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ABSTRACT

This report summarizes trends in the job search experiences and employment outcomes of 1993-1994 physics graduates at all degree levels. Data were gathered via the American Institute of Physics' Employment Survey. Type of position secured in terms of permanence, fields of permanent employment, and level of utilization is reported for doctoral and masters degree recipients. Employment outcome by subfield of study is also reported for doctoral graduates. A higher percentage of physics PhDs secured potentially permanent positions than in previous years, but the number of new entry-level positions for PhDs dropped. Post-degree outcome, success rate of various job search methods, number of new hires in various employment sectors by gender, median starting salary by employment sector, and level of training and skill use are reported for bachelors degree recipients. Six months after graduation, the number of bachelors still seeking employment had dropped. Bachelors reported similar starting salaries to previous years. Post-degree plans of doctoral recipients in astronomy are also reported. (JPB)

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AIP REPORT

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HIGHLIGHTS

- A higher percentage of physics PhD respondents secured potentially permanent positions this year than in recent years. Of these positions, 19% were not physics-related **(Figure 1)**.
- The proportion of physics PhD respondents remaining unemployed or taking temporary positions (other than postdocs) was lower than in the previous year **(Figure 2)**.
- Of the physics bachelor respondents who were employment-oriented, the percentage who describe themselves as still seeking employment drops significantly from 24% at the time of degree to 9% six months after graduation **(Figure 4)**.
- Responding physics bachelors reported a similar median starting salary to last year, except in the academic sector where the salary increased **(Table 6)**.
- Physics bachelor degree respondents felt well trained on a variety of skills necessary for success in the workplace, although they reported that not all of these skills were used in their current employment **(Table 7)**.

INTRODUCTION

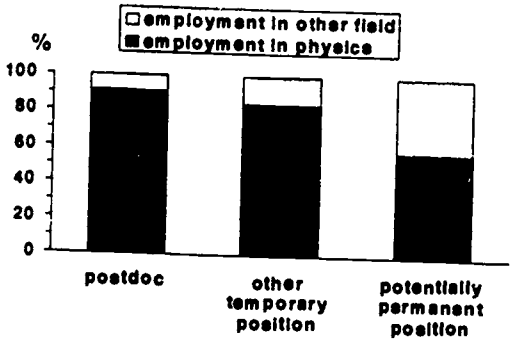
Employment in the field of physics continued to be difficult to secure for new physics degree recipients at all degree levels for the class of 1993-94. PhD recipients reported difficulties in finding permanent and postdoctoral positions. Bachelor and master recipients reported similar difficulties, though according to survey respondents, 54% and 29%, respectively, opted for graduate study following graduation and never tested the job market. This study of the class of 1993-94 physics graduates (bachelor, master and doctorate), conducted by the Education and Employment Statistics Division of the American Institute of Physics (AIP), provides a look at job search experiences and resulting employment outcomes.

The Employment Survey is a follow-up study directed at physics degree recipients who have responded to AIP's earlier student surveys (Graduate Student Survey and Survey of Physics Bachelors) conducted in the spring/summer. Thus, degree recipients receive the Employment Survey approximately six months after their graduation (more than six months for Fall 1993 graduates). Although locating physics degree recipients after they have left school is difficult, the respondents are able to provide a more accurate picture of their post-degree employment than they were at the time of their degree, when many were still seeking employment.

NEW PHDs

There has been a great deal of debate within the physics community in recent years over the severity of the current tight job market and the appropriate response to prevailing conditions. The Employment Survey results reported here suggest that employers sought few entry-level PhDs (1481 PhDs conferred in 1993-94). In fact, 19% of the employed PhDs accepted employment outside the field of physics. **Figure 1** shows these respondents broken out by type of position secured. As in previous years, postdoctoral and other temporary positions continued to be concentrated almost completely in physics. However, PhD respondents who found potentially permanent positions were split almost evenly between those continuing in the field and those leaving. It remains to be determined whether the latter will return to physics when the employment outlook improves.

Figure 1. Type of position secured, 1993-94 PhDs.



