

# Physics Graduate Degrees

Results from the Enrollments and Degrees & the Degree Recipient Follow-up Surveys

Patrick J. Mulvey and Starr Nicholson

## REPORTS ON ENROLLMENTS AND DEGREES

**R-151.45**

Astronomy Enrollments and Degrees (July 2010)

Physics Enrollments (February 2011)

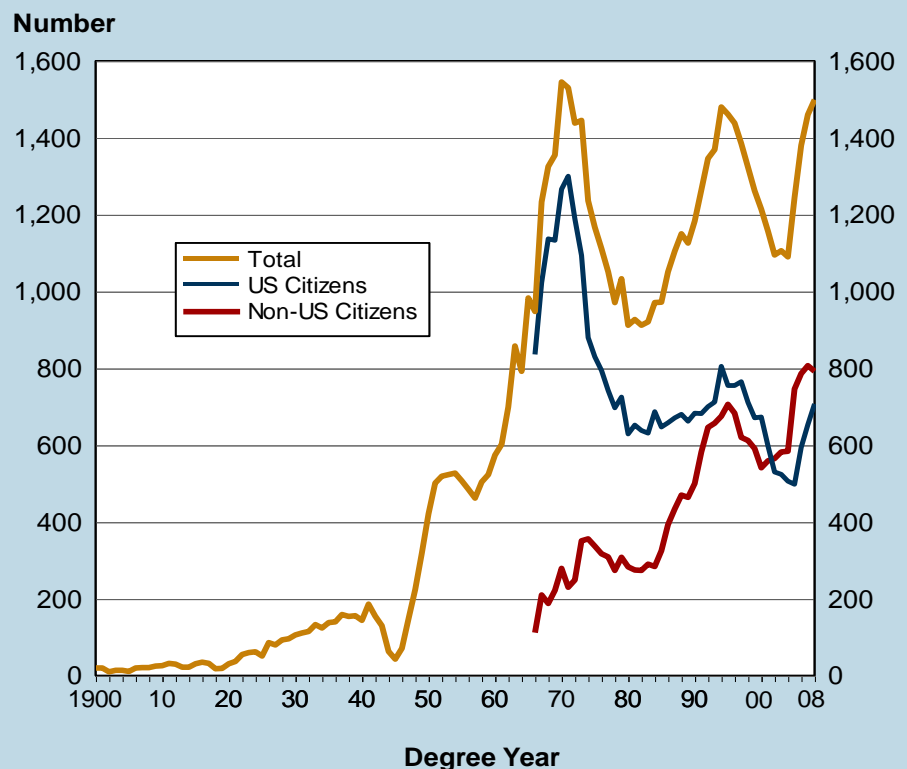
Physics Undergraduate Degrees (May 2011)

**Physics Graduate Degrees (July 2011)**

Physics PhD production has again made a dramatic turn, up 38% since a recent low only four years earlier. This sharp up-swing is a result of increases in the number of US citizens and non-US citizens earning physics PhDs. There are a number of influences that affect the cyclical changes in how many PhDs are conferred each year, and for the most part those influences came into play 5-8 years prior to each degree year. Examples of influences are: changes in university budgets and science funding, economic cycles affecting the job market for physicists, issues pertaining to the interests and abilities of international students to enter the US, the number of students receiving undergraduate physics degrees in the US, and the proportion of them choosing to pursue a physics PhD.

**Figure 1**

**Physics PhDs Conferred in the US, 1900 through 2008.**



<http://www.aip.org/statistics>

*Physics PhD production in the US has gone through repeated cycles of major increases and declines.*

### THE 2008 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 2007 AND 2008 FOLLOW-UP SURVEYS OF MASTER'S AND PHD RECIPIENTS

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

**Table 1****Number of Physics Departments with Graduate Programs,  
Academic Year 2007-08.**

Highest Physics Degrees Offered	Number of Departments	Percent of Departments
Master's	63	25
PhD	189	75
Total	252	100%

Note: There were an additional 511 physics departments that granted a bachelor's as their highest degree.

