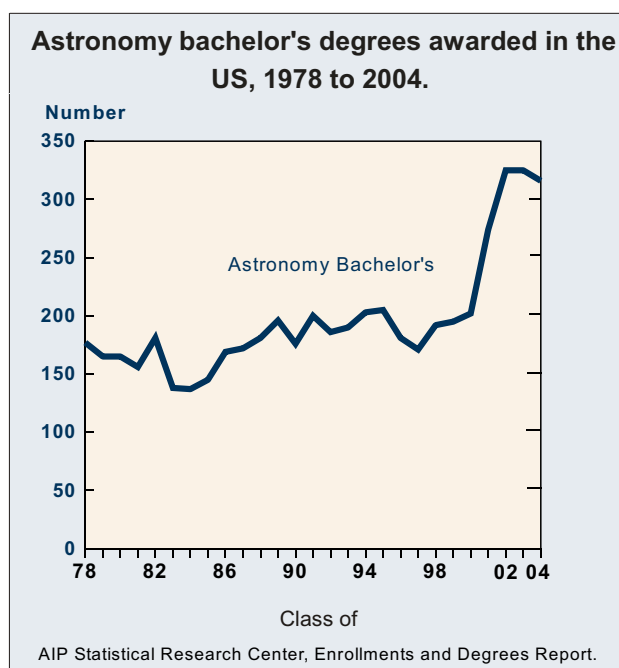
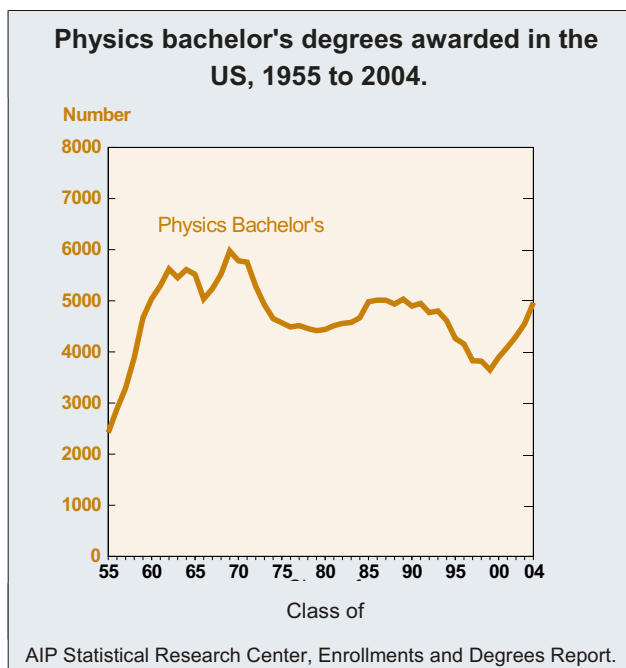


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## ENROLLMENTS AND DEGREES REPORT, 2004.



### Highlights

➤ Physics bachelor's degree production continued to increase in 2004, up 36% over the recent low in 1999 (**Cover**).

➤ In part due to the rise in physics bachelor's, the number of US citizens enrolling as first-year physics graduate students in the fall of 2004 increased 2% from the previous year, and is up 50% from their recent low in the fall of 1998 (**Figure 4**).

➤ In contrast, the number of foreign students enrolling in US graduate physics departments declined 11% from the previous year. This decline is responsible for the overall decline of 4% in total first-year student enrollments, the first such decline in six years (**Figure 4**).

➤ Steady increases are anticipated in PhD production, a result of the number of first-year students entering graduate school over the previous five years (**Figure 9**).

## highlights continued

➤Following an unprecedented two-year increase in 2000 and 2001 (61%), astronomy bachelor's degree production has remained relatively stable for the last three years (**Figure 11**).

➤The undergraduate programs at PhD-granting physics departments are large compared to programs at departments that only offer a bachelor's degree. On average, doctoral-granting departments produce over three times the number of physics bachelor's than do departments at primarily undergraduate institutions (**Table 4**).

## BACKGROUND

Each fall the American Institute of Physics (AIP) surveys all degree-granting physics and astronomy departments in the US and Puerto Rico. In the fall of 2004 the survey went out to all 767 physics departments (see **Table 1**) and 76 astronomy departments. The survey collected current student enrollment information and degree production data for the 2003-04 academic year.

**Table 1. Departments by highest physics degree offered, academic year 2003-2004.**

	Number of Depts.	Percent of Depts.
Bachelor's-granting	515	67
Master's-granting	67	9
PhD-granting	185	24
Total	767	100%

AIP Statistical Research Center, Enrollments and Degrees Report.

As in past years, the survey had a very high response rate. We received at least partial data from all but 7 departments, resulting in a 99% response rate to our census. Data for the non-responding departments were estimated using responses to this survey in previous years, and those estimated figures are included in the totals presented in this report.

Much of the departmental level data that are used to create the tables and figures in this report can be found in the 2004 Roster of Physics Departments and its sister publication for the astronomy departments. Printed copies of the Rosters can be ordered or an electronic version downloaded at no cost from the AIP's Statistical Research Center's web site (<http://www.aip.org/statistics/>).

This report series is a direct result of the effort put forth by physics and astronomy department chairpersons, faculty and staff, who provided us with information on their individual programs. The continuing high level of participation from the departments bolsters confidence in the data presented and is greatly appreciated.

## UNDERGRADUATE PHYSICS ENROLLMENTS AND DEGREES

In addition to the obvious role physics and astronomy departments have in producing degree recipients, they also have the important role of providing physics and astronomy course instruction at the introductory level to a wide range of majors. The introductory enrollment numbers in **Table 2** reflect the enrollments in the first-term of an introductory level physics, astronomy or physical science course offered by degree-granting physics and astronomy departments.

Table 2. Introductory course enrollments by type of department, academic year 2003-2004.					
Department Type	Calculus Based	Algebra Based	Conceptual	Astronomy*	Physical Science
Bachelor's-granting	45,000	42,000	28,000	64,000	31,000
Master's-granting	17,000	16,000	14,000	26,000	7,000
PhD-granting	102,000	70,000	28,000	91,000	19,000
<b>Total</b>	<b>164,000</b>	<b>128,000</b>	<b>70,000</b>	<b>181,000</b>	<b>57,000</b>

\*Astronomy course enrollments also include students from degree-granting astronomy departments, which accounted for 50,000 of the 181,000 introductory astronomy enrollments.

