PhDs awarded.

Exiting master's degrees are varied in the type of academic preparation they provide. Some exiting master's degrees are similar to a master's en route while others are designed to prepare individuals to enter the workforce. A master's program may be designed to prepare individuals for a career in education while others have features that provide graduates with the necessary skills for a career in industry, government, or nonprofit organizations. These career-focused master's programs exist at both PhD-granting departments and more frequently at departments where the master's is the highest physics degree offered. Many departments, regardless of the highest degree they offer, have a variety of master's programs in which students can enroll.

A *focus on* describing the career paths physics master's follow can be found on the statistical research center's website: www.aip.org/statistics.

Exiting master's from the combined classes 2010, 2011, and 2012 consisted of 23% women and 32% non-U.S. citizens. The non-U.S. citizens comprise a smaller proportion of exiting physics master's than they do among physics PhDs which averaged 49% non-U.S. citizens during the same 3-year period. Conversely for the combined classes of 2010, 2011, and 2012, the representation of women (23%) was higher among exiting master's than for PhD recipients (19%).

The average age for exiting master's was 28.9 with about 10% over the age of 35. Exiting master's who were U.S. citizens had a higher average age then the non-U.S. citizens, 29.2 and 28.0 respectively. In light of the fact that a physics master's can be earned in two to three years, the age data suggest that many of them may have been in the workforce before starting graduate school.

Table 1

Demographic Characteristics of Exiting Physics Master's, Classes of 2010, 2011 & 2012 Combined.

Sex	Male	77%
	Female	23%
Citizenship	U.S.	68%
	Non-U.S.	32%
Average Age		28.9

Note: Exiting physics master's are individuals who upon receiving their degrees leave their current departments. They include graduates from departments where the master's is the highest degree offered as well as master's leaving departments that offer a PhD.

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About 10% of exiting physics master's were over the age of 35.

Table 2

Education Characteristics of Exiting Physics Master's, Classes of 2009, 2010 & 2011 Combined.

Field of bachelor's degree:	%
Physics	81
Engineering	11
Astronomy	2
Other	6

Did exiting master's have a specific research field or specialty?	%
Yes	67
No	33

Of those with a research specialty	%
Condensed Matter	13
Applied Physics	11
Astronomy	9
Materials Science	8
Medical Science	6
Nuclear Physics	6
Optics	6
Particles and Fields	6
Other	35

Note: Exiting physics master's are individuals who upon receiving their degrees leave their current departments. They include graduates from departments where the master's is the highest degree offered as well as master's leaving departments that offer a PhD.

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Almost a fifth of exiting physics master's received their undergraduate degree in a field other than physics.

A large majority of exiting physics master's (81%) received a bachelor's degree in physics with a significant proportion (11%) coming into the field after studying engineering as undergraduates. About 40% of the non-U.S. citizens receiving an exiting physics master's indicated that they had completed some physics graduate study outside the U.S. prior to enrolling in a U.S. physics program.

Two-thirds of the exiting physics master's had a research field or specialty in connection with their degree.

Many physics departments give physics master's recipients the opportunity to focus on a specific research field or specialty. About two-thirds of the exiting master's reported having had a specific research focus in connection with their degrees with the remainder earning a master's degree in general physics. Condensed matter was the most frequently cited research specialty but many exiting master's indicated a variety of research specialties in applied areas of physics.

African Americans and Hispanic Americans continue to be under-represented among exiting physics Master's when compared to 25-34 year olds in the U.S. population.

Historically Black Colleges and Universities (HBCUs) continue to play an important role in awarding exiting physics master's degrees to African Americans. There are 31 HBCUs that offer a physics degree; 4 of them offer a PhD and 6 offer a master's as their highest degree. These 10 departments with graduate programs represent 4% of all graduate physics programs (257) but were responsible for awarding about half of the physics master's degrees earned by African Americans in the classes of 2010 through 2012 combined.

