

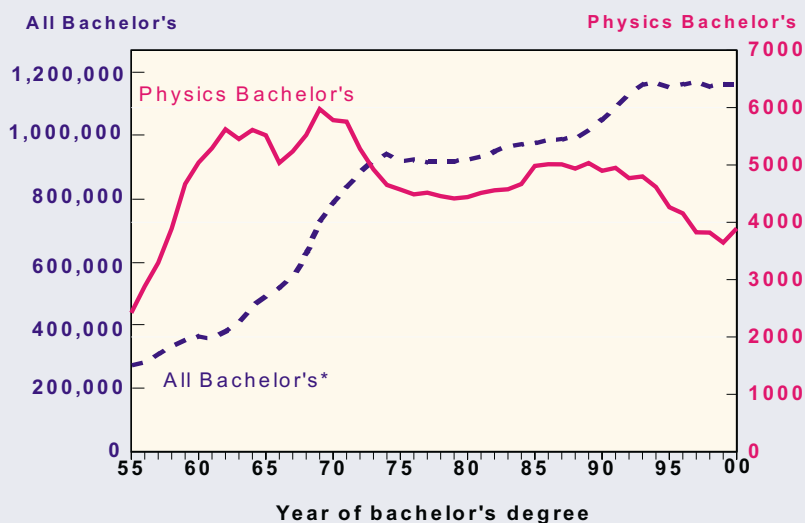
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## ENROLLMENTS AND DEGREES REPORT

**Figure 1. Physics bachelor's and total bachelor's produced in the US, 1955 to 2000.**



AIP Statistical Research Center, Roster of Physics Departments, and  
\* NCES Digest of Education Statistics

### Highlights

►The number of individuals receiving physics bachelor's degrees increased substantially after a decade of declines. There were 3,894 physics bachelor's degrees conferred in the class of 2000, an increase of 7% from the previous year (see Figure 1).

►First-year graduate student enrollments increased for the second consecutive year (see Figure 4).

►Although the number of African-Americans receiving PhD's went from 10 for the class of 1999 to 17 for the class of 2000, minorities remain highly under-represented among physics degree recipients (see Table 8).

►Astronomy degree recipients, at all levels, have a higher proportion of women and a lower proportion of foreign citizens than physics degree recipients (see Tables 7 and 11).

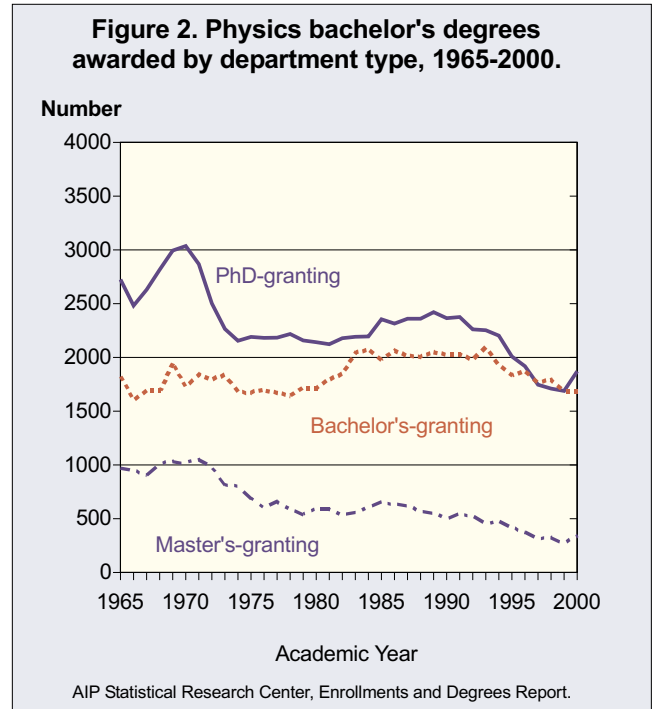
## BACKGROUND

In the fall of 2000, we asked the 770 degree-granting physics departments in the US and Puerto Rico to provide information on their current enrollments and recent degrees (see Table 1). Since the physics community relies heavily on these data, much effort was spent obtaining as many responses as possible. We received data from 98% of the departments. Data for the non-responding departments were estimated using previous survey responses and are included in the totals presented in this report.