Note: In addition to the introductory course enrollments given above, a significant number of students take an introductory-level physics course at a two-year college. In 2002 this figure was approximately 120,000 students. (*Physics in the Two-year Colleges:2001-02*, Mark McFarling and Michael Neuschatz, June 2003, College Park MD: American Institute of Physics)

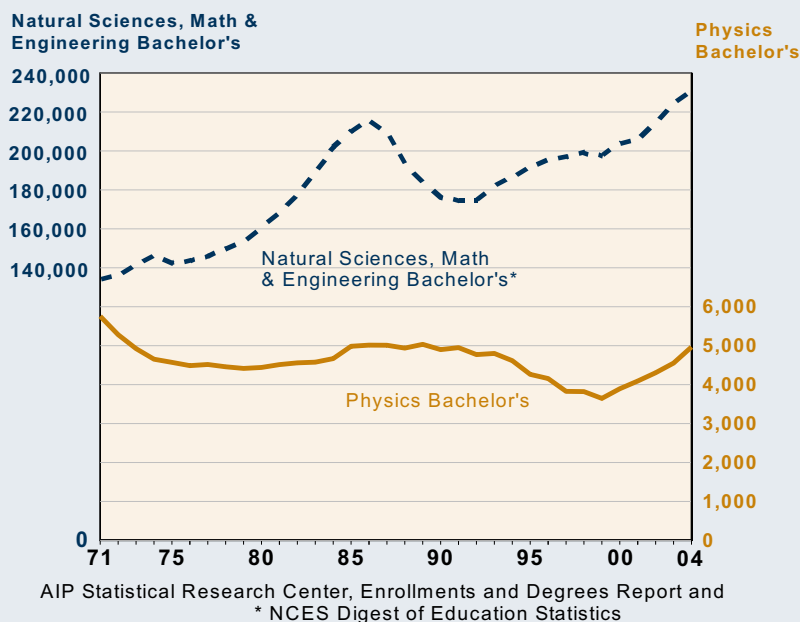
AIP Statistical Research Center, Enrollments and Degrees Report.

About 362,000 students took an introductory physics course during the 2003-2004 academic year, an increase of about 13% from five years earlier. Additionally about 181,000 students took an introductory astronomy course, which represents an increase of about 15% from five years earlier. An introductory astronomy course can be taken at an astronomy or physics department, and in fact, almost three-quarters of the introductory astronomy course enrollments come from physics departments where no astronomy degree is offered.

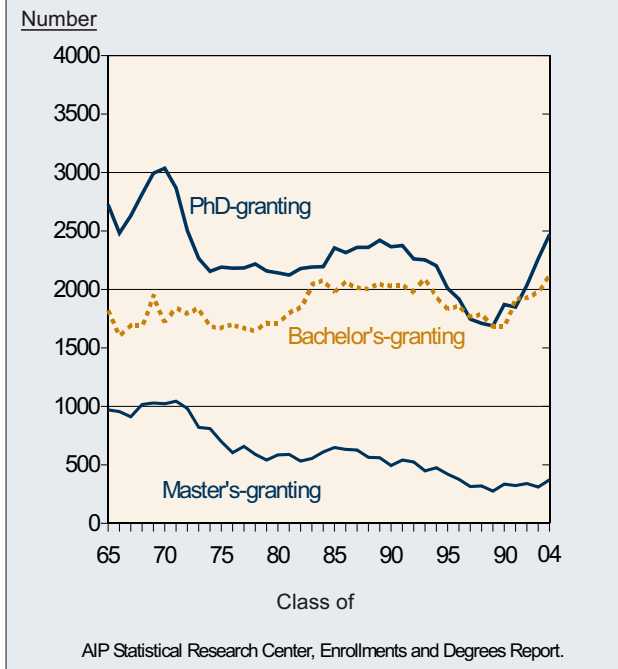
The 4,965 physics bachelor's conferred in the class of 2004 represent a 36% increase over the recent low in 1999 (see **Figure 1**).

After steady declines in the 1990's, undergraduate physics degree production has risen sharply for the fifth consecutive year.

**Figure 1. Physics bachelor's and Natural Sciences, Math and Engineering bachelor's produced in the US, 1971 to 2004.**



**Figure 2. Physics bachelor's degrees awarded by department type, 1965-2004.**



**Table 3. Bachelor's degrees awarded in selected fields, class of 2004.**

	Number
Engineering	78,227
Biological sciences	61,509
Computer and Information sciences	59,488
Mathematics	13,327
Chemistry	9,016
Physics	4,965
Geoscience	3,312

Note: Geoscience does not include atmospheric and environmental science.  
 Non-physics data: NCES Digest of Education Statistics 2005, Tables 249 and 289.  
 AIP Statistical Research Center, Enrollments and Degrees Report.

Physics bachelor's degrees account for a small fraction (less than 0.4%) of the 1.3 million bachelor's awarded in the US in 2004 and only about 2% of the degrees conferred in the natural sciences, math and engineering. To get a clearer picture of the relative size of the physics degree class for 2004, **Table 3** compares the number of the physics degrees granted to other fields.

**Figure 2** breaks out physics bachelor's production by the highest degree offered by the department. Recent increases in degree output are occurring at all department types, with the PhD-granting departments realizing the greatest gains, increasing 46% in five years.

**Table 4. Size of physics bachelor's class by type of department, class of 2004.**

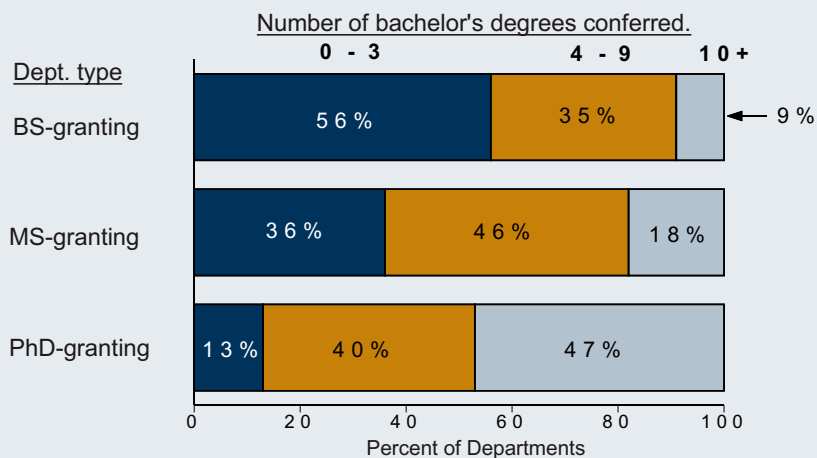
Department Type	Degrees per Department	
	Average	Median
Bachelor's-granting	4.1	3
Master's-granting	5.6	5
PhD-granting	14.0	9

AIP Statistical Research Center, Enrollments and Degrees Report.

PhD-granting departments only represent 24% of all physics departments, but because of the relatively large size of their undergraduate programs, they were responsible for half of the physics bachelor's in the class of 2004. **Table 4** and **Figure 3** illustrate the difference in the size of undergraduate physics programs by type of department. On average, physics departments where the PhD was the highest degree averages over three times the number of bachelor's produced by the undergraduate-only departments.

Foreign citizens continue to make up only a small fraction of the undergraduate physics degrees conferred in the US, with 6% of the class of 2004 being non-US citizens.

**Figure 3. Number of physics bachelor's by highest physics degree offered, class of 2004.**



AIP Statistical Research Center, Enrollments and Degrees Report.

