AMERICAN INSTITUTE OF PHYSICS

AIP REPORT

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ENROLLMENTS AND DEGREES REPORT, 2005.

Figure 1. Number of physics PhD's conferred in the United States, 1966 to 2005.

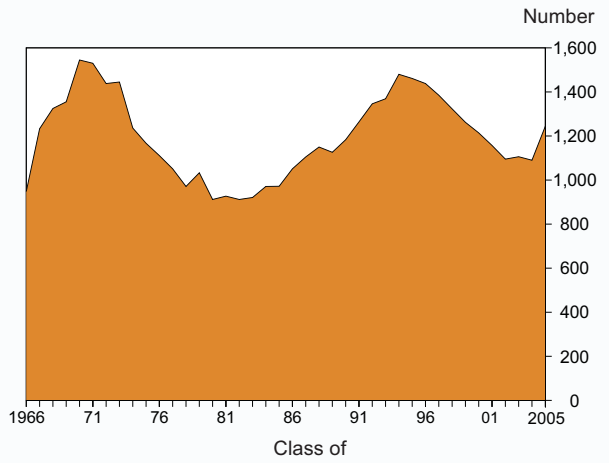

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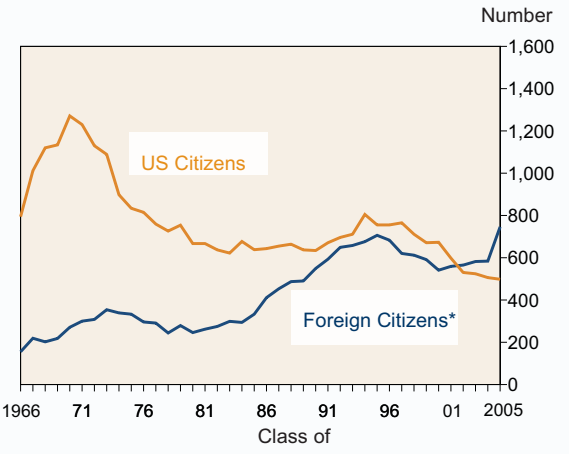
Figure 2. Citizenship of physics PhD's, 1966 to 2005.



**Foreign citizens include individuals with permanent resident status and those with temporary visas.*

Sources: NSF (1966-1991) AIP (1992-2005)

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Highlights

➢There were 1,244 physics PhD's conferred in the class of 2005, a 14% increase from the previous year. The proportion of foreign citizens among new physics PhD's is at an all time high with 60% of the class of 2005 being non-US citizens **(see Figure 2)**.

➢The number of enrolled junior and senior physics majors has been steadily rising and is now at levels that exceeds the recent highs of the early 1990's **(see Figure 5)**.

➢The 5,113 physics bachelor's in the class of 2005 represents the sixth consecutive year of increase, resulting in an overall gain of 40% from a recent low in 1999 **(see Figure 6)**.

➢The 343 astronomy bachelor's produced in the class of 2005 establishes a new all-time high. Astronomy bachelor's experienced an unprecedented two-year increase (61%) from 2000 to 2002 **(see Figure 7)**.

Highlights (continued)

➢First-year student enrollments at master's granting departments continue to rise, up 61% from six years earlier **(see Figure 10)**.

➢After seven years of increasing enrollments, first-year graduate student enrollments at PhD-granting departments have dropped for the second consecutive year **(see Figure 11)**.

➢Based on recent trends in first-year student enrollments at doctoral-granting departments, PhD production will continue to increase for at least the next few years and it is expected that US citizens will return to being in the majority of new PhD's by 2008 or 2009 **(see page 16)**.

➢Fifteen out of the 185 doctoral-granting departments were responsible for producing about 30% of all the PhD's conferred during the last three years **(see Table 12)**.

BACKGROUND

The Statistical Research Center of the American Institute of Physics has been collecting Enrollment and Degree data for four and a half decades. This departmental census goes out in the fall of each year to all physics and astronomy departments in the US and Puerto Rico. This report is based on data collected in the fall of 2005 from the 764 departments that offer physic degrees **(**see **Table 1)** and from the 76 departments that offer astronomy degrees **(**see **Table 2)**. Eight of the 185 PhD-granting physics departments do not offer undergraduate degrees in physics and 7 universities have two degree-granting departments, usually a department of physics and a department of applied physics.

Table 1. Departments by highest physics degree offered, academic year 2004-2005.

	Number of Depts.	Percent of Depts.
Bachelor's-granting	513	67
Master's-granting	66	9
PhD-granting	185	24
Total	764	100%

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Table 2. Number of degree-granting astronomy departments by highest astronomy degree offered, academic year 2004-2005.

Department Type	Combined with physics	Separate astronomy	Total
PhD-granting	10	29	39
Master's-granting	2	2	4
Bachelor's-granting	26	7	33
Total	38	38	76

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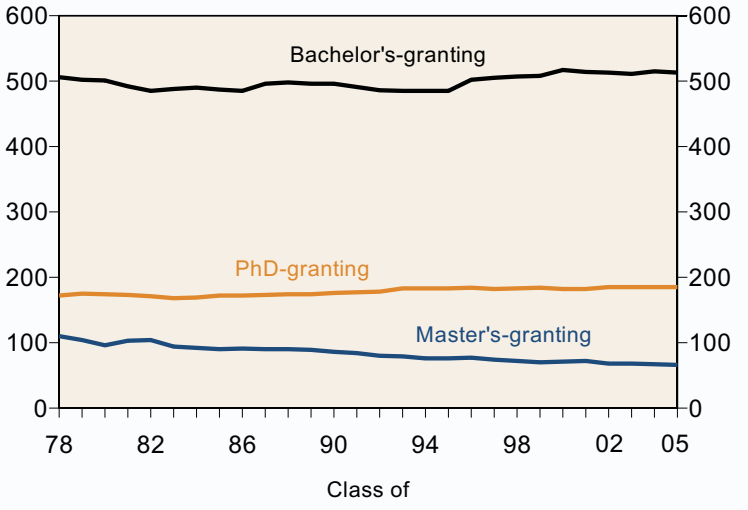
The 76 degree-granting astronomy departments in the US fall into two groups. Half are separate, stand-alone departments, devoted strictly to the fields of astronomy and astrophysics. The other half are part of a combined department that also offers degrees in physics. In the cases of these combined departments their physics and astronomy data were collected separately. It should be noted that some students receive degrees in astrophysics (primarily at the doctoral level) from departments of physics. These astrophysics degrees are included in the physics degree totals presented in this report. Eight of the 39 PhD-granting astronomy departments do not have an undergraduate astronomy program.

In past Enrollments and Degrees Reports, the data gathered from the degree-granting astronomy departments were presented in a separate section of

the report. This report integrates the astronomy department data throughout the report. The enrollment and degree data concerning astronomy includes what was reported by the stand alone astronomy departments as well as what was reported from the astronomy portion of the combined departments. This was done to facilitate comparisons with data gathered from the physics departments.

Figure 3. Number of departments by highest physics degree offered, 1978 - 2005.



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The information presented in this report is a product of the efforts put forth by department chairs, faculty members, and staff in providing their individual departmental data. For this year, we received responses from 96% of the departments. 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.