## UNDERGRADUATE PHYSICS ENROLLMENTS AND DEGREES

During the 1990's, physics degree production at the bachelor level experienced consistent declines. However, for the first time in over a decade, the number of students receiving physics bachelor's degrees has risen significantly in the class of 2000, up 7% from the previous year (see Figure 1). This change, though considerable, comes as no surprise considering that physics enrollments at junior and senior levels had risen the previous year. Examining the current trend of physics enrollments, particularly at the junior level, it is reasonable to anticipate further increases in the number of physics bachelor's degrees conferred.

There were 3,894 physics bachelor's degrees conferred in the class of 2000. These degrees account for a very small fraction (0.3%) of the overall bachelor degree production in the country. It should be noted that, just as was the case with the

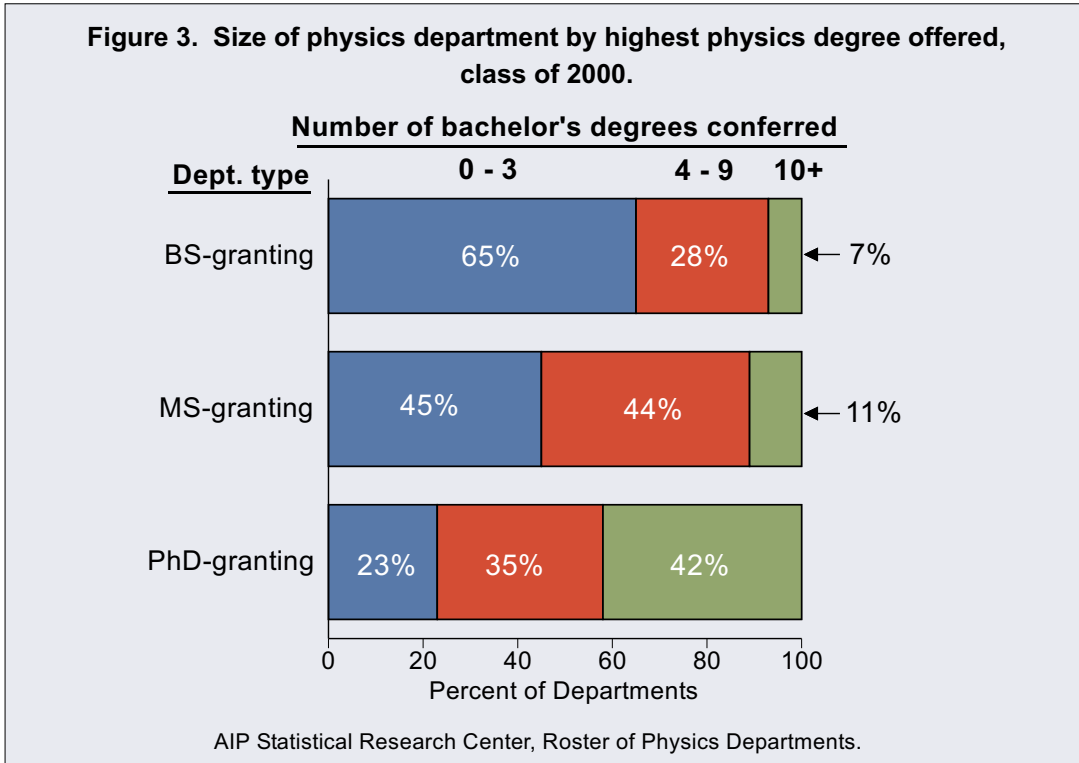


sustained declines of the 1970's, the declines in the 1990's were concentrated in departments that had a graduate program. These same departments are now responsible for the majority of the gains experienced in the class of 2000 (see Figure 2).

**Table 1. Departments by highest physics degree offered, academic year 1999-2000.**

	Number of Depts.	Percent of Depts.
Bachelor's-granting	517	67
Master's-granting	71	9
PhD-granting	182	24
Total	770	100%

AIP Statistical Research Center, Enrollments and Degrees Report.



Departments with graduate programs, specifically those that offer the PhD as their highest physics degree, still remain home to the largest undergraduate programs in the country (see **Figure 3**). These departments produced on average about 11 physics bachelor's degrees in the class of 2000. Only about a quarter of these departments conferred 3 or fewer degrees. This contrasts greatly with degree production at departments where the bachelor's is the highest physics degree offered. These averaged only 3 degrees per department, with almost two-thirds of the departments conferring 3 or fewer degrees (see **Table 2**). Still, taken together, undergraduate-only departments made a large contribution to the number of overall physics bachelor's produced, 43% in the class of 2000.