**Table 5. Bachelor's-granting departments averaging 10 or more physics bachelor's degrees per year, classes of 2002, 2003 and 2004.**

	Annual Average		Annual Average
US Air Force Academy (CO)	24	Bowdoin College (ME)	12
Harvey Mudd College (CA)	22	Bethel College (MN)	11
U of Wisconsin-La Crosse	22	Oberlin College (OH)	11
Illinois St U	20	The Coll of New Jersey	11
Carleton College (MN)	19	Whitman College (WA)	11
Reed College (OR)	19	U of Puget Sound (WA)	11
Colorado College	18	Allegheny College (PA)	10
CA Poly St U-San Luis Obispo	17	Colby College (ME)	10
College of Charleston (SC)	17	Dickinson College (PA)	10
SUNY College-Geneseo (NY)	17	Kalamazoo College (MI)	10
Gustavus Adolphus College (MN)	14	Salisbury U (MD)	10
Williams College (MA)	14	Sonoma State U (CA)	10
Xavier U (LA)	14	Southern Oregon U	10
Bates College (ME)	13	U of Montana	10
Grinnell College (IA)	13	U of Northern CO	10
Middlebury College (VT)	13	SUNY Coll at Fredonia (NY)	10
Saint Olaf College (MN)	13	Vassar College (NY)	10
U.S. Military Academy (NY)	13		

Note: List includes only those departments who contributed degree data for all 3 years.

AIP Statistical Research Center, Enrollments and Degrees Report.

**Tables 5, 6 and 7** list the departments that were responsible for producing the largest number of physics bachelor's during the last three years. The tables are organized by the highest physics degree offered by the department and show three-year averages to minimize year-to-year fluctuations.

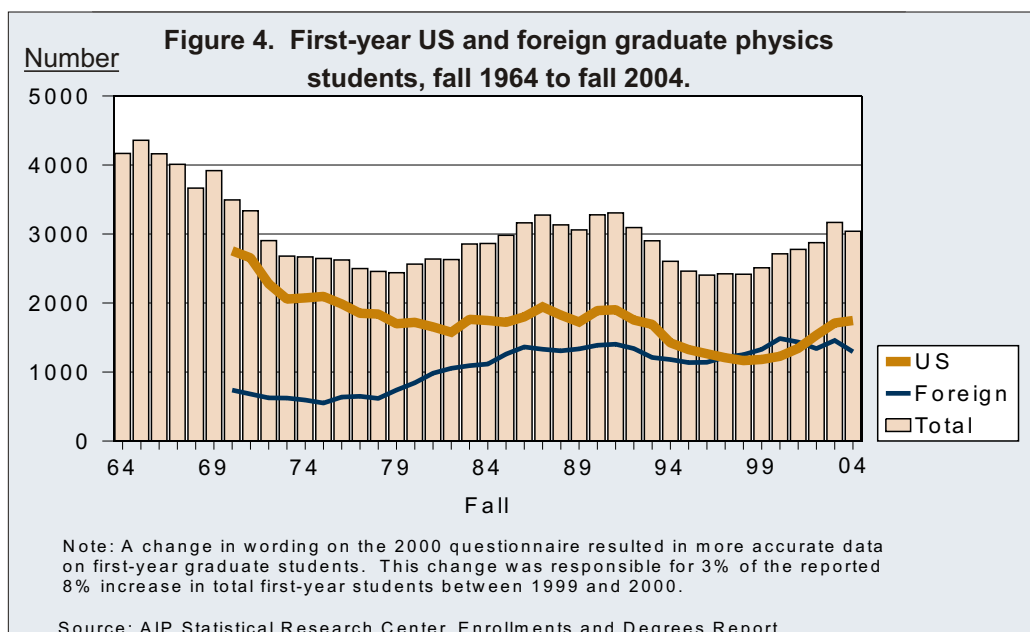
Recently there has been considerable interest in the amount of time it takes bachelor's to complete their degree. Many factors can contribute to why physics bachelor's might take more than four years from the time he or she graduated from high school to obtain their undergraduate degree. According to an AIP survey of physics seniors, about 15% did not enter a 2 or 4 year college immediately after graduating from high school. About one-third indicated it was going to take them more than four years from the time they first enrolled in college to earn their bachelor's degree. The most frequently cited reasons for a delayed graduation were earning a double major and changing majors <sup>(1)</sup>.

After graduating, one-third of new physics bachelor's in the classes of 2002 and 2003 immediately continued their education at the

graduate level in physics or astronomy. An additional fifth immediately enrolled in graduate programs other than physics. Engineering dominated the fields that bachelor's pursued outside of physics. The balance of new graduates, about 45%, entered directly into the workforce <sup>(2)</sup>. Many of these will eventually enroll in a graduate program after having worked for a year or two. In the end, about 15% or 1 in 7 of US physics bachelor's recipients eventually receive a physics or astronomy PhD. This is six times the rate for all bachelor's degree recipients.

### GRADUATE PHYSICS ENROLLMENTS

The number of US citizens enrolling as first-year physics students in the fall of 2004 increased only 2% from the previous year but is up 50% from the recent low in the fall of 1998. Although first-year enrollments for US citizens continued to increase, for the first time in six years the total number of students (3,040) entering graduate physics programs fell 4%. (see **Figure 4**). This overall drop is attributable to a decline from the previous year of 11% in first-year student enrollments among the foreign students.



**Table 6. Master's-granting departments averaging 7 or more physics bachelor's degrees per year, classes of 2002, 2003 and 2004.**

	Annual Average		Annual Average
Miami U (OH)	13	CA State U-Fullerton	8
Appalachian State U (NC)	11	SUNY-Binghamton U (NY)	8
CA State U-Northridge	11	U of CO, Colorado Springs	8
Northern Arizona U	11	Virginia Commonwealth U	8
Cleveland State U (OH)	10	Creighton U (NE)	7
Texas State U-San Marcos	10	San Diego State U (CA)	7
San Jose State U (CA)	9	San Francisco State U (CA)	7
Southwest Missouri St U	9	U of Memphis (TN)	7

Note: List includes only those departments who contributed degree data for all 3 years.  
AIP Statistical Research Center, Enrollments and Degrees Report.

**Table 7. PhD-granting departments averaging 20 or more physics bachelor's degrees per year, classes of 2002, 2003 and 2004.**

	Annual Average		Annual Average
U of California-Berkeley	74	Ohio St U	26
U of Washington	64	U of Utah	26
Harvard U (MA)	58	Cornell U (NY)	25
MA Inst of Technology	58	Cornell U-Applied (NY)	25
Brigham Young U (UT)	52	U of California-Davis	25
U of IL-Urbana/Champaign	41	U of Florida	24
U of Texas-Austin	36	U of MN-Minneapolis	24
CA Inst of Technology	33	Georgia Inst of Tech	23
Rutgers U-New Brunswick (NJ)	33	Portland State U (OR)	23
U of California-Santa Cruz	33	U of Michigan-Ann Arbor	23
U of CA-Los Angeles	32	U of Wisconsin, Madison	23
U of Maryland-College Park	31	Carnegie Mellon U (PA)	22
U of California-San Diego	31	Oregon State U	21
U of California-Santa Barbara	31	Pennsylvania St U	21
U of Arizona	30	Purdue U-W. Lafayette (IN)	21
U of Virginia	29	Case Western Reserve U (OH)	20
Colorado School of Mines	28	North Carolina State U	20
U of Chicago (IL)	28	Stanford U (CA)	20

Note: List includes only those departments who contributed degree data for all 3 years.  
AIP Statistical Research Center, Enrollments and Degrees Report.