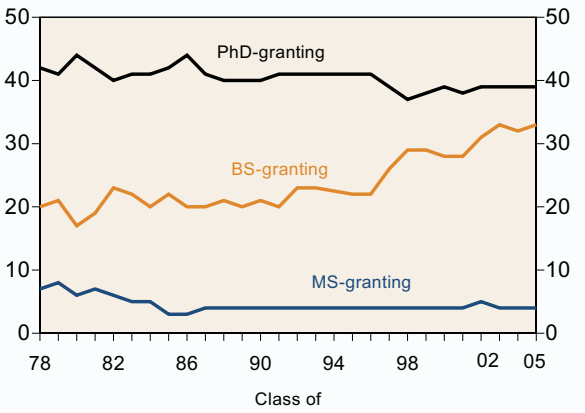
Much of the individual departmental-level data that are used to create the tables and figures in this report can be found in the 2005 Rosters of Physics and Astronomy Departments which can be found on the statistical research center's website (www.aip.org/statistics).

Data on the subsequent educational pursuits and types of employment secured by recent physics and astronomy degree recipients can be found in the "Initial Employment Report", also available on our web site.

Each year, for various reasons, a few degree-granting physics and astronomy departments may change their degree-granting status. Departments which only offer a bachelor's degree may start a graduate program at the master's or PhD level. Others may drop an existing graduate program and become a department where the bachelor's is the highest degree available. Others still may drop their degree-granting status altogether. Conversely, some colleges or universities may establish a degree-granting physics or astronomy program where one did not exist before.

Over the last two decades, the number of departments whose highest physics degree was the bachelor's or PhD has slightly increased (see **Figure 3).** Although gradual, these gains have been significant enough to offset the fairly steady decline seen in the number of departments that offer a physics master's as its highest degree. Although some of the gains in bachelor's- and PhD-granting departments are the result of master's programs adding a doctoral component or eliminating its graduate program, there has still been an overall net gain of 15 physics departments since 1985.

Figure 4. Number of departments by highest astronomy degree offered, 1978 - 2005.



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The number of departments awarding astronomy degrees has increased substantially in recent years **(**see **Figure 4)**. This growth is primarily the result of existing physics departments adding an astronomy bachelor's program to their current degree offerings.

UNDERGRADUATE ENROLLMENTS

In addition to providing programs for degree seeking students, physics and astronomy departments also offer introductory level physics and astronomy instruction to undergraduates enrolled in a wide range of majors. **Table 3** contains enrollment numbers for introductory physics, astronomy, and physical science courses taught by physics and astronomy departments. The data in the table represent the annual enrollments in the first-term of introductory courses. It is a measure of the number of students who, in the 2004-05 academic year, were exposed to these subjects at degree-granting physics and astronomy departments.

Table 3. Introductory course enrollments by type of department, academic year 2004-2005.

Department Type	Calculus Based	Algebra Based	Conceptual	Astronomy*	Physical Science
Bachelor's-granting	48,000	46,000	29,000	63,000	33,000
Master's-granting	18,000	18,000	14,000	28,000	8,000
PhD-granting	111,000	75,000	29,000	92,000	17,000
Total	177,000	139,000	72,000	183,000	58,000

*Astronomy course enrollments also include students from degree-granting astronomy departments, which accounted for 46,000 of the 183,000 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)

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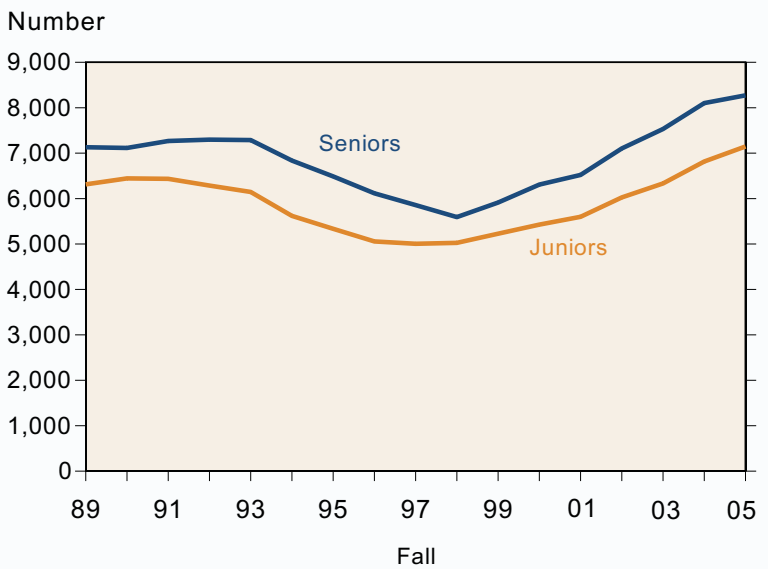
The introductory physics courses are divided into three basic types depending upon the level of math required, with the calculus-based course representing the largest group. In total, about 388,000 students took an introductory physics course during the 2004-05 academic year. This represents an increase of 22% from the number of students who were enrolled six years earlier. The increase was similar for the course enrollments in each math levels and reflects, in large part the increase in overall college enrollments.

Introductory astronomy enrollments have also been increasing, 17% in the last six years, with enrollments of about 183,000 students in 2004-2005. Introductory astronomy courses are offered at both the degree-granting astronomy departments and at physics departments with no astronomy degree program. In fact, about three-quarters of the introductory astronomy course enrollments were at the far more numerous separate physics departments.

In the fall of 2005 physics departments reported enrollments of 7,142 junior-level and 8,272 senior-level physics majors. **Figure 5** shows changes in undergraduate major enrollments over time. Junior level enrollments have risen 43% since a recent low in 1998. As can be seen from the figure, the number of senior-level majors is significantly larger than the previous academic year's junior-level majors. This is primarily a result of many students maintaining senior-level status for more than one academic year. Data from the AIP survey of physics seniors show that about 30% of physics majors take more than 4 years to complete their degree. But this is low compared to the 60% figure for all bachelor's [(1)].

Many factors can contribute to why physics bachelor's might require more than four years to obtain their undergraduate degree, including: taking additional course work for a double major, changing major, taking a leave of absence, holding employment while enrolled part-time, and transferring from another institution. Only a small proportion of the individuals requiring more than 4 years indicated they were enrolled in a five-year program [(1)].

Figure 5. Junior and senior level physics major enrollments, fall 1989 - fall 2005.