<b>Table 2. Size of physics bachelor's class by type of department, class of 2000.</b>		
Department Type	Degrees per Department	
	Average	Median
Bachelor's-granting	3.2	2
Master's-granting	4.7	4
PhD-granting	10.7	8

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**Table 3. PhD-granting departments averaging 20 or more physics bachelor's degrees per year, classes of 1998, 1999 and 2000**

	Annual Average of Bachelor's Degrees Granted
Harvard U (MA)	54
U of California-Berkeley	51
Brigham Young U (UT)	45
MA Inst of Tech	39
U of Washington	38
U of Virginia	31
U of Texas-Austin	29
U of California-Los Angeles	28
Portland St U (OR)	28
Rutgers U-Busch (NJ)	27
California Inst of Tech	26
U of IL-Urbana/Champaign	25
Ohio St U	24
U of California-San Diego	23
CO Sch of Mines & Tech	23
U of Utah	23
U of Colorado-Boulder	22
Georgia Inst of Tech	21
U of California-Irvine	21

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**Table 4. Bachelor's-granting departments averaging 10 or more physics bachelor's degrees per year, classes of 1998, 1999 and 2000**

	Annual Average of Bachelor's Degrees Granted
US Air Force Academy (CO)	19
US Naval Academy (MD)	19
Reed College (OR)	17
Harvey Mudd Coll (CA)	16
SUNY Geneseo Coll (NY)	15
College of Charleston (SC)	15
Colorado Coll	13
St. Olaf College (MN)	13
Illinois St U	13
Xavier U (LA)	12
Middlebury College (VT)	12
Colby Coll (ME)	12
Bates College (ME)	12
Longwood College (VA)	12
US Military Academy (NY)	11
U of Wisconsin-La Crosse	11
CA Poly St U-San Luis Obispo	11
Illinois Wesleyan U	11
Wartburg College (IA)	11
Kalamazoo College (MI)	11
Hamline U (MN)	11
Gustavus Adolphus Coll (MN)	11
Pomona Coll (CA)	10
Bethel College (MN)	10
Carleton College (MN)	10
Whitman College (WA)	10
U of Puget Sound (WA)	10
Georgetown U (DC)	10
Colgate U (NY)	10

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**Table 5. Introductory course enrollments by type of department, academic year 1999-2000.**

Department Type	Calculus Based	Algebra Based	Conceptual	Astronomy*	Physical Science
Bachelor's-granting	38,000	40,000	25,000	54,000	26,000
Master's-granting	16,000	14,000	14,000	23,000	6,000
PhD-granting	99,000	64,000	26,000	86,000	9,000
<b>Total</b>	<b>153,000</b>	<b>118,000</b>	<b>65,000</b>	<b>163,000</b>	<b>41,000</b>

\*Astronomy course enrollments also include students from degree-granting astronomy departments, which accounted for 51,000 of the 163,000 introductory astronomy enrollments.

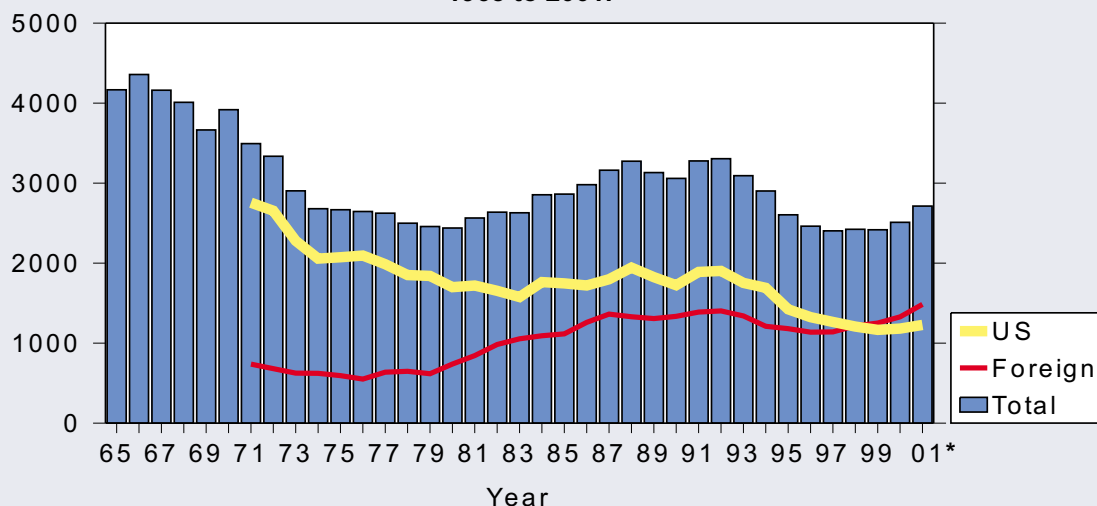
Note: In addition to the introductory course enrollments given above, a significant number of students take an introductory-level physics course at a two-year college. In 1996 this figure was approximately 120,000 students. (Calculus-based: 27,000, Algebra-based: 40,000, Conceptual: 19,000, Physical Science: 10,000, Other: 24,000) (*Physics in the Two-year Colleges*, Michael Neuschatz, et. al., October 1998, College Park MD: American Institute of Physics)