**Table 8. Characteristics of first-year physics graduate students by highest degree of department, fall of 2004.**

	PhD-granting	Masters-granting
Number of departments	185	67
Gender (%)		
Male	80	77
Female	20	23
Citizenship (%)		
US	56	71
Foreign	44	29
Type of support* (%)		
Teaching assistantship	64	68
Research assistantship	15	20
Fellowship	17	3
Self-financed	2	9
Total first-year enrollments	2716	324
*Source: AIP Graduate Student Survey, 2003-2004.		
AIP Statistical Research Center, Enrollments and Degrees Report.		

Despite this recent decline, the number of foreign students enrolling in US physics graduate programs is still up 3% compared to the fall of 1998. Visa issues and the perceived climate toward foreign graduate students in the US are definitely factors that have an impact on foreign student enrollments. AIP surveys of physics departments showed that around 20% of the foreign students who were accepted and were expected to attend in the fall of 2002 were at least initially prevented from entering their intended graduate program. This fell to 12% by the fall of 2004<sup>(3)</sup>. Although some of the recent shifts in incoming foreign student enrollments can undoubtedly be attributed to tightened visa regulations, it should be noted that foreign student enrollments had already begun to experience a decline prior to the fall of 2002, the first entering class which could have been affected by changes resulting from events of September 11, 2001.

International students still make up a significant portion of the first-year graduate students (43%) at US physics departments, but their representation has not been this low since the early 1990s. As can be seen in **Figure 4**, the recent changes in the proportion of first-year foreign students is not due to large swings in the number of foreign students enrolling, but rather can be attributed to relatively large changes in the number of entering US students.

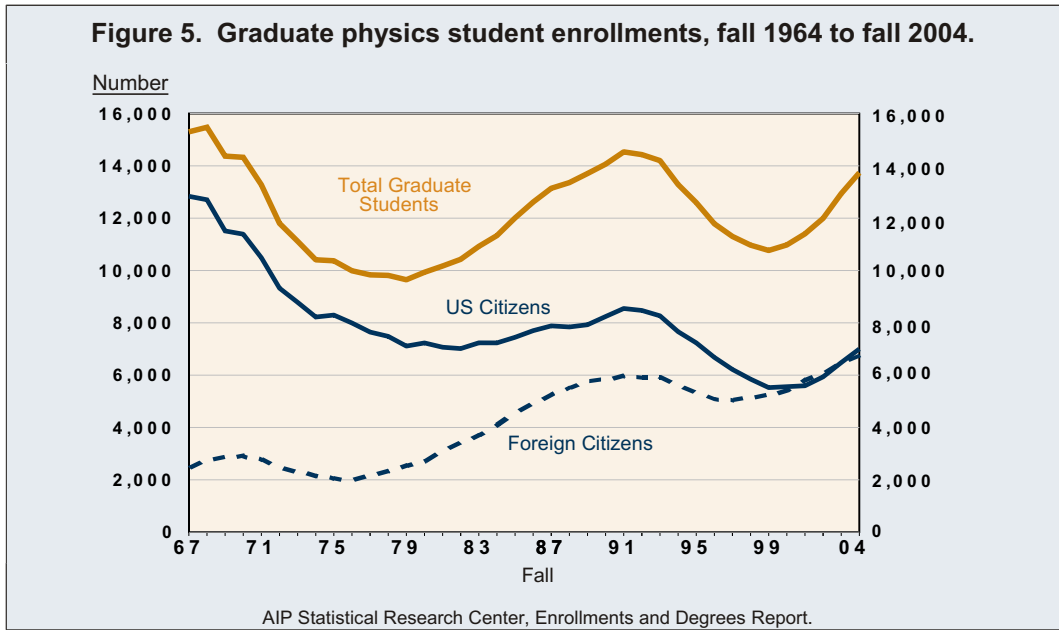
**Table 8** shows the characteristics of first-year students by the highest degree offered by the department in which they are enrolled. Eleven percent (324 students) of the 3,040 incoming students in the fall of 2004 were enrolled at a department where the master's was the highest physics degree offered. Non-citizens make up a somewhat larger proportion of students enrolling in departments that offer a PhD than in departments that offer degrees only at the master's level. The table also shows that first-year physics graduate students are typically well supported, with the vast majority receiving some type of financial support, most commonly teaching assistantships. Ninety-six percent of first-year students in the fall of 2004 indicated they received either a full or partial tuition waiver<sup>(4)</sup>.

Approximately 90% of first-year physics graduate students indicated that they received their undergraduate degree in physics or astronomy. The figures for first-year student enrollments include as many as 10% who had transferred from other US physics graduate programs<sup>(4)</sup>.

Reflecting increases in first-year student enrollments as well as changes in the proportion of foreign citizens, the total number of enrolled graduate students has been climbing in recent years, with foreign citizens now representing about half of the students (see **Figure 5**).



**Figure 5. Graduate physics student enrollments, fall 1964 to fall 2004.**



Increases in total student enrollments are expected to continue for a number of years mirroring past changes in incoming student enrollments.

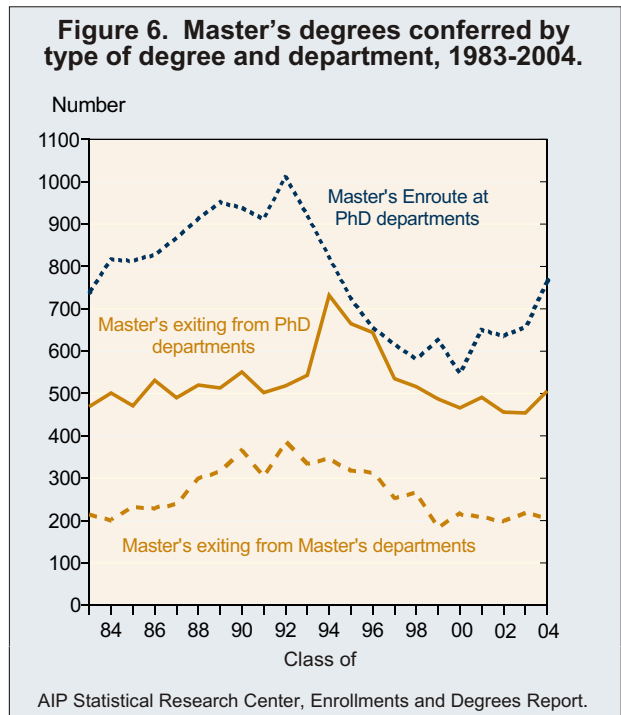
**GRADUATE PHYSICS DEGREES**

In the 2003-04 academic year, there were 67 departments that offered a physics master’s as their highest physics degree and an additional 185 which offered degrees up through the PhD. Clearly, the 210 master’s recipients in the class of 2004 who received their degree from a department where the master’s was the highest degree offered intended to exit that department with a master’s. This is not necessarily the case for the 506 master’s recipients exiting departments that also offer a PhD. While some portion of these may have always intended to only go as far as the master’s, others may have originally aimed at a PhD.