<http://www.aip.org/statistics>

---

*PhD-granting physics departments outnumber master's-granting physics departments 3 to 1.*

---

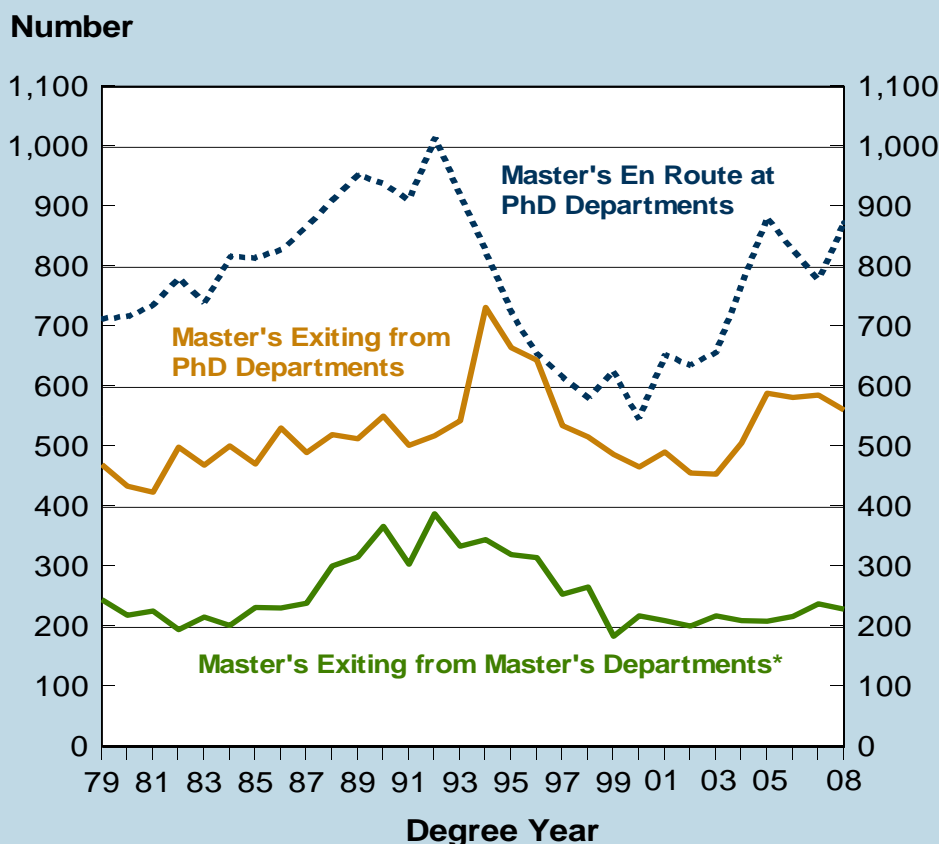
There are seven universities that have two doctoral-granting physics departments. Typically one of the departments is a traditional physics department offering undergraduate and graduate-level physics degrees, and the other has an applied physics focus. Three of these applied physics programs do not have an undergraduate program. In total, 8 of the 189 PhD-granting physics departments do not have an undergraduate program.

Physics master's degrees are characterized as being either an exiting master's degree or an en route degree. For this report, exiting master's are defined as individuals who received their physics master's degrees from US physics departments and left their departments with the master's as their highest degrees. En route master's degrees are awarded to individuals who, after receiving their master's, continue on at the same department working toward physics PhDs. Not all graduate students pursuing physics PhDs receive en route master's degrees.

In 2008, 71% of the exiting physics master's came from PhD-granting departments. Some of these degree recipients had originally planned to pursue PhDs and enrolled in graduate programs with that goal in mind. For others, the master's was the desired degree and they had enrolled in specific master's degree programs.

**Figure 2**

**Physics Master's Degrees Conferred by Type of Degree and Department, 1979 through 2008.**



*A high percentage of exiting master's (71%) came from PhD-granting physics departments.*

\*These departments offer a master's as their highest physics degree.

<http://www.aip.org/statistics>

Table 2

**Master's-Granting\* Departments Averaging 5 or More Physics Master's Degrees per Year, Classes of 2006, 2007 & 2008 Combined.**

	Annual Average
San Diego State U (CA)	10
Ball State U (IN)	9
U of Louisville (KY)	8
U of Mass, Dartmouth	8
Cleveland State U (OH)	7
Fisk U (TN)	7
Miami U (OH)	7
U of Mass, Boston	7
Christopher Newport U (VA)	6
San Jose State U (CA)	6
U of Puerto Rico, Mayaguez	6
Appalachian State U (NC)	5
CA State U, Long Beach	5
CA State U, Northridge	5
City College (NY)	5
Missouri State U	5
Northern Arizona U	5

List includes only those departments who contributed degree data for all three years.