AIP Statistical Research Center, Enrollments and Degrees Report.

Introductory course enrollments at physics departments remain strong. The numbers presented in **Table 5** are meant to reflect only the enrollments in the first term of an introductory level class at physics degree-granting departments. The table gives a picture of the distribution of students taking an introductory physics course by highest degree offered by a department, and

by the type of courses taken. Additionally, the number of students who took an introductory course at two-year colleges (1996) is also given (**see Table 5 note**). These are the most recent data available. Enrollments for 1999-2000 are estimated to be similar, with about 120,000 students taking an introductory-level physics or physical science course at a two-year college.

**Figure 4. First-year US and foreign graduate physics students, 1965 to 2001.**



\*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 reported 8% increase in total first-year students between 2000 and 2001.

Source: AIP Statistical Research Center, Enrollments and Degrees Report.

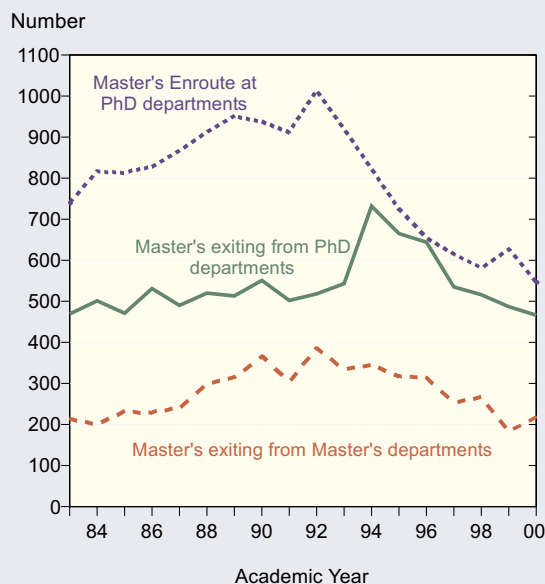
## GRADUATE PHYSICS ENROLLMENTS AND DEGREES

First-year graduate student enrollments increased for the second consecutive year. Similar to 1999, the increase in 2000 is almost entirely attributable to an increase in the number of foreign students enrolling in physics programs. 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 shown in **Figure 4** and is responsible for practically all the increase among US students seen in the figure. Foreign students comprised 55% of students entering their first year of graduate study at physics departments in 2000-2001 and 51% of the total number of students currently enrolled in graduate physics programs. It is anticipated that the increases being experienced in degree production at the undergraduate level will help bolster the number of US citizens enrolling in graduate physics programs. The proportion of foreign students entering graduate physics programs varies greatly by department but some differences by department rank do exist. When the

top 25 ranked departments (using the 1995 National Academy Press rankings) are compared to the all other departments, a lower proportion of their incoming students are foreign. Overall, 46% of the incoming students at the top ranked departments were foreign citizens, whereas 61% of the incoming students at the remaining PhD departments were foreign.

In stark contrast to an 8% increase in 1999, the number of students receiving a master's at a doctoral-granting institution in 2000 dropped 13%, resuming a trend that began in the early 1990's (see **Figure 5**). This latest decline is somewhat unexpected since the number of new graduate students entering these departments has been flat or on the rise. The number of students exiting doctoral-granting departments with a master's degree also continued to decline, dropping 4% from the previous year. The only increase in master's degree production was at departments where the master's is the highest physics degree offered. Master's degrees from these departments rose 18% from the previous year.