The number of students (769) that departments reported as receiving a master’s degree enroute (continuing at that same doctoral institution in pursuit of a physics PhD) in the academic year 2003-04 rose by 18% from the previous year. This relatively sharp jump has been anticipated as the overall number of first-year students

entering PhD-granting departments has been rising. For many PhD departments, the master’s enrout degree is not required, so not all students who ultimately obtain a PhD receive this interim degree. **Figure 6** presents two decades of master’s degree production by both type of master’s and highest physics degree offered by the department.

**Figure 6. Master’s degrees conferred by type of degree and department, 1983-2004.**



Twenty-two percent of the exiting-master's were women and 38% were non-US citizens. The distribution of these two groups was similar for both PhD and master's-granting departments.

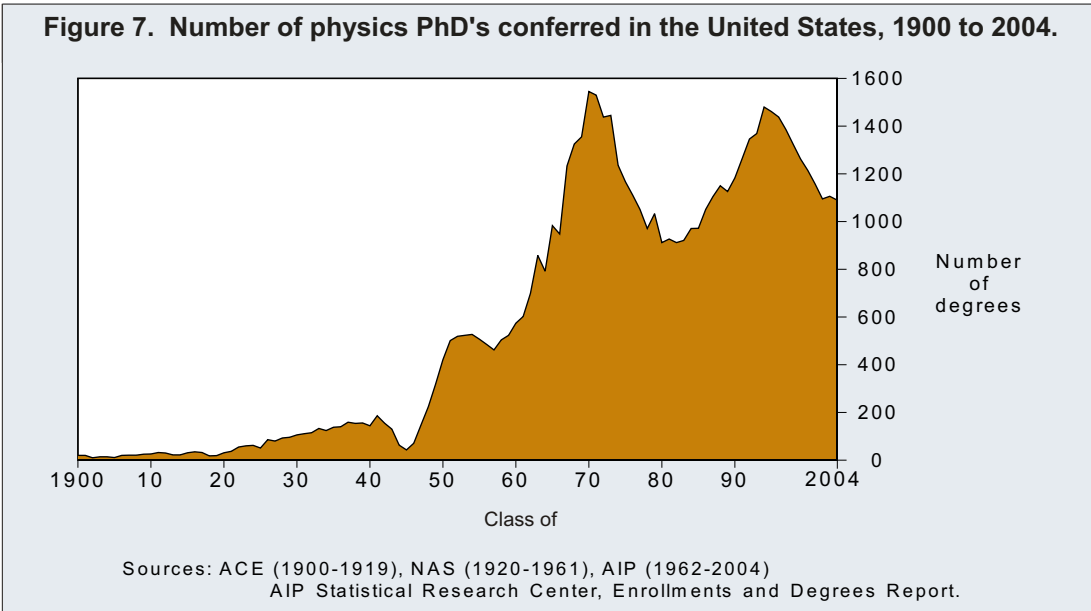
The master's-granting departments listed in **Table 9** awarded the largest number of master's degrees during the last three years. These 14 departments represent 21% of the departments that offer a master's as their highest degree but awarded 39% of all the master's degrees from master's-granting institutions. Departments with the master's as their highest physics degree averaged 3 master's per department in the class of 2004.

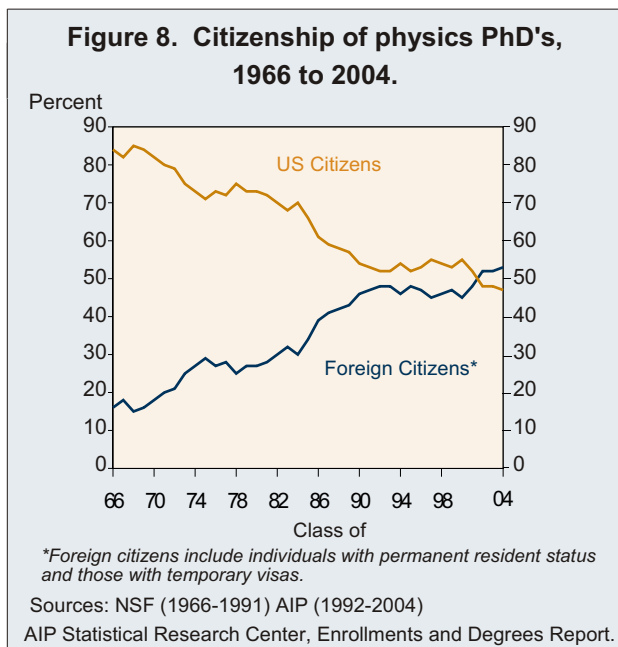
Many exiting-master's degree recipients from both master's-granting departments and departments that offer a PhD continue their education in physics or another field. The initial outcomes of exiting master's vary greatly by citizenship. A little over a quarter of the master's who are US citizens continue with graduate study in another department, compared to about three-quarters of the foreign citizens. For both groups, the majority of the individuals immediately continuing their graduate education enroll in a physics PhD program at another US institution <sup>(2)</sup>.

**Table 9. Departments with the master's as the highest degree offered averaging 5 or more physics master's degree per year, classes of 2002, 2003 and 2004.**

	Annual Average
Christopher Newport U (VA)	7
San Francisco State U (CA)	7
U of MA, Dartmouth	7
Ball State U (IN)	6
San Diego State U (CA)	6
San Jose State U (CA)	6
U of Louisville (KY)	6
U of MA, Boston	6
U of Texas, El Paso	6
CA State U, Northridge	5
Central Michigan U	5
Southern IL U, Carbondale	5
Southwest MO State U	5
Western IL U	5

Note: List includes only those departments who contributed degree data for all 3 years.  
AIP Statistical Research Center, Enrollments and Degrees Report.





**Figure 7** displays the long history of physics PhD production in the United States. PhD production has been relatively flat for the last two years. The 1090 PhDs conferred in the class of 2004 is 26% below the number of degrees produced about a decade ago.

After many years of relative stability, the proportion of new physics PhDs conferred to foreign citizens has increased from 45% in the class of 2000 to 54% of the PhDs in the class of 2004 (see **Figure 8**). In the coming years, US students are expected to return to being in the majority, as the proportion of US students entering physics graduate programs has risen significantly.

The physics PhD graduates of 2002 and 2003 who were US citizens reported both a median and an average of 6 Full-Time Equivalent (FTE) years of graduate study to complete their degree<sup>(2)</sup>. Generally, foreign PhD recipients spend a shorter amount of time enrolled in US graduate physics programs. However, it is unclear how many FTE years of physics graduate study foreign citizens took to receive their degree because a large proportion (about 50%) had been enrolled in the equivalent of a physics graduate

program in their home country before enrolling in their current department<sup>(4)</sup>.