\* Departments offering a master's as their highest physics degree.

<http://www.aip.org/statistics>

---

*These seventeen master's departments were responsible for producing about half of the master's degrees from departments where the master's was the highest degree offered.*

---

In the 2007-08 academic year there were 63 departments that offered a master's as their highest physics degree. These departments produced an average of 3.5 master's degrees per department.

The proportion of Hispanic Americans and African Americans among US citizens who received an exiting physics master's degree was twice that seen at the physics PhD level.

**Table 3**

**Minority and Ethnic Profile of Exiting Physics Master's,\*  
Classes of 2007 & 2008.**

	Two-Year Average	Percent Physics Master's
White	441	55
Hispanic American	25	3
African American	25	3
Asian American	25	3
Other US Citizens	7	1
Non-US Citizens	284	35
Total	807	100%

\* Exiting master's include students from master's-granting departments as well as students leaving departments that offer a PhD.

<http://www.aip.org/statistics>

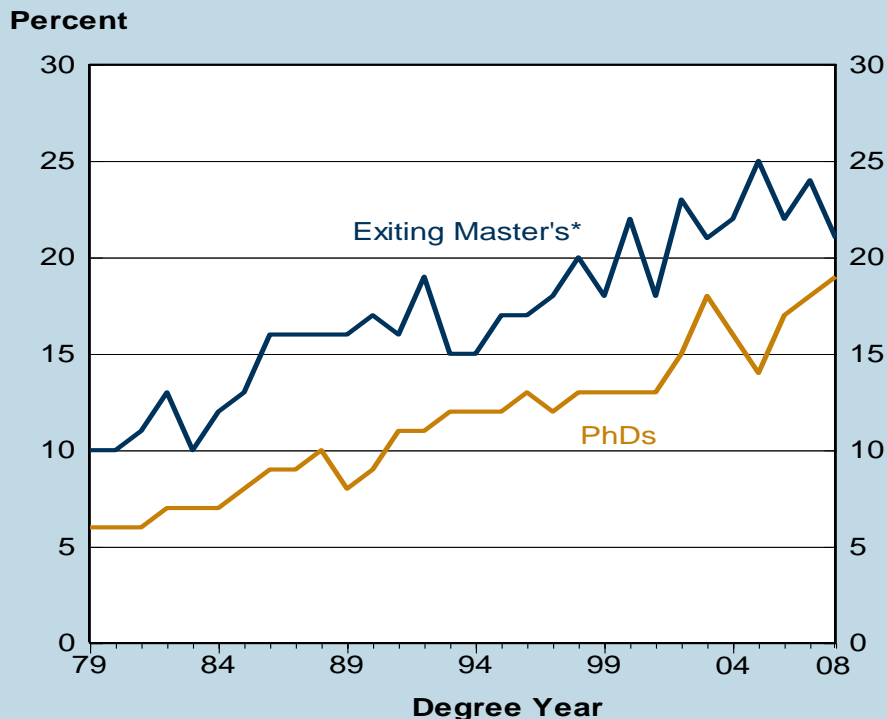
---

*Both the number and percentage of African Americans and Hispanic Americans among exiting physics master's has increased in recent years.*

---

Figure 3

**Percent of Physics Master's and PhDs Earned by Women, 1979 through 2008.**



\*Exiting master's includes students from master's-granting departments as well as those students leaving departments that offer PhDs.