**Figure 5. Master's degrees conferred by type of degree and department, 1983-2000.**

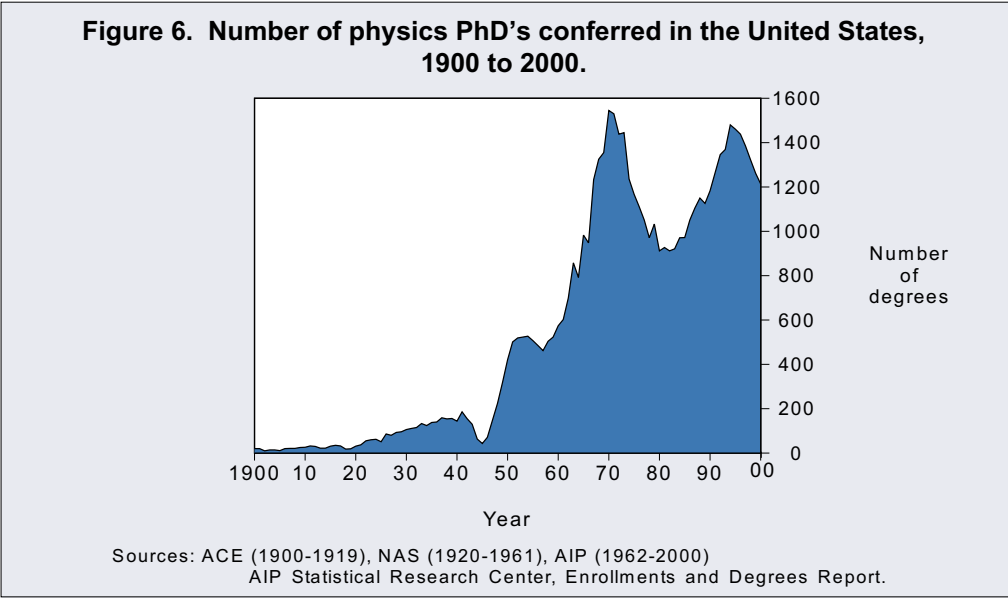


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**Table 6. Departments averaging 20 or more physics doctorates per year, classes of 1998, 1999 and 2000**

	Annual Average of PhD's Granted
MA Inst of Tech	41
U of IL-Urbana/Champaign	34
U of Texas-Austin	33
U of California-Berkeley	30
Cornell U (NY)	27
U of Maryland-College Park	25
U of California-San Diego	22
U of Colorado-Boulder	21
SUNY-Stony Brook (NY)	21
U of Wisconsin-Madison	21
Princeton U (NJ)	20

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**Figure 6** illustrates the sharp decline, beginning in the early 90's, in physics doctorate production in the US. The number of PhD's conferred in the class of 2000 was 1,214, a drop of 4% from the previous year's total. This marks the sixth consecutive year that physics PhD production in the US has declined, an aggregate fall of 18%. While current graduate enrollments suggest a leveling or a possible increase in the future, the downward trend is expected to continue for a few more years.

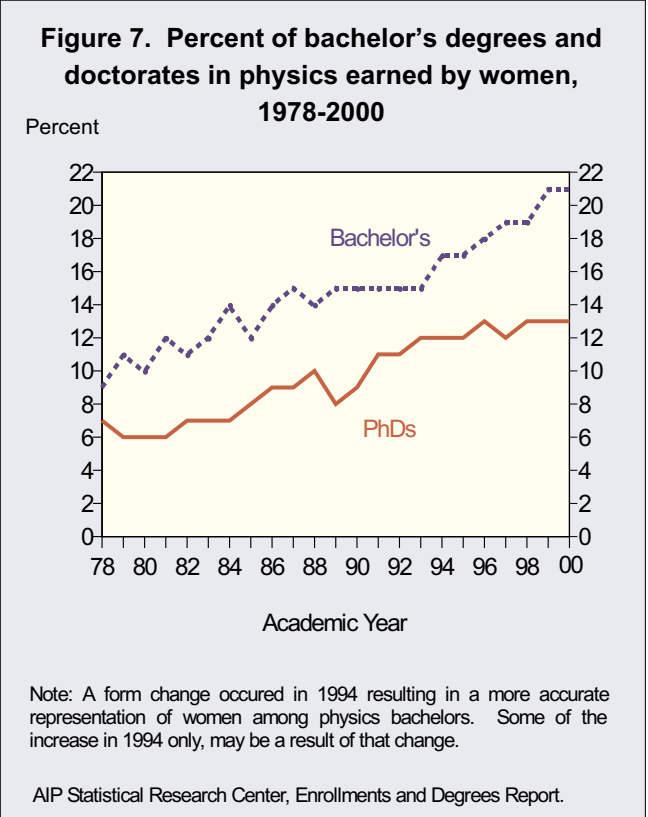
The percentage of women in the class of 2000 earning a bachelor's or doctorate degree in physics remained unchanged from last year at 21% and

13% respectively (see **Table 7**). Overall, the percentage of women receiving physics bachelor's degrees has been rising about 1% a year for the last few years, whereas the proportion of women receiving physics PhD's has remained relatively unchanged since the early 1990's (see **Figure 7**).