Table 3

Race and Ethnicity of Exiting Physics Master's, Classes of 2010, 2011 & 2012 Combined.

	3-Yr Average Number	Percent* of all Physics Master's	Percent of U.S. Physics Master's**
White	450	58	86
Asian American	26	3	5
Hispanic American	27	3	5
African American	18	2	3
Other U.S. Citizens	6	1	1
Non-U.S. Citizens	250	32	-
Total	777	100%	100%

Note: Exiting physics master's are individuals who upon receiving their degrees leave their current departments. They include graduates from departments where the master's is the highest degree offered as well as master's leaving departments that offer a PhD.

*** Percents for all master's do not add to one hundred due to rounding.**
****Based on a three year average of 527 U.S. citizens.**

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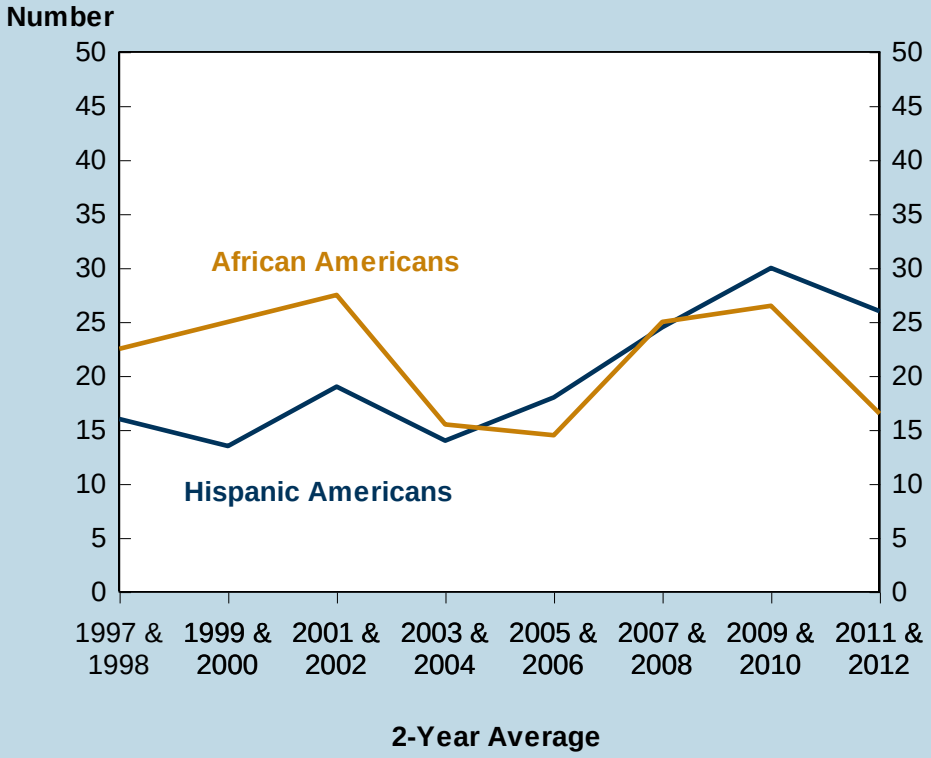
African Americans and Hispanic Americans continue to be under-represented among exiting physics master's.

Figure 2

Number of Exiting Physics Master's Earned by African Americans and Hispanic Americans, Classes of 1997 through 2012.