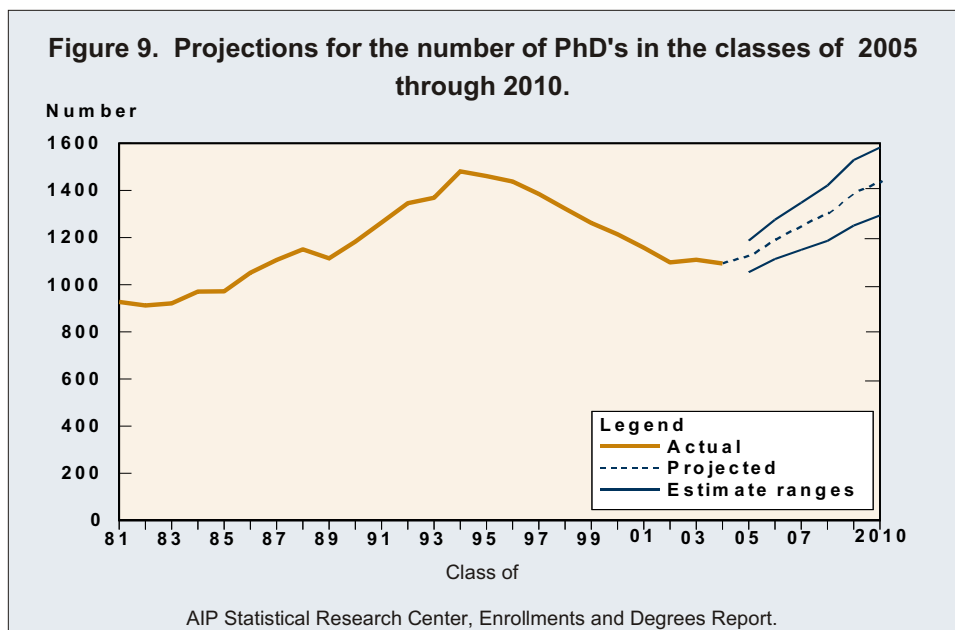
The number of PhDs a department produces varies greatly. The 185 doctoral-granting departments averaged about 6 PhDs per department during the last three years. Fifty-nine departments or about a third of the departments averaged 2 or fewer PhDs during the same time period. The departments listed in **Table 10** are responsible for producing the largest number of physics PhD's during the last three years. The 18 departments listed represent only 10% of all the doctoral departments, but they awarded 34% of all the PhDs conferred.

**Table 10. Departments averaging 15 or more physics doctorates per year, classes of 2002, 2003 and 2004.**

	Annual Average
MA Inst of Technology	34
U of Texas-Austin	30
SUNY-Stony Brook (NY)	30
U of California-Berkeley	30
U of IL-Urbana/Champaign	27
Harvard U (MA)	22
U of Maryland, College Park	21
Stanford U (CA)	21
CA Inst of Technology	18
Cornell U (NY)	17
Ohio St U	17
Princeton U (NJ)	16
U of California, Santa Barbara	16
U of Chicago (IL)	16
U of MN, Minneapolis	16
U of Washington	15
U of Wisconsin, Madison	15
U of California, San Diego	15

Note: List includes only those departments who contributed degree data for all 3 years.

AIP Statistical Research Center, Enrollments and Degrees Report.



## PHYSICS DOCTORATE PROJECTIONS

The type of employment new PhDs accept varies with the economic conditions they encounter, with changes in long-term career goals, and with other factors. In recent years there has been a sharp increase in the proportion of new PhDs accepting postdocs. In the PhD class of 2003, 68% accepted a postdoc as their first post-degree position. This is up from around 45% in the late 1990's. These postdocs are concentrated at universities, with a smaller number at government agencies. About half of the potentially permanent positions accepted by new PhDs are in the private sector, and about a quarter are in academia <sup>(2)</sup>.

One could say that physics PhD production has never experienced a significant period of stability. This trend is not expected to end any time soon.

By using past first-year student enrollment figures and factoring in the time it has historically taken students to earn PhDs, along with the percent of individuals who exit doctoral

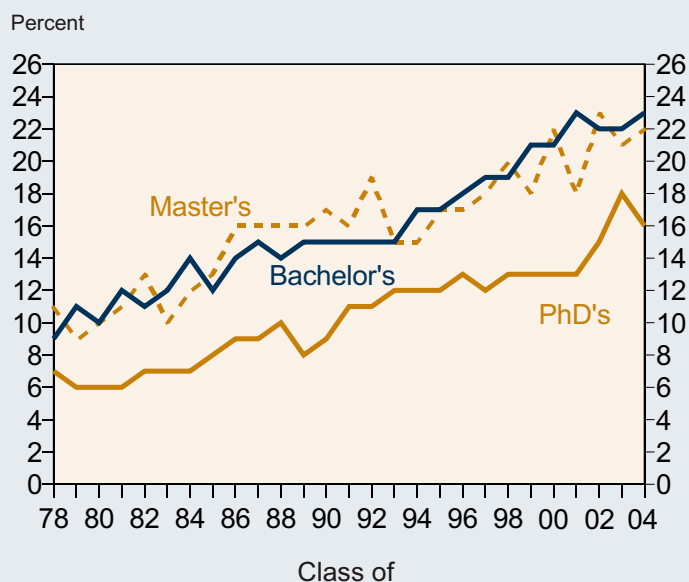
programs prior to receiving a PhD, we have projected PhD production through the 2009-2010 academic year (see **Figure 9**). PhD production should start to register relatively steady increases for the next few years.

## WOMEN

The proportion of physics bachelor's being conferred to women rose steadily from the class of 1993 to a high of 23% in the class of 2001, and has plateaued since then (see **Figure 10**). Despite the recent gains, physics has one of the lowest representations of women among undergraduate degree recipients of any of the science and engineering fields.

Although the representation of women among physics bachelor's has been relatively flat in recent years, the rising overall number of physics bachelor's conferred translates into an increase in the total number of women receiving degrees. The 1143 women who received a physics bachelor's degree in the class of 2004 represents an increase of 23% over the class of 2001.

**Figure 10. Percent of bachelor's degrees, masters degrees and doctorates in physics earned by women, 1978-2004.**



Note: A form change occurred in 1994 resulting in a more accurate representation of women among physics bachelors. Some of the increase in 1994 only, may be a result of that change.

AIP Statistical Research Center, Enrollments and Degrees Report.

The proportion of exiting master's degrees conferred to women has tracked very closely to the proportion among undergraduate degree recipients. The exiting master's in the class of 2004 included 22% women, which corresponds to 160 individuals.

After two years of sharp increases the representation of women among physics PhDs has dropped to 16% for the class of 2004, down from 18%, the all time high set the previous year. The sharp increases in the representation of women in the classes of 2002 and 2003 were largely attributable to an increase in the proportion of women among PhD recipients who were foreign citizens. Similarly, the decline seen in 2004 is a result of the decline in the

number of foreign women. Among US citizens, women represented 15% of physics PhDs, unchanged from 2003. Among foreign citizens, the 2004 figure was 16%, down about three percent from the year before.

For more detail on the representation of women throughout the physics and astronomy communities please see the AIP report: *Women in Physics and Astronomy, 2005* at <http://www.aip.org/statistics/trends/reports/women05.pdf>

## MINORITIES

**Table 11** shows the number and percent of physics degree recipients who are US citizens by their minority or ethnic group. As has been historically true, Hispanic-Americans and African-Americans are underrepresented among physics degree recipients at all levels.