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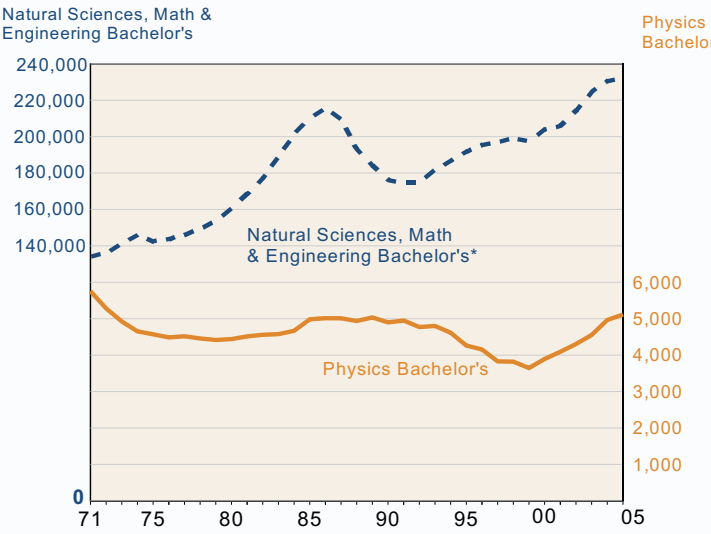
UNDERGRADUATE DEGREES

Figure 6 displays more than three decades of undergraduate degree production in physics and in the natural sciences, math and engineering. The 5,113 physics bachelor's conferred in the class of 2005 represents the sixth consecutive year of increase. These gains represent a 40% increase over the recent low in 1999.

Figure 6. Physics bachelor's and Natural Sciences, Math and Engineering bachelor's produced in the US, 1971 to 2005.



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* NCES Digest of Education Statistics

The recent gains in physics bachelor's production not only completes the recovery from the steady declines experienced during the 1990's but substantially out paces gains seen in degree production for related majors during the same time period. Still, despite the rapid increase, physics bachelor's sill only represent 1 out of every 280 (0.36%) bachelor's conferred in all fields combined for the class of 2005.

To get a clearer picture of the relative size of the physics degree class, **Table 4** compares the number of the physics degrees granted to other fields for the class of 2005. Physics only represents about 2% of the degrees conferred in the natural sciences, math and engineering.

Table 4. Bachelor's degrees awarded in selected fields, class of 2005.

	Number
Engineering	79,743
Biological sciences	64,611
Computer and Information sciences	54,111
Mathematics	14,351
Chemistry	9,664
Physics	5,113
Geoscience	3,953

Note: Geoscience does not include environmental science.

Non-physics data: NCES Digest of Education Statistics 2006, Table 258.

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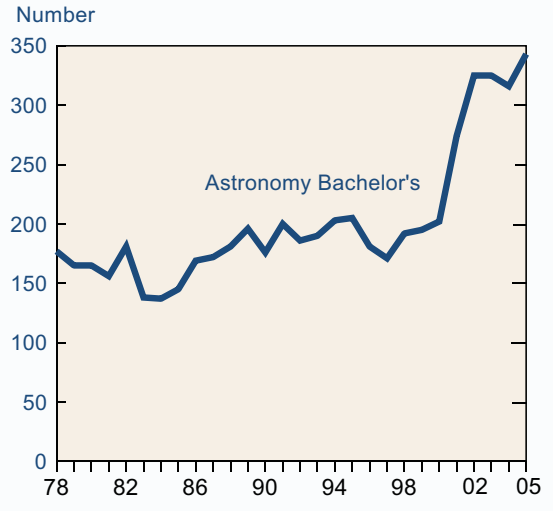
Figure 7. Astronomy bachelor's degrees awarded in the US, 1978 to 2005.



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The number of undergraduate astronomy degrees conferred in the class of 2005 is up 8% from the previous year, establishing a new all-time high of 343 degrees **(**see **Figure 7)**. Astronomy bachelor's degree production has risen very sharply during the last decade, much of which is the result of an unprecedented two-year increase (61%) from 2000 to 2002.

There are many influences responsible for the gains seen in astronomy and physics degree production and for that matter in the natural sciences, math and engineering. Changes in the general population and the educational background of college age students is one area that is relatively easy to quantify. There recently has been an increase in the number of 18 year olds, 21% between 1992 (a recent low) and 2001 [(3)]. As the number of 18 year olds has increased, there has also been a small increase in the proportion of high school graduates enrolling in college [(4)]. These two population changes create a larger pool of students for all majors to draw from. There has also been a steady increase in the number and proportion of high school students taking a physics class, with particularly fast growth in the number of students taking Advanced Placement physics. The likelihood of an individual majoring in physics is much greater if he or she has taken a physics course while in high school, and this is especially true for AP physics takers.

Efforts put forth by different aspects of the physics community, although hard to measure, may also be responsible for some of the recent gains. One such initiative which was organized by the National Task Force on Undergraduate Physics, resulted in the publication *Strategic Programs for Innovations in Undergraduate Physics: Project Report* (SPIN-UP). Another is an annual workshop for new physics and astronomy faculty members organized by the American Association of Physics Teachers This conference helps new faculty understand how students learn physics and astronomy and suggests how this information can impact a new professor's teaching methods.

There are also many unpredictable influences and factors, like economic changes, that can affect the fields students choose to study as an undergraduate. That said, using the junior enrollment figures from **figure 5** and the predicted college age population increases for the next couple of years, it is probably safe to predict that physics bachelor's production will continue to increase for at least the next few years.

Figure 8 separates physics bachelor's production by the highest physics degree offered by the department. Recent increases in degree production are occurring at all department types, with the PhD-granting departments realizing the greatest gains, increasing 55% in six years. These same departments experienced the greatest declines

Figure 8. Physics bachelor's degrees awarded by department type, 1965-2005.

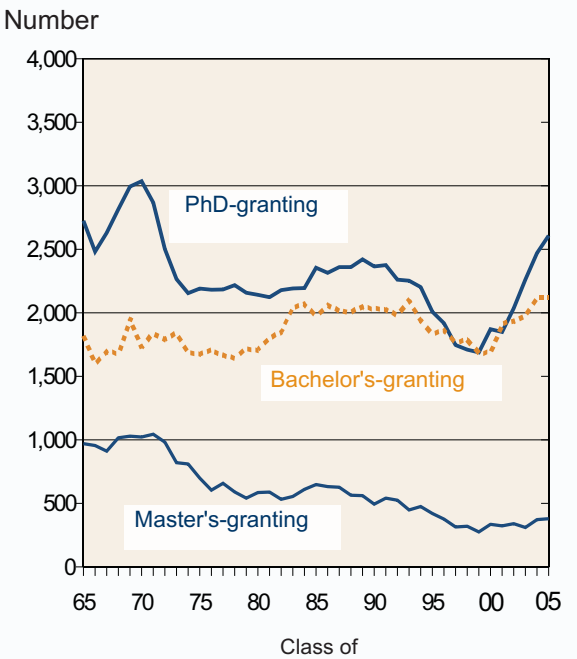

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Table 5. Number of physics bachelor's produced by highest degree offered, class of 2005.

Department Type	Number of Depts	Degrees per Department	
		Average	Median
Bachelor's-granting	513	4.1	3
Master's-granting	66	5.7	5
PhD-granting	177	14.7	11

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Note: There are an additional 8 PhD-granting departments which do not offer a degree at the bachelor's level.

during the 1990's. This greater swing in degrees at the PhD-granting departments may, in part, have resulted from undergraduates being exposed to graduate students who were discontented about their employment prospects during the poor PhD job market of the early 1990's.