<http://www.aip.org/statistics>

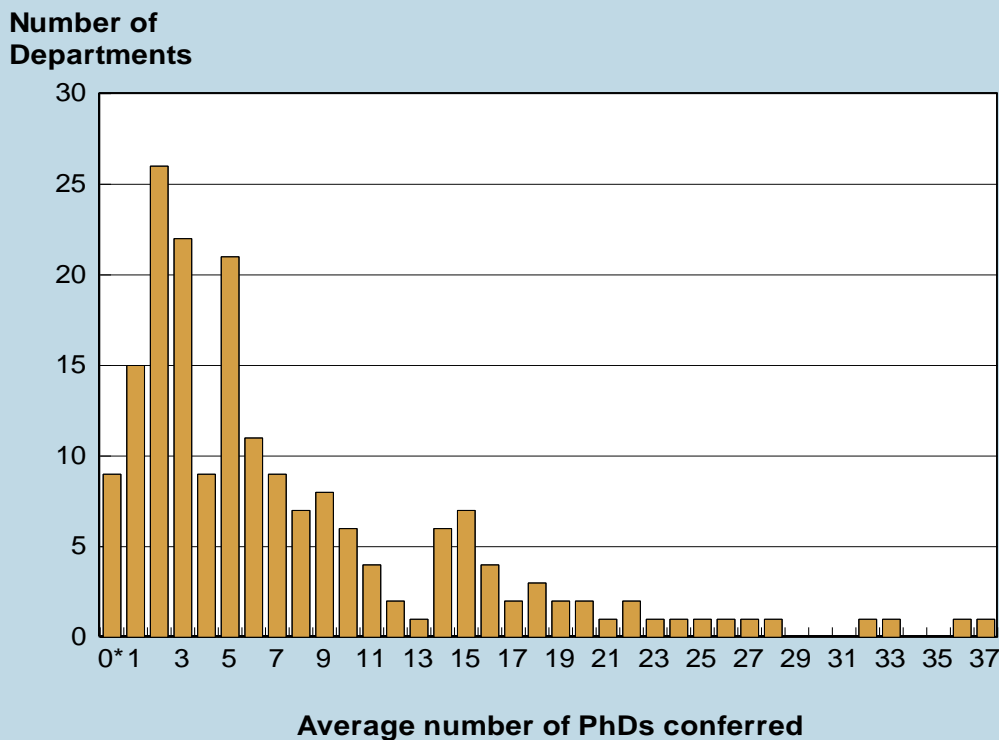
*There has been a steady but slow increase in the representation of women among exiting master's and PhDs.*

Of the 790 exiting master's in the class of 2007-08, 167 (21%) were awarded to women. Although subject to year-to-year fluctuations, this percentage is down from an all-time high of 25% three years earlier. Over the past three decades, the proportion of women among physics PhDs has tripled. Of the 1,499 PhDs conferred in the class of 2007-08, 281 (19%) were awarded to women.

The size of physics PhD programs can vary greatly. The 189 PhD-granting physics departments produced an average of 7.6 and a median of 5 PhDs for the classes of 2006 through 2008.

**Figure 4**

**Number of Doctoral-Granting Departments by the Average Number of PhDs Conferred, Classes of 2006, 2007 & 2008 Combined.**



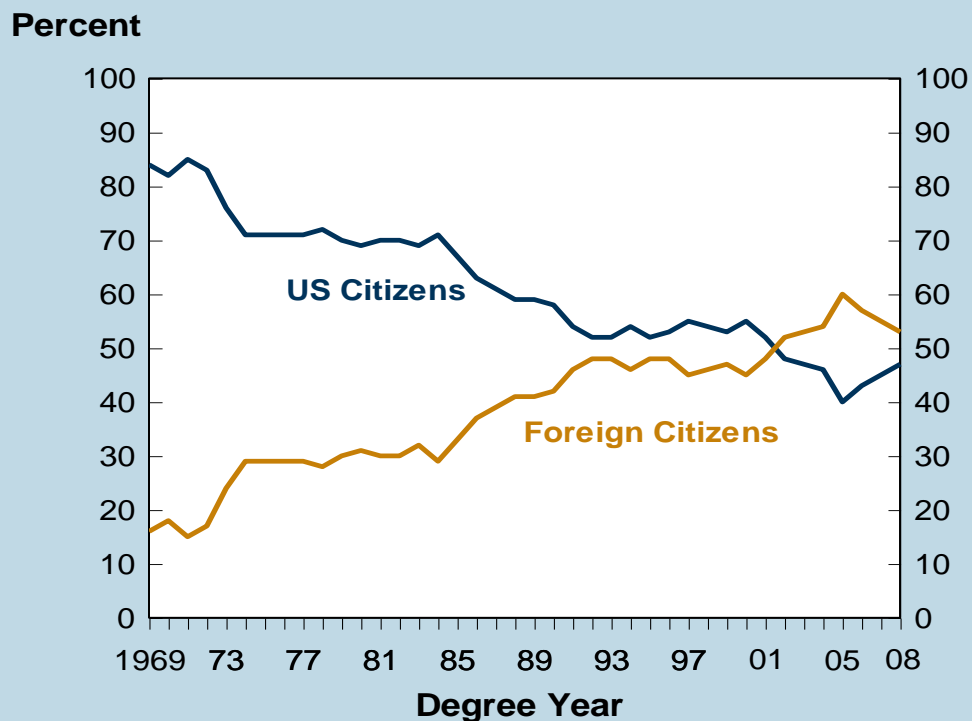
*The ten largest PhD-granting physics departments represent 5% of the departments but were responsible for conferring about 20% of physics PhDs in recent years.*