Thirty-five of the degree-granting physics departments are located at an Historically Black College or University (HBCU). These departments play a significant role in producing a large proportion of the degrees conferred to African-Americans, regardless of discipline. For the class of 2004, they graduated 52% of all the physics bachelor's degrees conferred to African-Americans. **Table 12** lists the institutions that have recently averaged the most physics bachelor's degrees to African-Americans. All but 2 of the departments listed (Chicago State U and Harvard U) are HBCU's.

**Table 11. Number and percent of physics degrees granted to US citizens by minority / ethnic group status, class of 2004.**

	Bachelor's		Exiting Master's		PhD's	
	Number	Percent	Number	Percent	Number	Percent
White	4041	87	389	87	444	88
Asian-American	198	4	9	2	33	7
African-American	176	4	16	4	9	2
Hispanic-American	157	3	14	3	7	1
Other	106	2	20	4	13	2
<b>Total US Citizens</b>	<b>4678</b>	<b>100%</b>	<b>448</b>	<b>100%</b>	<b>506</b>	<b>100%</b>

AIP Statistical Research Center, Enrollments and Degrees Report.

Similarly, the four doctoral-granting HBCU physics programs and the additional six departments that offer a master's degree were responsible for a large proportion of the master's and PhDs conferred to African-Americans, 31% and 33% respectively.

The minority data in this report covers a period prior to the hurricane that flooded New Orleans, LA in the summer of 2005. The six degree-granting physics departments in that city (three of which are HBCU's) are responsible for producing a fair number of the African-American bachelor's each year. The extent to which these institutions and communities recover from the effects of the flooding could noticeably alter the number of African-Americans receiving physics bachelor's degrees in the future.

Unlike the African-Americans, Hispanic-Americans receiving physics degrees tend not to have high concentrations at specific universities, despite the concentration of Hispanic-Americans in certain states. Well over half (61%) of the 158 Hispanic-Americans receiving physics bachelor's degrees in 2004 received their degrees

either from Puerto Rico or one of three states: California, Texas and New York.

**Table 12. Departments averaging 3 or more African-American physics bachelor's per year, classes of 2002, 2003 and 2004.**

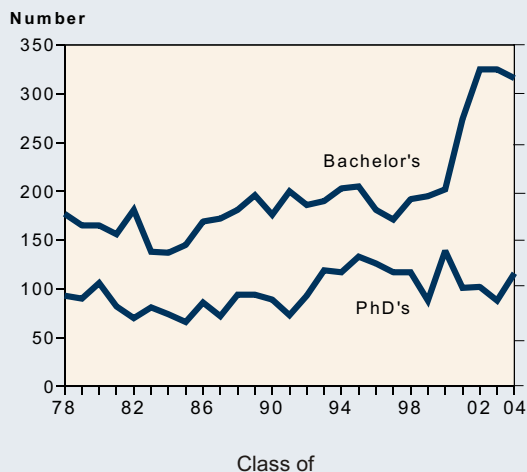
	Annual Average
Xavier U (LA)	14
Benedict Coll (SC)	7
Spelman Coll (GA)	7
Florida A&M U	5
Morgan St U (MD)	4
Norfolk St U (VA)	4
North Carolina A&T St U	4
Alabama A&M U (AL)	3
Chicago St U (IL)	3
Hampton U (VA)	3
Harvard U (MA)	3

Note: List includes only those departments who contributed degree data for all 3 years.

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**Figure 11. Astronomy bachelor's degrees and doctorates awarded in the US, 1978-2004.**



Note: The astronomy doctorate totals presented here do not include astrophysics degrees conferred by physics departments. Those degrees are included among the physics totals.

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**Table 13. Number of degree-granting astronomy departments by highest astronomy degree offered, academic year 2003-2004.**

Department Type	Combined with physics	Separate astronomy	Total
PhD-granting	10	29	39
Master's-granting	2	2	4
Bachelor's-granting	25	7	32
<b>Total</b>	<b>37</b>	<b>38</b>	<b>75</b>

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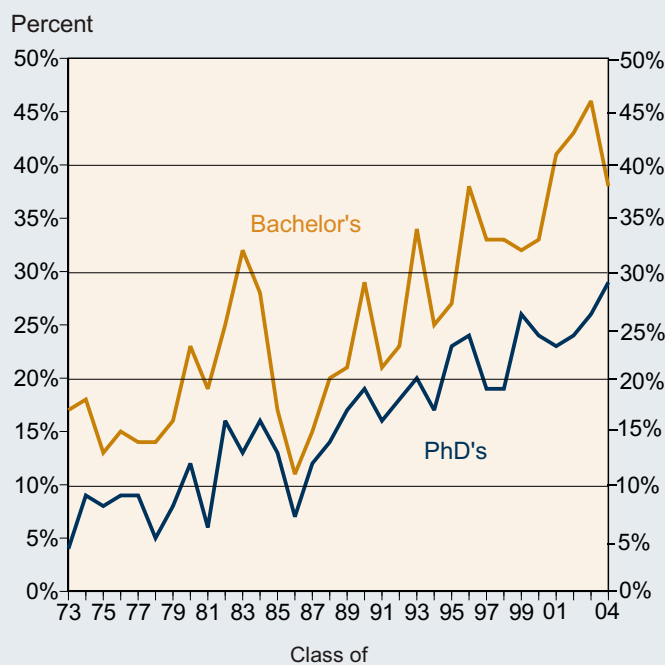
earlier. Most of the students (72%) took their course at a physics department that did not have an astronomy degree program (see **Table 2**).

## ASTRONOMY

The 75 degree-granting astronomy departments in the US fall into two groups. About half are stand-alone departments devoted strictly to the fields of astronomy and astrophysics. The other half are part of departments that also offer degrees in physics (see **Table 13**). It should be noted that some students receive degrees in astrophysics (primarily at the doctoral level) from departments of physics that do not have an astronomy degree program. These astrophysics degrees are included in the physics degree totals presented earlier in the report.

The number of students taking an introductory astronomy course has been increasing in recent years. The 181,000 students taking such a course during the 2003-04 academic year is up about 16% from five years

**Figure 12. Percent of bachelor's degrees and doctorates in astronomy earned by women, 1973-2004.**



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Following the unprecedented two-year increase (61%) in undergraduate astronomy degree production from 2000 to 2002, astronomy bachelor's degree production has remained relatively stable for the last three years (see **Figure 11**). The 38 doctoral-granting astronomy departments have been averaging about 100 PhDs per year for the last few years with 116 PhDs conferred in the class of 2004.

The proportion of women among astronomy degree recipients has shown considerable gains, especially for the undergraduates (see **Figure 12**). Women have traditionally been better represented in astronomy than in physics. In the class of 2004, women comprised 38% of the bachelor's and 29% of the PhDs, compared to 23% and 16% respectively for physics.

**Table 14** lists the astronomy departments that granted the largest number of astronomy bachelor's during the last three years. All but one (Williams College) also have a doctoral program in astronomy. Overall, almost three-quarters of all the astronomy bachelor's came from departments that also offer an astronomy PhD.