Respondents not working in the field were asked what their primary reason was for working outside of physics. Twenty-nine percent of these respondents said they found "no physics-related positions available," and 15% said "applied but did not get a position in physics." On the other side, an almost equal proportion of the respondents (37%) indicated a conscious choice to leave the field, as opposed to feeling the poor job market forced them to leave. The response for the remaining 19%, "more attractive non-physics employment became available," was more ambiguous and probably included both graduates who felt their move away from physics was voluntary and those who regarded it as involuntary. **Table 1** illustrates other fields of permanent employment for those migrating out of physics.

Table 1. Fields of permanent employment for PhD respondents outside the field of physics, 1993-94.

	%
Engineering	32
Computer Software	30
Business/Finance	22
Other	16
	100

In recent years, degree recipients appeared to turn to temporary employment (other than postdoctoral appointments), most likely as an interim solution until a permanent position could be secured. However, **Figure 2** shows that in 1994 the percentage accepting these other temporary positions was lower than in the previous two years. This may be a positive indicator for future physics job seekers.

Figure 2. Underutilization among physics PhDs in the winter following year of graduation, 1993-94.

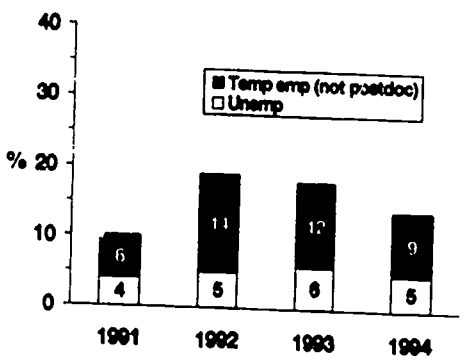
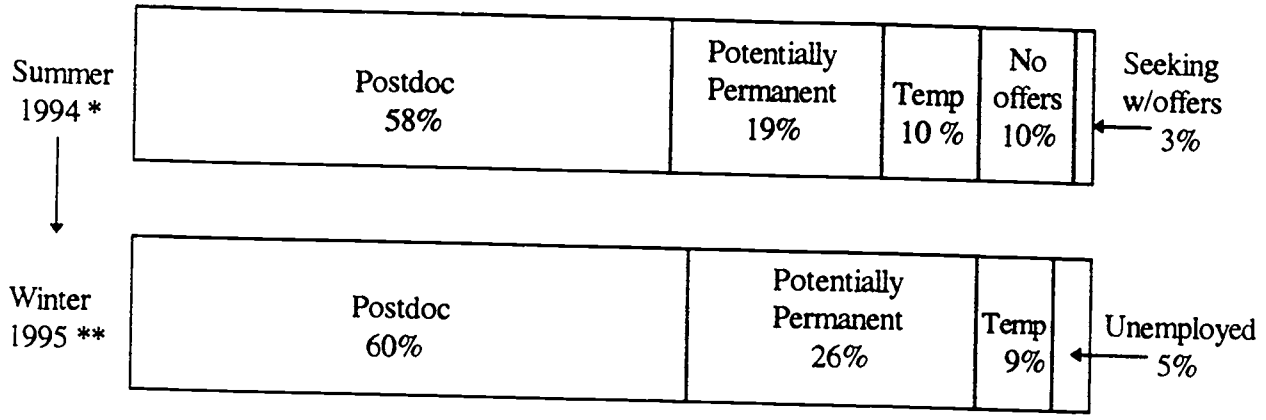


Figure 3. Post-degree outcomes for 1993-94 physics PhDs, summer 1994 and winter 1995.



* Includes only US employed graduates with a degree at the time of the survey.
** Includes only US employed graduates.

Another measure of the job market is the degree of improvement in the prospects of post-degree job seeking. **Figure 3** first displays 332 Employment Survey respondents' post-degree plans at the time of degree and shows their responses 6 months later. Not surprisingly, the unemployment rate fell by half in the intervening months between surveys. Moreover, the decreased percentage of unemployed respondents during this interim bolstered the percentage of the permanent employment category and not temporary positions. This is in contrast to the previous year, when the unemployment rate dropped but the proportion in temporary positions rose.