\*Includes three departments that conferred one PhD during the three year period.

<http://www.aip.org/statistics>

Figure 5

## Citizenship of Physics PhDs, 1969 through 2008.



Sources: NSF (1969-1991), AIP (1992-2008)

<http://www.aip.org/statistics>

---

*The proportion of US citizens among physics PhDs has risen for the third consecutive year.*

---

While the number of physics PhDs conferred to both US and non-US citizens has been climbing in recent years (see **Figure 1**), US citizens have been increasing at a greater rate. As a result, the representation of US citizens among physics PhDs has been on the rise. The class of 2007-08 was comprised of 47% US citizens, up from an all-time low of 40% in 2004.

Changes in the number of PhDs conferred and the proportion of US citizen among them are, in large part, due to changes in the number and composition of students enrolling in graduate physics programs 5-7 years earlier.



**Table 4**

**Departments Averaging 15 or More Physics PhDs per Year, Classes of 2006, 2007 & 2008 Combined.**

	Annual Average		Annual Average
MIT (MA)	37	Ohio State U	18
U of Illinois, Urbana-Champaign	36	Princeton U (NJ)	18
U of Texas, Austin	33	U of California, Los Angeles	18
U of Maryland, College Park	32	Michigan State U	17
U of California, Berkeley	28	U of Minnesota, Minneapolis	17
Cornell U (NY)	27	Georgia Inst of Tech	16
Stanford U (CA)	25	Pennsylvania State U	16
SUNY Stony Brook U (NY)	24	U of Washington	16
U of Colorado, Boulder	23	Columbia U (NY)	15
Caltech (CA)	22	Florida State U	15
U of Chicago (IL)	22	Purdue U, West Lafayette (IN)	15
U of Wisconsin, Madison	21	Texas A&M U, College Station	15
U of California, Santa Barbara	20	U of Rochester (NY)	15
U of Michigan, Ann Arbor	20	Washington U (MO)	15
Stanford U – Applied (CA)	19	Yale U (CT)	15
U of Florida	19		

Note: List includes only those departments who contributed degree data for all three years.

---

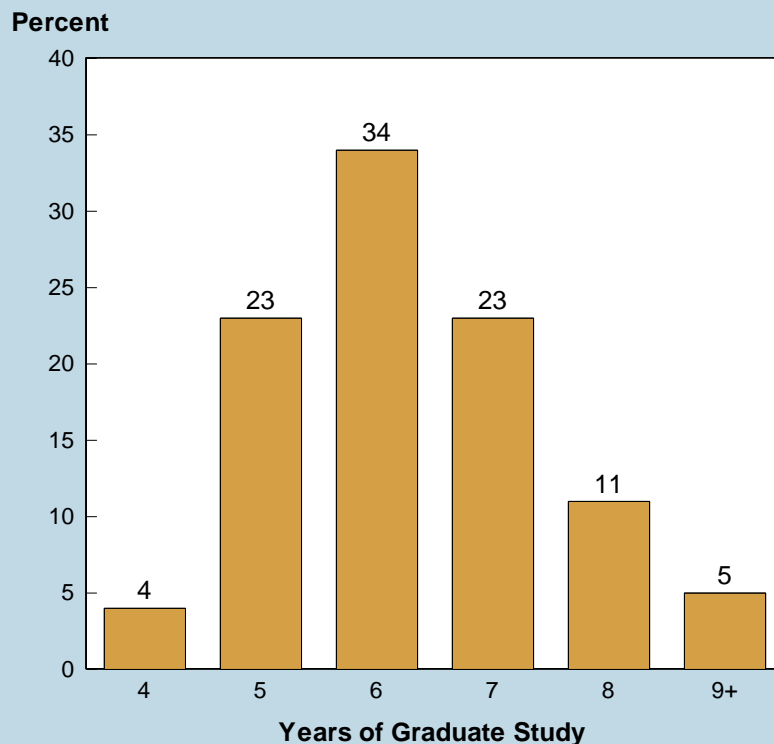
*These 31 PhD-granting physics departments represent 16% of the departments in the US that grant the PhD as their highest physics degree and were responsible for conferring 45% of the PhDs in recent years.*