Similar to the physics bachelor's, about half of the astronomy undergraduates immediately continue their studies at the graduate level. However, fewer choose graduate study fields outside of astronomy or physics. The private sector hired about half of the astronomy bachelor's who went into the workforce <sup>(2)</sup>.

There were 27 exiting astronomy master's degrees conferred in the class of 2004. Of these, 8 were granted to women and 5 were granted to non-US citizens. Only six of these master's were conferred at one of the four astronomy departments where the master's is the highest degree offered.

<b>Table 14. Astronomy departments averaging 7 or more astronomy bachelor's degrees per year, classes of 2002, 2003 and 2004.</b>	
	Annual Average
U of CA-Berkeley	18
U of Arizona	13
U of CA-Los Angeles	12
U of Wisconsin-Madison	12
Boston U (MA)	11
Pennsylvania St U	11
U of Maryland-College Park	11
Michigan State U	9
U of Colorado-Boulder	9
U of Texas-Austin	9
Florida Inst of Tech	8
U of MA-Amherst	8
U of Virginia	8
Williams College (MA)	8
Ohio State U	7
U of Pittsburgh (PA)	7

Note: List includes only those departments who contributed degree data for all 3 years.  
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The 116 astronomy PhDs conferred in the class of 2004 included 29% women and 33% foreign citizens. New PhDs in astronomy have a lower representation of foreign citizens and a higher representation of women than their physics counterparts, which have 54% and 16% respectively. Postdoctoral appointments are the prevailing post degree outcome for new astronomy PhDs, with about three-quarters of new doctorates accepting one <sup>(2)</sup>.

## APPENDIX

<b>A1. Trend in astronomy enrollments* and degrees, academic years 1992 to 2005.</b>							
Academic Year	Number of astronomy degrees granted			Undergraduate astronomy major enrollments		Graduate astronomy student enrollments	
	Bachelor's	Exiting Master's	PhD's	Juniors	Seniors	1st-year	Total
1992-93	190	56**	119	337	348	173	939
1993-94	203	34	117	257	388	180	901
1994-95	205	43	133	269	351	165	905
1995-96	181	44	126	272	361	149	874
1996-97	177	23	117	265	332	155	837
1997-98	192	29	116	252	330	143	777
1998-99	195	23	88	263	340	165	799
1999-00	202	25	139	395	409	187	838
2000-01	274	13	101	391	461	180	809
2001-02	325	22	102	420	478	170	807
2002-03	325	22	88	385	576	201	892
2003-04	316	27	116	441	540	218	966
2004-05				437	584	212	999

\* Includes part-time students.  
 \*\* Thirty-four Master's came from the Arizona Summer Science Institute for science teachers at the University of Arizona.

Note: The astronomy doctorate totals presented here do not include astrophysics degrees conferred by physics departments. Those degrees are included among the physics totals.

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<b>A2. Trend in physics enrollments* and degrees, academic years 1992 to 2005.</b>							
Academic Year	Number of physics degrees			Undergraduate physics major enrollments		Graduate physics student enrollments	
	Bachelor's	Exiting Master's	PhD's	Juniors	Seniors	1st-year	Total
1992-93	4800	877	1369	6287	7297	3090	14430
1993-94	4615	1077	1481	6146	7289	2902	14201
1994-95	4263	985	1461	5620	6836	2604	13285
1995-96	4156	959	1438	5335	6489	2462	12596
1996-97	3826	789	1385	5057	6116	2404	11786
1997-98	3821	782	1323	5006	5857	2423	11302
1998-99	3646	671	1262	5026	5593	2417	10971
1999-00	3894	684	1214	5227	5913	2510	10768
2000-01	4091	701	1157	5428	6309	2713**	10978
2001-02	4305	657	1095	5599	6521	2777	11402
2002-03	4553	672	1106	6026	7104	2875	11995
2003-04	4965	716	1090	6333	7532	3168	12141
2004-05				6817	8102	3040	13738

\* Includes part-time students.  
 \*\* A change in wording on the 2001 questionnaire resulted in more accurate data on first-year graduate students. This change was responsible for 3% of the 8% increase in total first-year students between 2000 and 2001.

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**A3. Trend in physics enrollments\* and degrees by institution type, academic years 1992 to 2005.**

Academic Year	Number of physics degrees granted			Undergraduate physics major enrollments		Graduate physics student enrollments	
	Bachelor's	Exiting Master's	PhD's	Juniors	Seniors	1st-year	Total
<b>Doctorate-granting institutions</b>							
1992-93	2253	543	1369	3038	3845	2688	13222
1993-94	2203	732	1481	2920	3729	2509	13042
1994-95	2009	665	1461	2648	3453	2209	12173
1995-96	1918	644	1438	2461	3344	2117	11545
1996-97	1746	535	1385	2200	3133	2074	10900
1997-98	1710	516	1323	2223	2899	2127	10432
1998-99	1688	487	1262	2363	2814	2174	10256
1999-00	1871	466	1214	2412	3053	2304	10104
2000-01	1849	491	1157	2565	3270	2431**	10272
2001-02	2036	456	1095	2684	3399	2480	10622
2002-03	2262	454	1106	2951	3792	2614	11237
2003-04	2470	506	1090	3058	4079	2863	12141
2004-05				3357	4491	2716	12898
<b>Master's-granting institutions</b>							
1992-93	448	334		719	887	405	1208
1993-94	475	345		696	930	393	1159
1994-95	420	320		610	813	395	1113
1995-96	376	315		556	703	345	1047
1996-97	314	254		530	667	330	886
1997-98	320	266		561	636	296	870
1998-99	275	184		478	576	243	715
1999-00	335	218		465	589	206	664
2000-01	323	210		438	574	282**	706
2001-02	340	201		443	594	297	780
2002-03	310	218		494	610	261	758
2003-04	372	210		548	694	305	800
2004-05				562	756	324	840
<b>Bachelor's-granting institutions</b>							
1992-93	2099			2530	2565		
1993-94	1937			2530	2630		
1994-95	1834			2362	2570		
1995-96	1862			2318	2442		
1996-97	1766			2327	2316		
1997-98	1791			2225	2322		
1998-99	1683			2185	2203		
1999-00	1688			2348	2271		
2000-01	1919			2425	2465		
2001-02	1929			2472	2528		
2002-03	1981			2581	2702		
2003-04	2123			2727	2759		
2004-05				2898	2855		

\* Includes part-time students.

\*\* A change in wording on the 2001 questionnaire resulted in more accurate data on first-year graduate students. This change was responsible for half of the increase at PhD institutions and a quarter of the increase at masters institutions.

AIP Statistical Research Center, Enrollments and Degrees Report.

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### ***Physics Bachelors with Master's Degrees (March 2003)***

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### ***Rosters of Physics and Astronomy Departments with Enrollments and Degree Data, 2004 (August 2005)***

Two reports detailing data for both physics and astronomy degree-granting departments in the U.S.

### ***2004 Salaries: Society Membership Survey Tables (April 2003)***

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