**Table 7. Percent of women and of foreign citizens among recent physics degree recipients, class of 2000.**

Degree	Women %	Foreign* %
Bachelor's	21	6
Exiting Master's	22	44
PhD's	13	45

\* Foreign citizens include individuals with either permanent resident status or temporary visas.  
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**Table 8. Number and percent of physics degrees granted to US citizens by minority / ethnic group status, class of 2000.**

	Bachelor's		Exiting Master's		PhD's	
	Number	Percent	Number	Percent	Number	Percent
African-American	170	5	26	7	17	3
Hispanic-American	103	3	18	5	14	2
White	3114	85	327	86	595	88
Asian-American	176	5	9	2	32	5
Other	94	2	2	-	15	2
Total US Citizens	3657	100%	382	100%	673	100%

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The low numbers of US minorities receiving physics degrees at all levels generate year-to-year fluctuations that may not be sustained over the long term. The number of African-Americans receiving PhD's went from 10 for the class of 1999 to 17 for the class of 2000 (see Table 8). An increase such as this is encouraging, but physics still has one of the lowest proportions of African-Americans of any PhD field. In the class of 2000, 7% of all US citizens earning PhD's, regardless of discipline, were awarded to African-Americans, compared to only 3% in physics.

The one area where African-American students are over-represented is at the nation's 34 Historically Black Colleges and Universities (HBCU's). These schools represent only 4.5% of the nation's physics programs that offer an undergraduate physics degree, 4% of those that offer a master's, and about 1.5% offering a doctorate. Yet they were responsible for producing over half of the physics degrees awarded to African-Americans at each of the three degree levels. Such a large contribution by so few minority-based institutions further underscores the extent of the under-representation of African-Americans at non-HBCU institutions.

Another group who is greatly under-represented within the US physics community are Hispanic-Americans. The Statistical Research Center is currently producing a detailed report addressing this population. It is due out in the fall of 2002.

**Table 9. Institutions consistently reporting race of students and averaging 4 or more African-American physics bachelor's per year, classes of 1998, 1999 and 2000.**

	Annual Average
Xavier U (LA)	12
Southern U & A&M Coll (LA)	10
Lincoln U (PA)	9
Morehouse Coll (GA)	5
Benedict Coll (SC)	4
Norfolk St U (VA)	4
Alabama A&M U (AL)	4
Jackson St U (MS)	4

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**Table 10. Number of degree-granting astronomy departments by highest astronomy degree offered, academic year 1999-2000.**

Department Type	Combined with physics	Separate astronomy	Total
PhD-granting	9	30	39
Master's-granting	2	2	4
Bachelor's-granting	23	5	28
<b>Total</b>	<b>34</b>	<b>37</b>	<b>71</b>

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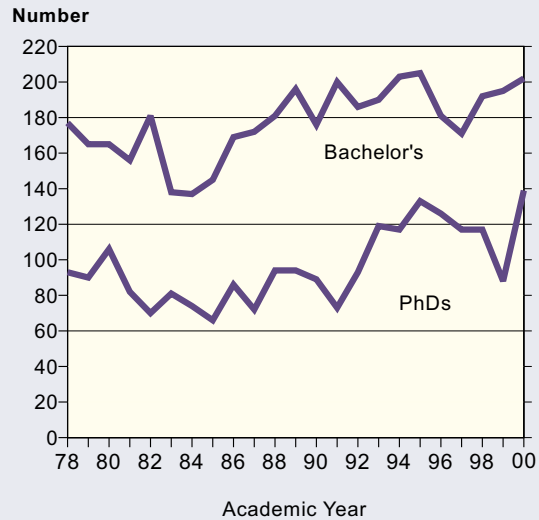
## ASTRONOMY

The 71 departments with astronomy degree programs fall into two distinct groups (see **Table 10**). About half are stand-alone departments devoted strictly to the field of astronomy, while the remaining half are administered in conjunction with a physics program. This year we received responses from all but two astronomy departments. It should be noted that some students also receive degrees in astrophysics from stand-alone physics departments. These astrophysics degrees are included in the totals presented earlier in the report for physics departments.