---

<http://www.aip.org/statistics>

Figure 6

### Years of Physics Graduate Study to Receive a PhD, Classes of 2007 & 2008 Combined.



Note: This graph depicts the number of full-time equivalent years of physics graduate study completed in the US. Includes US citizens only.

<http://www.aip.org/statistics>

---

*US citizens took an average of 6.2 full-time equivalent years of graduate study to complete their PhDs.*

---

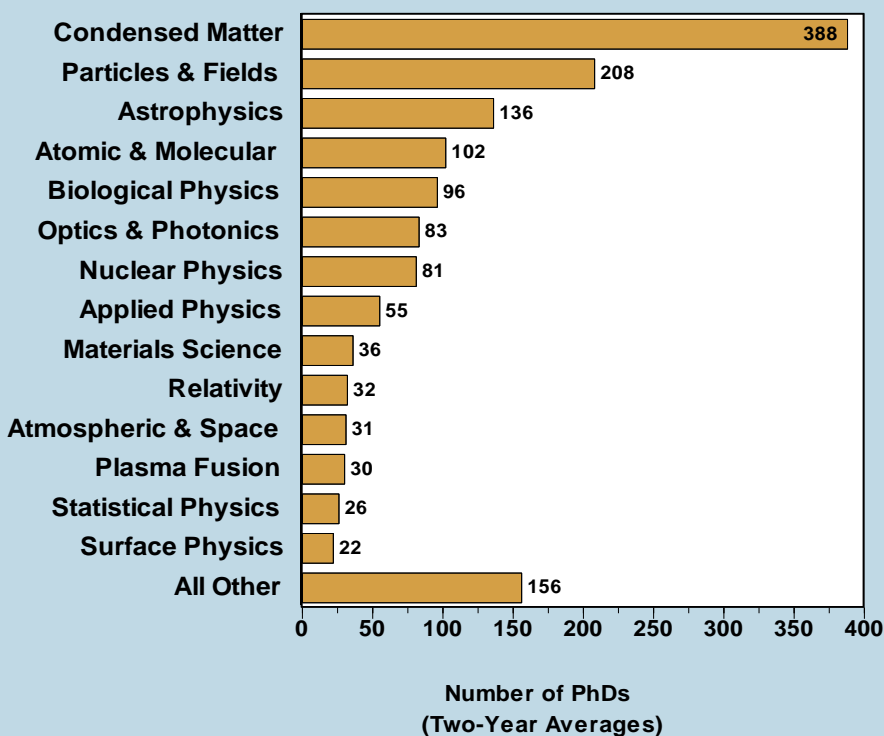
The majority of US citizens (80%) in the classes of 2007 and 2008 combined took between 5-7 years to obtain their degrees. Ten percent of the US citizens were enrolled in a US physics graduate program prior to enrolling at the department from which they earned their PhDs. A significant proportion of non-US citizens (42%) indicated that they had been enrolled in a graduate physics program prior to coming to the US to study. Due to the varied education systems of other countries and the different levels of preparation of incoming international students, we were unable to accurately report the number of years required by non-US citizens to complete their PhDs.

Condensed matter continues to be the most common dissertation subfield of physics PhDs, with 26% choosing this subfield. The distribution of subfields among US and non-US citizens was similar with two exceptions: condensed matter and astrophysics. A larger proportion of non-US citizens selected condensed matter as their subfield of dissertation (31%) than US citizens (20%). US citizens were more likely to have a subfield dissertation of astrophysics (14%) than their non-US citizen counterparts (5%).

Foreign citizens were more likely to have a primary dissertation research method that was theoretical; this was also true for men – regardless of citizenship. Thus, while 32% of all PhDs were theoreticians, only 16% of US women had a primary dissertation method that was theoretical.