The physics departments that do not have a graduate program tend to be small, averaging about 4 bachelor's per department for the class of 2005 **(**see **Table 5)**. Physics departments where the PhD is the highest degree offered average over three times this number. Although generally smaller, the undergraduate-only departments are far more numerous and collectively are responsible for producing 42% of all the physics bachelor's in the class of 2005**.** **Figure 9** further illustrates the differences in size of a department's undergraduate program by the highest degree it offers. In 2004-05, only 11% of the undergraduate-only departments had a class size of 10 or more. This compares to 18% of the master's-granting departments and over half of the PhD-granting departments.

As has been historically true, foreign citizens make up only a small fraction of the undergraduate physics degrees conferred in the US, with 7% of the class of 2005 being non-US citizens.

Figure 9. Size of undergraduate program by highest physics degree offered, class of 2005.

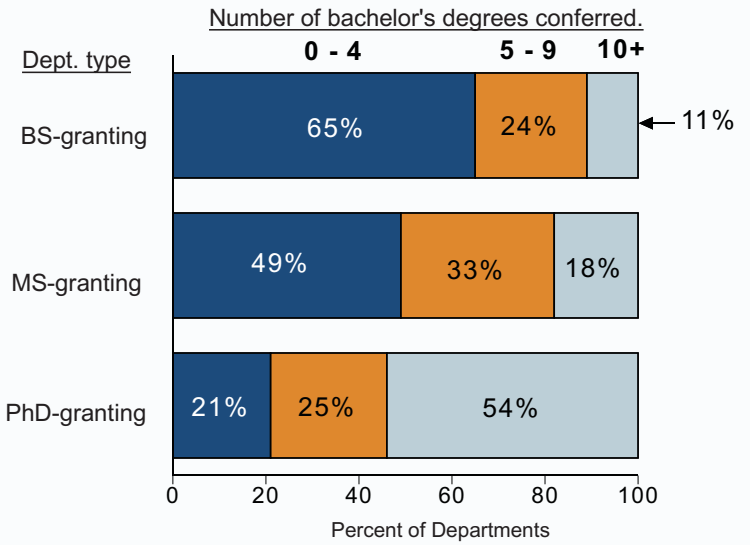

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Table 6. Bachelor's-granting departments averaging 10 or more physics bachelor's degrees per year, classes of 2003, 2004 and 2005.

	Annual Average		Annual Average
CA Poly St U-San Luis Obispo	24	Saint Olaf College (MN)	12
US Air Force Academy (CO)	23	The College of New Jersey	12
Harvey Mudd College (CA)	22	U of Northern Colorado	12
College of Charleston (SC)	19	Augustana College (IL)	11
Illinois State U	19	Colorado College	11
U of Wisconsin-La Crosse	19	James Madison U (VA)	11
SUNY College-Geneseo (NY)	18	Middlebury College (VT)	11
Williams College (MA)	18	Sonoma State U (CA)	11
Reed College (OR)	17	Whitman College (WA)	11
Gustavus Adolphus Coll (MN)	16	Benedict College (SC)	10
Bates College (ME)	15	Colby College (ME)	10
Carleton College (MN)	15	Furman U (SC)	10
Bethel College (MN)	13	Grove City College (PA)	10
Dickinson College (PA)	13	Kalamazoo College (MI)	10
US Military Academy (NY)	13	U of Puget Sound (WA)	10
Bowdoin College (ME)	12	U of Wisconsin-River Falls	10
Grinnell College (IA)	12	Xavier U (LA)	10
Oberlin College (OH)	12		

Note: List includes only those departments who contributed degree data for all 3 years.
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Table 7. Master's-granting departments averaging 8 or more physics bachelor's degrees per year, classes of 2003, 2004 and 2005.

	Annual Average		Annual Average
Texas State U-San Marcos	14	U of Central Oklahoma	9
Miami U (OH)	13	U of CO, Colorado Springs	9
Appalachian State U (NC)	11	Ball State U (IN)	8
California State U-Northridge	11	San Diego State U (CA)	8
Northern Arizona U	11	Stephen F Austin State U	8
San Jose State U (CA)	11	SUNY Binghamton U (NY)	8
Cleveland State U (OH)	10	U of Memphis (TN)	8
Missouri State U	9	Virginia Commonwealth U	8

Note: List includes only those departments who contributed degree data for all 3 years.
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Tables 6, **7** and **8** 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.

Table 9 lists the astronomy departments that granted the largest number of astronomy bachelor's during the last three years. All of the departments in the listing 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.

After graduating, 37% of new physics bachelor's in the classes of 2003 and 2004 immediately continued their education at the graduate level in physics or astronomy. An additional fifth immediately enrolled in graduate programs other than physics, with engineering being the dominant field. The balance of new graduates, about 40%, entered directly into the workforce. Many of these will eventually enroll in a graduate program after having worked for a year or two. 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. In the end, about two-thirds of physics bachelor's will have enrolled in a graduate program, the

Table 8. PhD-granting departments averaging 20 or more physics bachelor's degrees per year, classes of 2003, 2004 and 2005.

	Annual Average		Annual Average
U of California-Berkeley	77	Cornell U (NY)	28
U of Washington	71	Ohio State U	28
Mass Inst of Technology	68	U of California-Davis	28
Brigham Young U (UT)	55	U of Minnesota-Minneapolis	27
U of Illinois-Urbana/Champaign	44	Pennsylvania State U	26
U of California-Los Angeles	41	U of Michigan-Ann Arbor	26
U of California-Santa Barbara	36	Carnegie Mellon U (PA)	25
U of Texas-Austin	36	Rensselaer Polytech Institute (NY)	25
U of Arizona	35	U of Wisconsin, Madison	25
U of California-San Diego	34	Georgia Inst of Technology	24
Rutgers U-New Brunswick (NJ)	34	Purdue U-West Lafayette (IN)	24
U of Maryland-College Park	33	U of Florida	24
Colorado School of Mines	32	U of Utah	24
U of Virginia	32	Portland State U (OR)	21
U of California-Santa Cruz	31	Stanford U (CA)	21
California Inst of Technology	30	Boston U (MA)	20
Cornell U-Applied (NY)	29	U of California-Davis Applied	20
U of Chicago (IL)	29		

Note: List includes only those departments who contributed degree data for all 3 years.
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Table 9. Astronomy departments averaging 7 or more astronomy bachelor's degrees per year, classes of 2003, 2004 and 2005.

	Annual Average		Annual Average
U of California-Berkeley	22	U of Maryland-College Park	9
U of Colorado-Boulder	15	U of Mass-Amherst	9
U of Wisconsin-Madison	12	Michigan State U	8
Boston U (MA)	11	U of Michigan-Ann Arbor	8
Florida Inst of Technology	11	U of Virginia	8
U of Arizona	11	U of Pittsburgh (PA)	7
U of California-Los Angeles	10	U of Texas-Austin	7
Pennsylvania State U	10		

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

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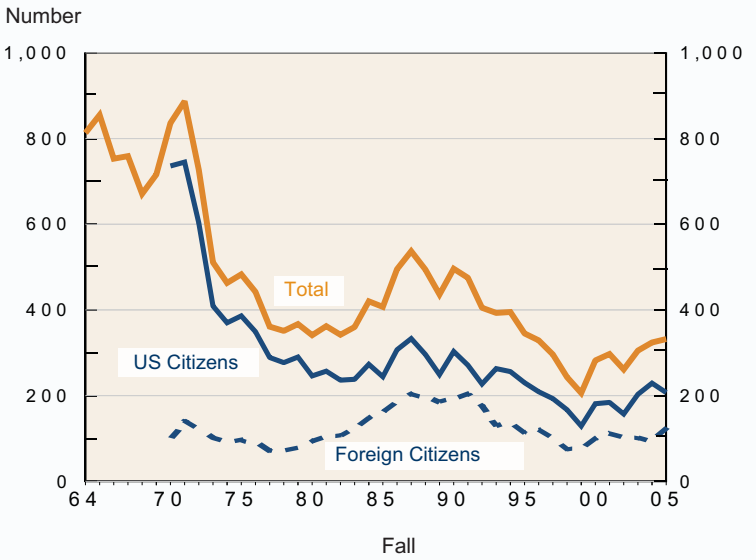
majority receiving a master's or a PhD in a diverse set of fields [2].