Table 2 outlines the median number of months the respondents spent seeking employment, the number of positions they applied for and the number of job offers they received. As may be expected, respondents who finally landed a permanent position spent the longest time seeking, confirming the impression of the difficulties new PhDs have experienced trying to secure work. However, even those who took temporary positions had to endure a discouraging search process, as indicated by the large number of applications sent and the low number of job offers received.

Table 2. Job search characteristics for PhDs, 1993-94.

	Months seeking employment (Median)	Total positions applied for	Total offers received (Median)
Graduates who accepted potentially permanent position	4	12	2
Graduates who accepted postdoc	3	10	2
Graduates who accepted other temporary job	2	*	1

*disproportionate distribution with individual responses over 50

Table 3. PhDs' subfield of study by employment outcome, 1993-94.

	Nuclear %	Part. & Fields %	Atom. & Molec. %	Cond. Matter %
Postdoc	74	67	58	56
Potentially permanent position	10	24	32	22
Other temporary position	10	9	8	12
Unemployed	6	--	2	10
Percent switching out of degree subfield for new position	7	10	14	18
Percent of all responding PhDs in this subfield	9	14	11	26

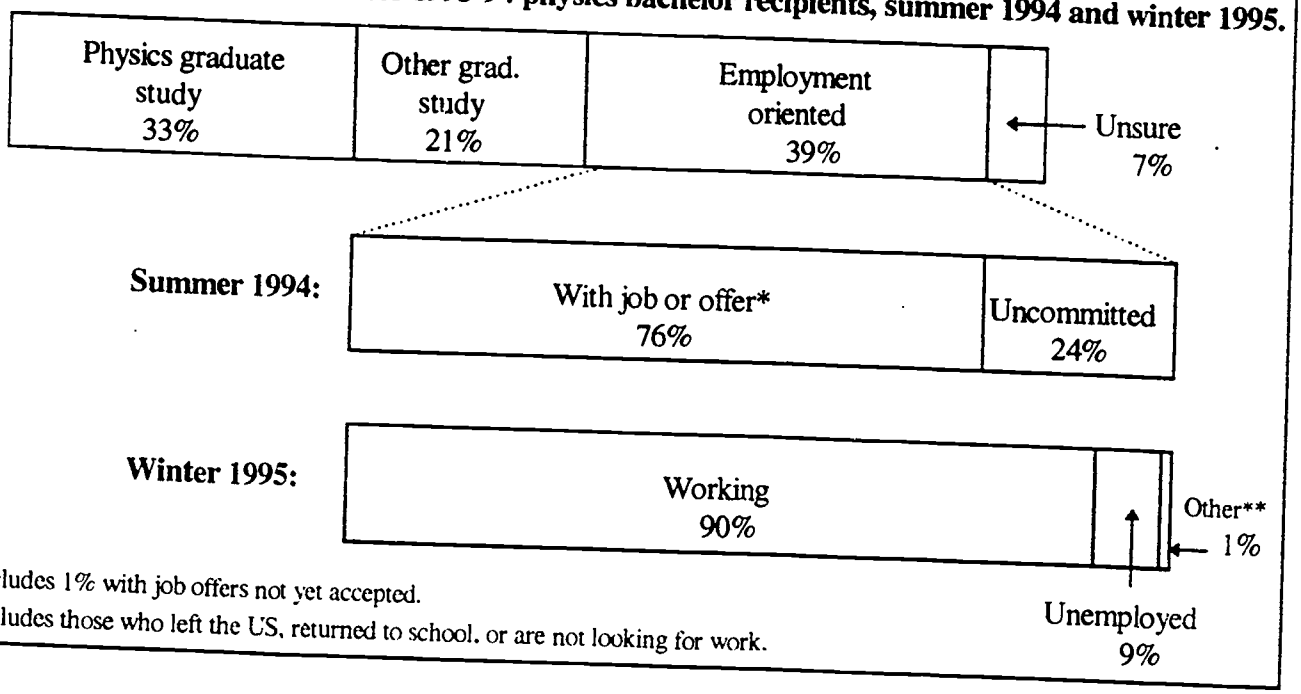
PhD students conduct their graduate research in a particular physics subfield. **Table 3** illustrates the predominant physics subfields of study and divides the PhDs by their post-degree outcome. Also included is the percentage of respondents within each subfield who switched to a different physics subfield for employment purposes. Condensed matter was the most common subfield of study among respondents but 10% were unemployed and of the employed, 18% switched to another subfield for employment purposes. On the other hand, of the respondents who studied nuclear physics, three-fourths accepted a postdoc and only 7% switched to a different subfield for employment.