**Figure 7**

**Number of Physics PhDs Granted by Subfield From Physics Departments, Classes of 2007 & 2008 Combined.**




---

*About a quarter of physics PhD recipients had a dissertation subfield in the area of condensed matter.*

---

Note: These data are based on an average of 1,480 PhDs conferred at US physics departments. Additionally, there was an average of 143 PhD astronomers from departments that offer astronomy degrees.

<http://www.aip.org/statistics>

Table 5

**Minority and Ethnic Profile of Physics PhDs,  
Classes of 2007 & 2008.**

	Two-Year Average	Percent Physics PhDs
White	601	41
Asian American	32	2
Hispanic American	16	1
African American	15	1
Other US Citizens	17	1
Non-US Citizens	800	54
Total	1,480	100%

---

*The four physics doctoral departments located at an HBCU produced about a quarter of the PhDs conferred to African Americans in the class of 2008.*

---

<http://www.aip.org/statistics>

There were an average of sixteen Hispanic Americans and fifteen African Americans who received physics PhDs in the classes of 2007 and 2008 combined. Of the 189 departments that offered a physics PhD in 2007 and 2008, four were located at an Historically Black College and University (HBCU). These four departments were responsible for conferring about a quarter of the PhDs conferred to African Americans in the classes of 2007 and 2008.

Although the majority of both US and non-US citizens indicated that they would have still pursued a physics PhD if given the opportunity to change their educational pursuits, non-US citizens reported a lower level of satisfaction with their choices. Only half of the non-US citizens would have repeated their educational experience at the same institution versus 78% of the US citizens. Consequently, the non-US citizens were more likely to indicate a desire to have attended a different physics department or to not have pursued a physics PhD at all.

**Table 6**

**Response to the Question “If You Had To Do It Over Again,  
Would You Still Get a PhD in Physics?”  
Classes of 2007 & 2008 Combined.**

	US Citizens	Non-US Citizens
Yes, at the same institution	78%	50%
Yes, at a different institution	10%	27%
No, I would get a PhD in another subject	8%	17%
No, I would not get a PhD	4%	6%

<http://www.aip.org/statistics>

---

*US citizens were more satisfied than non-US citizens with their choices to pursue physics PhDs.*

---

**Appendix 1. Exiting Physics Master's Degrees Conferred, Academic Years 1998-2008.**

Academic Year	Total Exiting Masters	Highest Physics Degree Offered by Department	
		Master's-granting	PhD-granting
1998-1999	671	184	487
1999-2000	684	218	466
2000-2001	701	210	491
2001-2002	657	201	456
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

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

<http://www.aip.org/statistics>

**Appendix 2. Physics Doctorates Conferred, Academic Years 1998-2008.**

Academic Year	Total
1998-1999	1,262
1999-2000	1,214
2000-2001	1,157
2001-2002	1,095
2002-2003	1,106
2003-2004	1,090
2004-2005	1,244
2005-2006	1,380
2006-2007	1,460
2007-2008	1,499

<http://www.aip.org/statistics>

## About the Surveys

### Survey of Enrollments and Degrees

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 and Puerto Rico to provide information concerning the number of students they have enrolled and counts of recent degree recipients. In the academic year 2007-08 there were 252 departments with physics graduate programs. For this survey, the degree year is defined as being from September to August. We received responses from 97% 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 can be found on our website and provides a departmental-level enrollment and degree snapshot of the class of 2007-08.

### Follow-Up Survey

The follow-up surveys for the classes of 2006-07 and 2007-08 were conducted in the winter following the academic year the PhDs and master’s received their degrees. For this survey, the degree year is defined as being from September to August. Degree recipients who left the US after receiving their degrees were not included in the analysis.

The physics PhD classes of 2006-07 and 2007-08 consisted of 1,460 and 1,499 PhDs, respectively. We received post-degree information on 54% of these degree recipients. Sixty-nine percent of our responses came from the PhD recipients themselves, and the remainder came from their thesis advisors.

The exiting physics master’s degree classes of 2006-07 and 2007-08 consisted of 824 and 790 degree recipients, respectively. We received post-degree information on 39% of these degree recipients, with 58% of the information coming directly from the degree recipients.

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