The number of students taking an introductory astronomy course during the 1999-2000 academic year was approximately 163,000 (see **Table 5**). Two-thirds of these students took that course in a physics department that had no astronomy degree program.

In the class of 2000, there were 202 astronomy bachelor's degrees and 139 astronomy doctorates conferred (see **Figure 8**). Although the number of astronomy bachelor's degrees conferred did experience a drop in the mid 1990s, this decline

**Figure 8. Astronomy bachelor's degrees and doctorates awarded in the US, 1978-2000.**



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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was not as great or sustained as in physics. Astronomy degree production has now returned to its pre-decline levels.

A higher proportion of women and a lower proportion of foreign citizens receive degrees in astronomy, at all levels, than in physics (see **Table 11**).

**Table 11. Percent of women and of foreign citizens among recent astronomy degree recipients, class of 2000.**

Degree	Women %	Foreign* %
Bachelor's	33	3
Exiting Master's	32	14
PhD's	24	24

\*Foreign citizens include individuals with either permanent resident status or temporary visas.

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## APPENDIX

<b>A1. Trend in astronomy enrollments* and degrees, academic years 1990 to 2001.</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
1989-90	176	19	89	223	236	186	842
1990-91	200	25	73	312	284	226	914
1991-92	186	31	93	290	331	175	935
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				391	461	180	809

\* 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 1990 to 2001.</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
1989-90	4898	918	1183	6313	7131	3059	13708
1990-91	4950	806	1264	6445	7115	3278	14065
1991-92	4770	906	1346	6435	7268	3306	14534
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				5428	6309	2713**	10978

\* 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 1990 to 2001.**

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>							
1989-90	2365	551	1183	2877	3664	2623	12440
1990-91	2376	502	1264	3082	3694	2782	12700
1991-92	2261	518	1346	3057	3729	2831	13118
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				2565	3270	2431**	10272
<b>Master's-granting institutions</b>							
1989-90	494	367		773	969	436	1268
1990-91	541	304		800	956	496	1365
1991-92	525	388		802	938	475	1416
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				438	574	282**	706
<b>Bachelor's-granting institutions</b>							
1989-90	2039			2663	2498		
1990-91	2033			2563	2470		
1991-92	1984			2576	2601		
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				2425	2465		

\* 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.

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

### **1998 Graduate Student Report\*\* (November 2000)**

A summary of the characteristics and career goals of physics and astronomy graduate students.

### **1999 Initial Employment Report: Follow-Up of 1998 Physics and Astronomy Degree Recipients\* (June 2001)**

A description of the initial employment and continuing education of physics and astronomy degree recipients.

### **Mastering Physics for Non-Academic Careers (2001)**

A detailed analysis of master's programs in physics departments in the U.S. including those that offer a master's as their highest physics degree and those that have a master's degree program in parallel with a physics PhD program in the same department.

### **Physics and Astronomy Senior Report: Classes of 1999 and 2000 (June 2002)\***

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

### **Physics in the High Schools IV. Maintaining Momentum: High School Physics for a New Millennium, 1997\*\*\* (August 1999)**

*Only available from the Web at [www.aip.org/statistics](http://www.aip.org/statistics)*  
An analysis and interpretation of information collected in a nationwide survey of teachers of physics at the secondary level.

### **Physics in the Two-Year Colleges (Oct. 1998)**

First comprehensive study of physics programs and faculty in the two-year colleges.

### **2000 Salaries: Society Membership Survey\*\* (June 2001)**

An analysis of the effect of factors such as geographic location, employment sector, gender, years from degree, and degree level on salary levels and salary increases. \$15 for a single copy, \$10 each for multiple copies.

*(All orders must be prepaid. Make your check payable to the American Institute of Physics and mail it to the address above.)*

### **2000: Salaries Summary Report\*\* (March 2000)**

*Only available from the Web at [www.aip.org/statistics](http://www.aip.org/statistics)*  
A two-page summary that gives overall trends and salaries.

### **Women in Physics, 2000 (June 2000)**

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

\* Published annually

\*\* Published biennially

\*\*\* Published quadrennially