Table 4 disaggregates the type of position secured by the employment sector in which it was located. More than half of the postdoctoral and temporary positions were located at universities, while over half of the potentially permanent positions were located in the industrial sector. It is noteworthy how few potentially permanent positions in academia were available to those emerging from graduate school.

Table 4. Employment outcomes by employment sector for physics PhDs, 1993-94.

	University	4 yr. Inst.	Fed. Gov't	Nat. Lab	Non-profit	Industry	Other	Total
Graduates who accepted postdocs	65	--	8	21	3	3	--	100%
Graduates who accepted potentially permanent positions	12	7	8	5	4	58	6	100%
Graduates who accepted other temporary jobs	61	7	3	3	3	13	10	100%

Figure 4. Post-degree outcomes for 1993-94 physics bachelor recipients, summer 1994 and winter 1995.



* Includes 1% with job offers not yet accepted.

** Includes those who left the US, returned to school, or are not looking for work.

BACHELOR RECIPIENTS

The population of 1993-94 physics bachelors totaled 4615, of whom 17% were women and 7% non-US citizens. This population was surveyed in the spring of 1994 with the Survey of Physics Bachelors. Respondents to the survey who indicated they were pursuing employment (rather than enrolling in graduate school) were surveyed again with the Employment Survey during the winter of 1994-95.

Figure 4 begins by describing the background employment data from the Survey of Physics Bachelors. In the summer of 1994, 349 respondents indicated employment-oriented post-degree plans and described their current employment status. The figure then goes on to detail the subsequent experiences for the 454 respondents who participated in the Employment Survey the following winter. Similar to the PhDs' employment situation, the employment-oriented bachelor unemployment rate dropped by nearly two-thirds from the time of their degree to six months after their graduation.

Table 5 lists the job search methods that the Employment Survey bachelor respondents used to secure their current employment. Both personal contact and more impersonal approaches, especially newspaper or journal advertisements, proved equally successful. These two methods are proven over time, as in 1992 and 1993 they were also described as the most successful methods.

Table 5. Job search method that resulted in bachelor recipients current employment, 1993-94.

	%
Personal contact, friends, etc.	18
Newspaper and journal ads	17
Unsolicited employer contact	10
University placement office	10
Campus recruiter	8
Previous employer contacts	8
Faculty contacts	7
Employment agency	5
Other	17
	100

Table 6 shows the employment sector and median starting salary by gender for the 1993-94 bachelor respondents. The lower overall median salary for women resulted largely from a discrepancy in industry, specifically service industries, and secondary schools. Salaries in other sectors were comparable for men and women. As in previous reports, industrial jobs (both service and manufacturing) continued to pay the highest starting salary.

The employed bachelor respondents were asked to rate their level of training and the degree to which they actually used selected skills in their current position. The rating scale ranged from one to five with one equal to none and five equal to extensive. The percentage of respondents who rated a skill with a 4 or 5, indicating extensive training or use, is shown in **Table 7**. Oral and written communication rated high on both level of training and use of skills, indicating that respondents felt their training was effective and relevant to their subsequent employment. However, for both knowledge of degree field and mathematics, the discrepancy in percents between respondents' level of training and use of skills indicated they had acquired skills that were not being tapped by their present employer.

Table 6. Gender by employment sector and median starting salary for bachelors, 1993-94.

Employment Sector	Male %	Female %	Median Starting Salary
Industry	56	45	$28,000
Civilian gov't.	5	8	28,000
Military	15	5	22,000
High School	9	20	24,000 *
Univ./ 4-yr college	8	14	24,000**
Hospital/Non-profit	3	4	24,000
Other	4	4	---
	100	100	
Median Starting Salary	$25,000	$24,000	$25,000

*63% and **12% of respondents had a 9 or 10 month pay schedule

Table 7. Percentage of physics bachelors who rated a 4 or 5* on training and use of skills, 1993-94.