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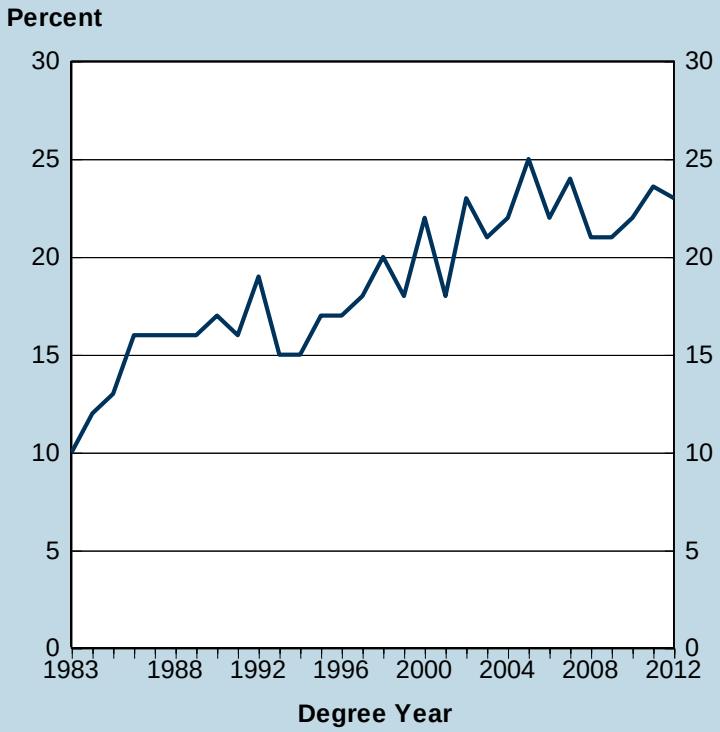
The number of Hispanic Americans receiving exiting physics master's degrees is significantly higher than a decade ago.

The number of African Americans and Hispanic Americans receiving exiting physics master's degrees is small. Because the number of degrees conferred from year to year fluctuates considerably, the data in Figure 2 is presented using 2-year averages. During the last 10 years there has been an increase in the number of Hispanic Americans receiving exiting master's degrees. Similar gains have not been seen in the number of African Americans receiving exiting master's degrees.

The proportion of exiting physics master's degrees earned by women has fluctuated between 21 and 25 percent for the past decade. Although there has not been a recent change, the representation of women among physics master's increased significantly during the 1980's and 1990's.

Figure 3

Percent of Physics Master's Earned by Women, 1983 through 2012.



Note: Exiting physics master's are individuals who upon receiving their degrees leave their current departments. They include graduates from departments where the master's is the highest degree offered as well as master's leaving departments that offer a PhD.

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The proportion of exiting physics master's degrees earned by women has stayed relatively unchanged for the last decade.

Appendix 1. Exiting Physics Master's Degrees Conferred, Academic Years 2002-2012.

Academic Year	Total Exiting Master's	Highest Physics Degree Offered by Department	
		Master's-granting	PhD-granting
2002-2003	672	218	454
2003-2004	716	210	506
2004-2005	798	209	589
2005-2006	799	217	582
2006-2007	824	238	586
2007-2008	790	229	561
2008-2009	838	277	561
2009-2010	794	286	508
2010-2011	735	216	519
2011-2012	801	259	542

Exiting master's are students who left their current departments with master's degrees.

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About the Surveys

Survey of Enrollments and Degrees

Each fall the Statistical Research Center conducts its Survey of Enrollments and Degrees. The survey is sent to all degree-granting physics and astronomy departments in the U.S. and Puerto Rico and asks them to provide the number of degrees they conferred in the previous academic year. We define the academic year as being from September to August.

In the academic year 2011-12 there were 257 departments with physics graduate programs and we received responses from 95% of these departments. Estimates were derived and included in the totals for non-responding departments.

Data from this survey are also used to produce the "Roster of Physics Departments," which provides a department-level enrollment and degree snapshot for each academic year. The most recent roster can be found on our website at: http://www.aip.org/statistics/trends/reports/physrost.pdf

Follow-Up Survey

The annual AIP follow-up surveys are conducted in the winter following the academic year in which students earn their degrees. The academic year is defined as being from September to August.

Data from the follow-up surveys of the exiting physics master's classes of 2009, 2010, and 2011 were used to calculate age in Table 1 and the education characteristics for Table 2. These classes consisted of 838, 794 and 735 exiting master's, respectively and we received post-degree information on 37% of these degree recipients. Over half of our responses came from the master's recipients themselves, and the remainder came from their advisors.

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

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