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 directly into the workforce [2].

GRADUATE ENROLLMENTS

Figure 10. First-year graduate physics student enrollments at master's-granting physics departments, fall 1964 to fall 2005.



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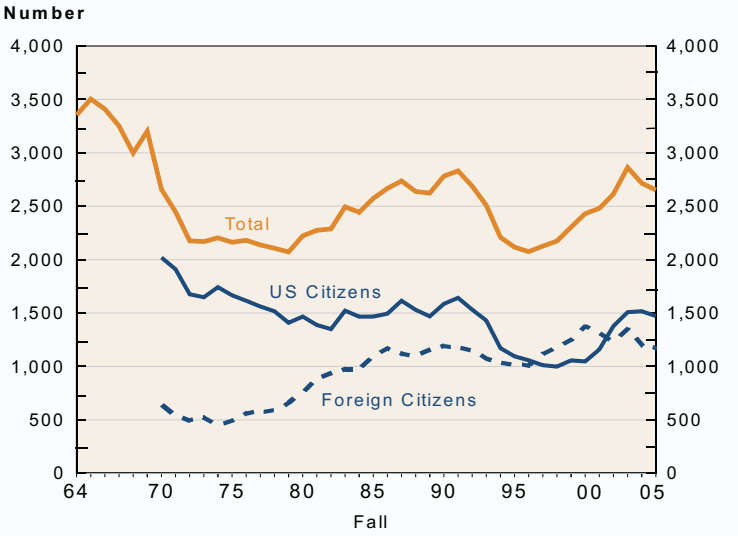
Overall, the number of students enrolling in a graduate physics department in the fall of 2005 is down 6% from a recent high two years earlier. Students can choose to enroll at one of two types of physics departments. Those that offer a physics master's as its highest degree or those that grant a PhD. Some students who enrolled at the master's-granting departments will subsequently enroll at a PhD-granting department after having received their master's. Some students at PhD-granting departments are enrolled in a master's degree program.

Figure 11. First-year graduate physics student enrollments at PhD-granting physics departments, fall 1964 to fall 2005.



First-year student enrollments at the master's-granting departments in the fall of 2005 represent a 61% increase from recent low 6 years earlier **(**see **Figure 10)**. The recent gains have been realized for both US and non-US citizens. However, this represents only a partial recovery from the substantial long-term drop in enrollments at this department type. This over-all long-term decline has to some extent paralleled the decline in the number of master's granting departments seen in Figure 3.

First-year student enrollments at the PhD-granting departments in the Fall of 2005 represent the second year of decline falling 7% from the fall of 2003 **(**see **Figure 11)**. Never the less, enrollments at these departments are still up a substantial 27% from a recent low in the fall 1996. Although the number of US citizens enrolling at these departments is down 3% from the previous fall, US student enrollments are up 47% from 7 years earlier.

Despite year-to-year fluctuations, first-year graduate student enrollments at the 43 graduate level astronomy departments have been generally rising in recent years **(**see **Figure 12)**. This is not unexpected, given the sharp increase in the number of us students receiving astronomy bachelor's degrees.

The characteristics of first-year physics and astronomy graduate students are presented in **Table 10.** The proportion of women enrolling at astronomy departments (44%) is twice the level at physics departments. Astronomy departments also have a considerably larger proportion of US citizens. First-year physics and astronomy graduate students are typically well supported, with the vast majority receiving some type of financial support, most commonly teaching assistantships. First-year graduate students in astronomy programs are twice as likely to hold a research assistantship than physics students.

Figure 12. First-year graduate astronomy student enrollments at departments that offer astronomy degrees, fall 1973 to fall 2005.

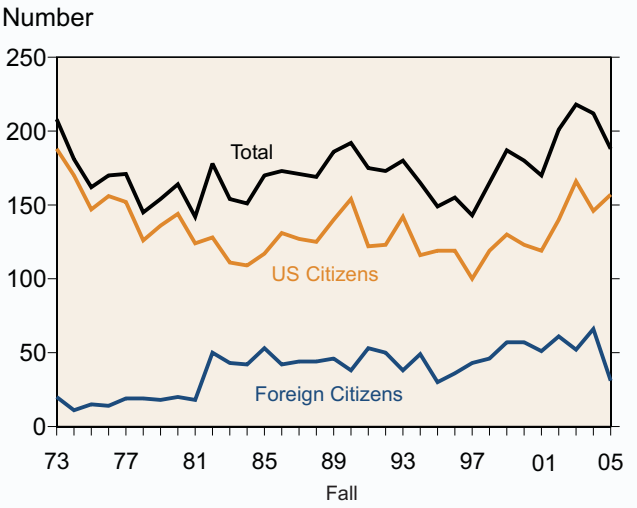


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Table 10. Characteristics of first-year physics graduate students, fall of 2005.

		Physics Depts		Astronomy Depts
		PhD-granting	Master's-granting	Both types
Number of departments		185	66	43
Gender		%	%	%
	Male	77	79	56
	Female	23	21	44
Citizenship				
	US	56	62	84
	Foreign	44	38	16
Type of support*				
	Teaching assistantship	66	68	47
	Research assistantship	13	10	27
	Fellowship	17	5	22
	Self-financed	1	14	13
	Other	3	3	1
Total first-year enrollments		2652	332	188

*Source: AIP Graduate Student Survey, 2005-2006.

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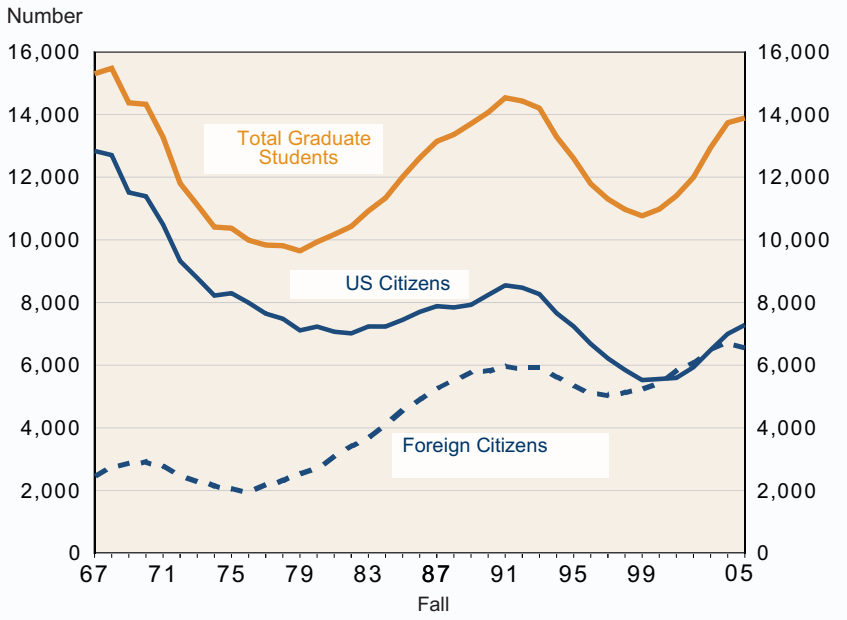
Figure 13. Graduate physics student enrollments, fall 1964 to fall 2005.