Skill	High level of training %	High level of use %
Ability to solve complex problems	66	35
Mathematics	61	16
Knowledge of degree field	53	17
Written communication	49	43
Oral communication	46	57
Computer skills	38	40
Teaching skills	38	26
Use of lab equipment	38	20
Managing people	29	35

* 5 point scale: 1 = none to 5 = extensive

MASTERS RECIPIENTS

It was difficult to collect survey responses from the physics masters recipients. In 1993-94, 1077 students received a physics masters degree (not including degrees enroute to a PhD at the same doctorate-granting institution). However, only 272 recipients identified themselves as masters recipients when responding to the Graduate Student Survey and an even smaller group of 99 responded to the Employment Survey. As a result, this report makes limited conclusions on the current employment status of physics masters recipients.

Table 8. Post-degree outcomes for professional masters respondents, 1993-94.

	%
Potentially permanent position	69
Return to school	23
Unemployed	8
	100

Table 8 shows the post-degree plans for the masters respondents. Of the 23% who said they were planning to return to school, most did not indicate what field of study they would pursue. With postdoctoral appointments reserved for PhDs, most masters degree recipients focus their employment search in the permanent employment domain. **Table 9** indicates the employment sectors in which masters recipients are working. Half of the respondents found employment in industry while almost one-third work in academia.

Table 9. Employment sector for masters recipients, 1993-94.

	%
Industry	49
Government (civilian/military)	16
High School/2 yr college	16
University/4 yr college	13
Hospital/Non-profit	3
Other	3
	100

ASTRONOMY DEGREE RECIPIENTS

In the 1993-94 academic year, there were 117 astronomy PhDs granted, 34 masters degrees (not including degrees enroute to a PhD at the same doctorate-granting institution) and 203 bachelor degrees. While the small number of degree recipients and the poor response rate make it necessary to exercise extreme caution when drawing conclusions from these data, the findings presented in **Table 10** accord well with the outcomes of earlier years' Employment Follow-up Surveys. At the undergraduate level, the majority of the astronomy bachelor respondents were employed in the industry and government sectors.

Table 10. Astronomy PhD respondent's post-degree plans, 1993-94.

	%
Permanent position	19
Postdoctoral position	74
Other temporary position	7
	100

This report was prepared with the help of Starr Nicholson and Phyllis LeFevre.

EDUCATION AND EMPLOYMENT STATISTICS DIVISION PUBLICATIONS

The Education and Employment Statistics Division collects data on the composition and dynamics of the scientific labor force and the education system. Below is a partial list of the Division's current publications along with a brief description of each. Unless otherwise indicated, single copies are available free of charge by writing to: American Institute of Physics, Education and Employment Statistics Division, One Physics Ellipse, College Park, MD 20740-3843 or by calling (301) 209-3070. When applicable, all orders must be prepaid. Please make your checks payable to the American Institute of Physics.

Academic Workforce Report
A discussion focusing on faculty openings and candidate availability in selected physics subfields.

**Bachelor's Degree Recipients Report*
A summary of the characteristics and career goals of physics and astronomy bachelor's degree recipients.

**Enrollments and Degrees Report*
An examination of academic enrollments and degrees conferred in physics and astronomy programs nationwide.

**Graduate Student Report*
A summary of the characteristics and career goals of physics and astronomy graduate students.

**Initial Employment Report*
A description of the initial employment search and eventual employment of physics and astronomy degree recipients.

National Laboratory Workforce Report
A study of PhD physicists working in Federally-Funded Research and Development Centers.

****Physics in the High Schools*
An analysis and interpretation of information collected in a nationwide survey of teachers of physics at the secondary level.

***1994 Salaries: Society Membership Survey*
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.

*** 1994: Salaries Summary Report*
A two-page summary which gives overall trends and salaries.

Society Membership Profile: Rich Diversity and Common Concerns
A description of the employment and demographic characteristics of the membership of the 10 AIP member societies.

*Published annually
**Published biennially
***Published triennially

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