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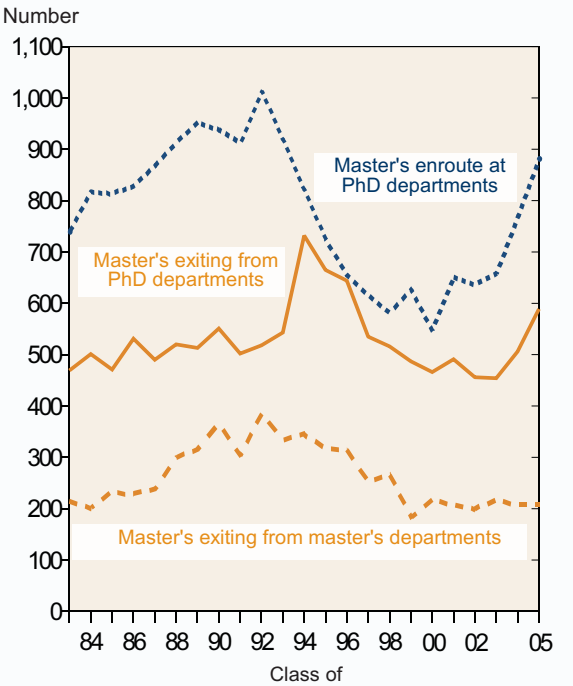
The total graduate student enrollment data in **Figure 13** reflect the cumulative effect of the year-to-year changes seen in the first-year student graphics. In the fall of 2005, foreign citizens comprised 48% of the enrolled physics graduate students. About 7% of the total graduate student enrollments were at departments that offer a master's as its highest physics degree.

GRADUATE DEGREES

Master's degrees, both enroute and exiting have been increasing at departments that offer a PhD **(**see **Figure 14)**. This reflects the first-year student enrollment increases that began in the late 1990's. The 883 enroute degrees were conferred on students continuing on at the same department in pursuit of a PhD. Although not all students pursuing a PhD are required to receive this interim degree, this recent sharp increase does foretell future increases in PhD production.

Figure 14. Master's degrees conferred by type of degree and department, 1983-2005.



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The number of students receiving master's degrees from departments where the master's is the highest degree available has remained relatively flat in recent years. The number of master's from these departments is expected to increase in coming years as a result of recent enrollment increases. Some of these students will continue with graduate studies at different departments or institutions, in physics or another field.

Clearly, the 209 master's recipients in the class of 2005 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 589 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 representation of women (25%) and non-citizens (40%) for exiting master's was similar regardless of whether the degree recipient received their degree from a PhD-granting department or from a department which offered the master's as its highest physics degree.

The departments listed in **Table 11** were the top producing master's-only graduate programs for the degree classes 2003, 2004 and 2005. Combined, these 9 departments awarded 27% of the master's degrees in these years, but represented only 14% of the master's-granting departments.

Figure 1 on the report cover shows the history of physics PhD production in the United States since 1966. The trend in physics PhD production has rarely been stable over the decades. Many factors influence the fluctuations in PhD production. One recent influence is the overall increase in the US college age population, coupled with a trend toward more students attending college and earning degrees at higher levels. Changes in how

Table 11. Departments with the master's as the highest degree offered averaging 5 or more physics master's degree per year, classes of 2003, 2004 and 2005.

	Annual Average
Christopher Newport U (VA)	8
U of Texas, El Paso	8
Ball State U (IN)	7
U of Louisiana, Lafayette	6
U of Louisville (KY)	6
U of Mass, Boston	6
U of Mass, Dartmouth	6
Southern Illinois U, Carbondale	5
Western Illinois U	5

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

AIP Statistical Research Center, Enrollments and Degrees Report.

funding for S&E research is administered also influence the number of individuals pursing S&E fields.

Many of the influences that affected physics PhD production also influenced degree production in other science and engineering fields, and indeed PhD production as a whole in this country **(**see **Figure 15).** The 1,244 physics PhD's in the class of 2005 represent 2.8% of all PhD's conferred in the US and 4.4% of the 28,000 S&E PhD's in the class of 2005.

Figure 2, also on the cover, shows the number of US and non-US citizens receiving PhD's in the US starting with the class of 1966. The increase in non-US citizens starting in the early 1980's was to a great extent driven by the appearance of students from China, who previously had not been

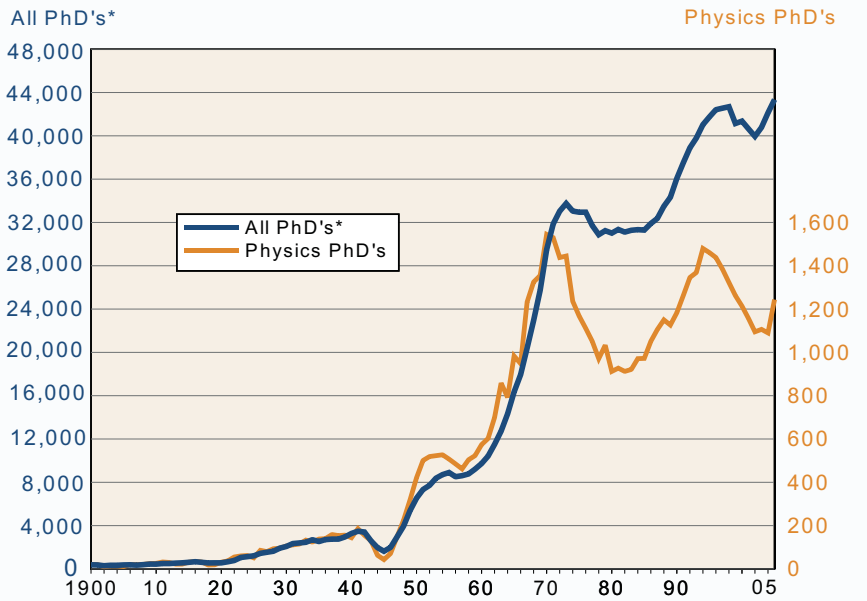
permitted by their government to study in the US. During the past decade the number of US citizens receiving physics PhD's has been declining, falling 34%. Degrees to non-US citizens also declined in the late 1990's, but then turned up starting with the class of 2000, with a sharp single year increase of 28% between the class of 2004 and 2005. Non-US citizens represented 60% of all physics PhD's in the class of 2005.

There is considerable variety in the size of doctoral granting departments. The 185 doctoral-granting physics departments averaged about 7 PhD's per department in the class of 2005. Fifty-six or 30% of the departments conferred two or fewer PhD's. At the other end of the spectrum, the 15 departments listed in **Table 12** are responsible for producing about 30% of all the PhD's conferred during the last three years.

Physics PhD's take a median of 6 full-time equivalent (FTE) years of graduate study in the US to complete their degree, with about 1 in 7 requiring 8 or more years. Based on recent trends in first-year student enrollments at doctoral-granting departments, PhD production will continue to increase for at least the next few years. Because first-year student enrollments among US citizens rose sharply in the early 2000's, it is expected that US citizens will return to being the majority of physics PhD's by 2008 or 2009.

The type of employment new PhD's accept can vary greatly over time, influenced by changing economic conditions and shifting patterns of long term career goals. About two-thirds of the PhD's in the class of 2004 accepted a postdoc as their first post-degree position. This is up significantly from the late 1990's, when about 45% took a postdoc. For more information on the types of jobs new degree recipients accept, see the Initial Employment Report at www.aip.org/statistics.

Figure 15. Physics PhD's and all PhD's conferred in the US, 1900 to 2005.



AIP Statistical Research Center, Enrollments and Degrees Survey
* NSF Survey of Earned Doctorates

Table 12. Departments averaging 15 or more physics doctorates per year, classes of 2003, 2004 and 2005.

	Annual Average		Annual Average
MA Inst of Technology	35	Cornell U (NY)	18
U of California-Berkeley	29	U of Wisconsin, Madison	18
U of Maryland, College Park	27	U of California, Santa Barbara	17
U of Texas-Austin	27	U of Chicago (IL)	17
SUNY-Stony Brook (NY)	23	Princeton U (NJ)	16
CA Inst of Technology	22	U of Washington	16
U of Illinois-Urbana/Champaign	22	U of Minnesota, Minneapolis	15
Stanford U (CA)	20		

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

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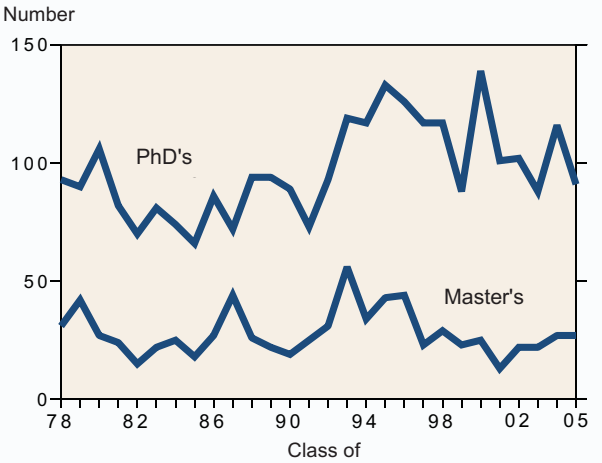
Turning from physics to astronomy graduate degrees, we can see in **Figure 16** that the 39 doctoral-granting astronomy departments have been averaging about 100 PhD's per year for the last few years, with 91 PhD's conferred in the class of 2005. The average number of degrees per department was just over two, with eight departments not conferring any degrees in the class of 2005. One third of the PhD's in the class of 2005 were non-US citizens. This compares to 60% non-citizens among physics PhD's. Postdoctoral appointments are the prevailing post-degree outcome for new astronomy PhD's, with about three-quarters of new doctorates accepting one [(2)]. There were 27 exiting astronomy master's degrees conferred in the class of 2005. Of these 13 were women and 6 were non-US citizens.

Figure 16. Astronomy master's degrees and doctorates awarded in the US, 1978-2005.



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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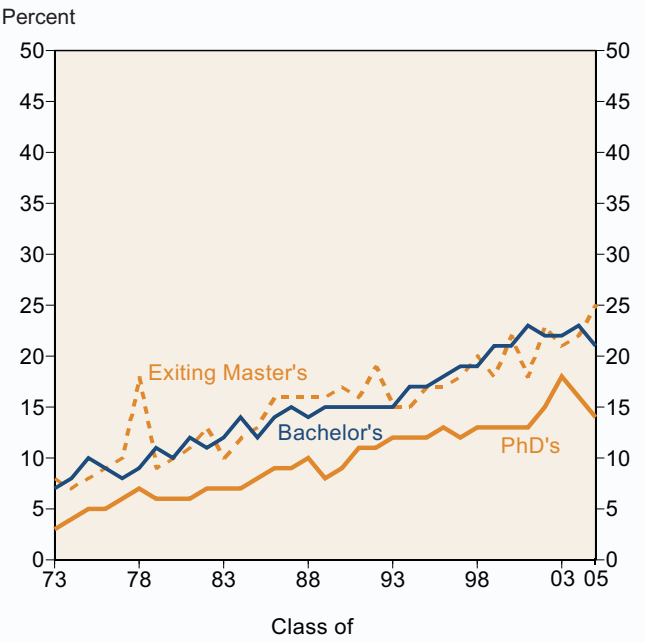
WOMEN

The proportion of physics bachelor's being conferred to women rose steadily through most of the 1990's leveling off at around 22-23% in the early 2000's. The class of 2005 was comprised of 21% women **(**see **Figure 17)**. Physics has one of the lowest representations of women among undergraduate degree recipients. The proportion of exiting master's degrees conferred to women historically has tracked very closely to the proportion among undergraduate degree recipients. The exiting master's in the class of 2005 included 25% women, which corresponds to 198 individuals.

Figure 17. Percent of bachelor's, master's and doctorates in physics earned by women, 1973-2005.



Note: A form change occured 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.

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The representation of women among physics PhD's has dropped for the second year in a row. Women represented 14%, or 175 individuals, in the class of 2005. This two year decline follows two years of sharp increases which resulted in an all time high of 18% women in the class of 2002. The sharp increases in the representation of women in classes of 2002 and 2003 were largely attributable to an increase in proportion of women among PhD recipients who were foreign citizens. One should keep in mind that the actual number of women among PhD recipients is small and although short-term fluctuations can be seem significant, it is advisable to view the overall trend for several years.

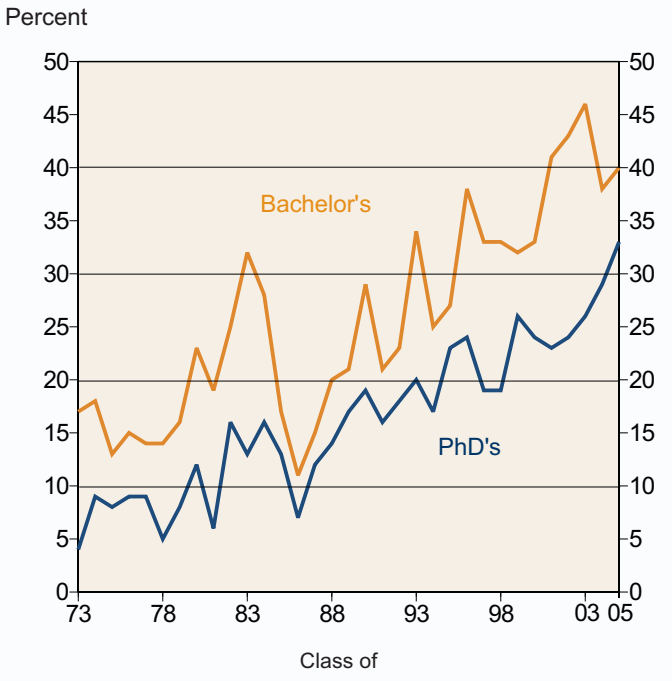
The proportion of women among astronomy degree recipients has shown a considerable rise over time **(**see **Figure 18)**. Women have traditionally been better represented in astronomy than in physics. In the class of 2005, women comprised 40% of the bachelor's and 33% of the PhD's, compared to 21% and 14% respectively for physics.

MINORITIES

Table 13 shows the number and percent of US citizen, physics degree recipients 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.

Among the 764 degree-granting physics departments in the US, 35 of them or 4.5% are located at an Historically Black College or University (HBCU). These departments play a significant role in educating physics degree recipients who are African-American. In the class of 2005, 51% of the African-Americans receiving physics bachelor's degrees did so at an HBCU.

Figure 18. Percent of bachelor's degrees and doctorates in astronomy earned by women, 1973-2005.



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Similarly, only 4 of the 185 PhD-granting physics departments are at an HBCU. One of these, Alabama A&M, conferred 3 of the 11 physics PhD's conferred to African-Americans in the class of 2005.

Table 13. Number and percent of physics degrees granted to US citizens by minority / ethnic group status, class of 2005.

	Bachelor's		Exiting Master's		PhD's	
	Number	Percent	Number	Percent	Number	Percent
White	4023	85	418	87	427	86
Asian-American	227	5	21	4	35	7
Hispanic-American	182	4	18	4	17	3
African-American	165	3	15	3	11	2
Other	152	3	8	2	8	2
Total US Citizens	4749	100%	480	100%	498	100%

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Table 14 lists the institutions that have recently averaged the most physics bachelor's degrees to African-Americans. All the institutions listed are either an HBCU or in the case of Chicago State, a Predominately Black College or University.

Similar to African-American's receiving physics bachelor's degrees, Hispanic-Americans are not evenly distributed across the country. Rather than being concentrated at specific universities, the majority of Hispanic-American physics bachelor's receive their degrees from states with large Hispanic populations, as well as from Puerto Rico.

California, the state which confers the largest number of physics bachelor's each year, and has a substantial proportion of Hispanics among its population, leads the county in conferring the most physics bachelor's to Hispanic-Americans. With 8% of its physics bachelor's being Hispanic, California was responsible for over a quarter of all the Hispanic-Americans receiving physics bachelor's in the class of 2005. Other states with a large proportion of Hispanics among their physics bachelor's are: New Mexico (22%), Texas (13%), and Florida (9%) All of the physics bachelor's from Puerto Rico were Hispanic, representing 15% of all the Hispanics in the physics bachelor's class of 2005.

Table 14. Departments averaging 3 or more African-American physics bachelor's per year, classes of 2003, 2004 and 2005.

	Annual Average
Xavier U (LA)	10
Benedict College (SC)	7
Dillard U (LA)	7
Florida A&M U	5
Southern U & A&M College (LA)	5
Spelman College (GA)	5
Chicago State U (IL)	4
Morehouse College (GA)	4
Norfolk State U (VA)	4
North Carolina A&T State U	4
Tuskeegee U (AL)	4
Morgan State U (MD)	3

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

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APPENDIX

A1. Trend in astronomy enrollments* and degrees, academic years 1992 to 2006.

	Number of astronomy degrees granted			Undergraduate astronomy major enrollments		Graduate astronomy student enrollments	
Academic Year	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	343	27	91	437	584	212	999
2005-06				511	565	188	1026

* 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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A2. Trend in physics enrollments* and degrees, academic years 1992 to 2006.

	Number of physics degrees			Undergraduate physics major enrollments		Graduate physics student enrollments	
Academic Year	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	5113	798	1244	6817	8102	3040	13738
2005-06				7141	8272	2984	13889

* 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.

AIP Statistical Research Center, Enrollments and Degrees Report.

A3. Trend in physics enrollments* and degrees by institution type, academic years 1992 to 2006.

	Number of physics degrees granted			Undergraduate physics major enrollments		Graduate physics student enrollments	
Academic Year	Bachelor's	Exiting Master's	PhD's	Juniors	Seniors	1st-year	Total
Doctorate-granting institutions							
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	2608	589	1244	3357	4491	2716	12898
2005-06				3552	4437	2652	12977
Master's-granting institutions							
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	379	209		562	756	324	840
2005-06				575	745	332	912
Bachelor's-granting institutions							
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	2126			2898	2855		
2005-06				3014	3090		

* 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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Projections of Education Statistics to 2014 **(NCES 2005-074)**
Washington, DC: US Department of Education, National Center for Education Statistics.

(4) ***Digest of Education Statistics, 2005,*** **Table 182**
Washington, DC: US Department of Education, National Center for Education Statistics.

STATISTICAL RESEARCH CENTER - PARTIAL LIST OF PUBLICATIONS

The Statistical Research Center collects data on the composition and dynamics of the scientific labor force and the education system. Below is a partial list of the Center's current publications along with a brief description of each. Unless otherwise indicated, single copies can be downloaded for free at www.aip.org/statistics or by writing to:

American Institute of Physics
Statistical Research Center
One Physics Ellipse
College Park, MD 20740-3843
(301) 209-3070
stats@aip.org
www.aip.org/statistics

2004 Physics & Astronomy Academic Workforce Report (December 2005)

A detailed analysis of faculty openings and new hires in universities and four-year colleges.

Women in Physics and Astronomy, 2005 (February 2005)

Data on the current and historic trends in the representation of women in physics, including comparative data on women in related fields.

Graduate Student Report: First-Year Physics and Astronomy Student, 2004 (March 2006)

A summary of the characteristics, subfields of specialization, sources of support, perception of undergraduate preparation, and career goals for first-year physics and astronomy graduate students.

Physics and Astronomy Senior Report: Class of 2003** (June 2006)

Looks into the backgrounds, experiences, and future plans of physics and astronomy majors at the point of graduation.

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.

2006 Salaries: Society Membership Survey Tables (July 2007)

Collection of twelve tables each focusing on different aspects of PhD employment. The statistical data are based on salaries reported by U.S.-resident members of AIP's ten Member Societies during March 2006. Tables can be purchased individually for $5.00 each or as a collection for $25.00. Members of AIP's Member Societies and the Society of Physics Students receive a 20% discount. To order visit the AIP iStore at http://store.aip.org/salaries/

Physics Students From Abroad: Monitoring the Continuing Impact of Visa Problems (September 2005)

This report documents the impact of visa regulations on international students in US physics graduate programs during the Fall of 2004. It quantifies the number of first-year international students who enrolled and the proportion who were denied entrance or substantially delayed due to visa difficulties and makes comparisons to two years earlier. It also discusses the visa problems experienced by non-US citizen faculty, postdocs and previously enrolled students when they tried to return from travel abroad.