

## SIGNS OF TIGHTER JOB MARKET GROW; MORE THAN RECESSION AT WORK

Like the proverbial snowball, evidence of a sharply tighter job market in physics has gradually accumulated during the last two years. To an extent the situation in physics merely reflects the larger economic picture, but factors besides the recession also are at work—notably the long-term decline of basic research in industry, a crisis of mission at many of the national labs and more stringent accounting procedures affecting some universities.

From a couple dozen interviews with physics department chairs at the various kinds of US colleges and universities and with some employment experts at the American Institute of Physics, a consistent pattern emerges. Although nearly everyone PHYSICS TODAY interviewed said that newly graduating PhDs in physics are still having little or no trouble finding satisfactory postdoc positions, many believe that young physicists are having to spend longer doing postdoctoral work, and almost all of those interviewed agreed that potentially permanent jobs—tenure-track academic positions or research positions in government or industry—which were not exactly easy to find previously, are now much harder to come by. Hiring is sharply down at many industrial and government labs, almost all large state universities are suffering financial stringencies, and even some elite private institutions are struggling.

Hardly anybody PHYSICS TODAY spoke to considers the current situation dire, let alone catastrophic. But the state of the job market has become a subject of frequent lunchtime conversations in many departments. And while the hope is that what we're seeing now is simply a blip, the fear is that truly grave and long-term difficulties lie ahead.

### Job ads, recruitment

Beverly Citrynell, who is responsible for job placement services at AIP, says the current downturn is the worst drop she has seen since coming to AIP in

1978. She began to notice it about two years ago and thinks it probably started with industrial and government labs. She says that weapons labs in particular used to have many openings and would hire whenever they found somebody they thought was well-qualified. "Now," she says, "they only hire for specific jobs."

Citrynell is beginning to hear from people in mid-career who have lost their jobs and are giving up physics. She also is getting more inquiries from Americans who are interested in jobs outside the US, and of course she is receiving scores of applicants from what used to be the Soviet Union.

The job market for recent graduates has also taken a noticeable downturn, as the latest survey by AIP's statistics division reveals. (See the story that follows.)

One obvious measure of market conditions is the number of pages of PHYSICS TODAY devoted to classified advertising, which consists almost entirely of job listings. Last year the number of these pages was down 16% from 1990, which in turn was 16% below 1989. Likewise, the number of recruitment ads appearing in 1991 was 28% lower than two years earlier.

There remains the possibility that advertisers are running ads for fewer months. But Edward Greeley, who is in charge of advertising, marketing and exhibits at AIP, thinks the main explanation is the one that comes most readily to mind: "Fewer jobs." In addition to getting fewer ads, Greeley says, he also is seeing more ads for positions that are contingent on funding being obtained.

In Greeley's view, the situation shaping up may be the worst since the late 1960s.

Of course physicists are not the only ones suffering in the current job market. At a meeting organized by the National Science Foundation's Commission on Professionals in Science and Technology in December, other science societies reported wors-

ening job prospects in their fields. The American Mathematical Society, for example, said that as of September 1991 about 12% of new math PhDs were still seeking work—more than double the figure a year earlier. Similarly, the American Chemical Society said that joblessness among new PhD chemists now stands at 11%.

### Liberal arts colleges flooded

Hiring for faculty positions at small four-year colleges seems to provide one of the most sensitive gauges of market conditions. Reports from around the country indicate that there are more applicants than ever before for positions at such institutions. Those interviewed noted that the quality of the applicant pool is higher—but also that more conspicuously unqualified individuals are now applying for any open positions.

To take one example, the chairman of the physics department at Macalester College in Minnesota, Sung Kyu Kim, says the 150 applicants for a current job are much stronger than in the past, and that almost all have been in postdoc positions for two to four years.

At Carleton College, another well-respected four-year school in Minnesota, the physics department has been getting 100–150 applicants for open positions during the last few years. But department chair Richard Noer says those numbers include a lot more "scattershot" applications, especially from foreign-born students. "The signal-to-noise ratio is fairly small," Noer comments.

From the applicant's viewpoint, the situation is most unsatisfactory. Steven Frautschi, a professor at Caltech, told PHYSICS TODAY of a PhD candidate he knew of who wanted to teach at a small liberal arts college and who was extremely well suited to do such work. But this person was unable to find a satisfactory job, Frautschi reports.

Clemson, a liberal arts college in South Carolina, is said to have received an astonishing 550 applica-



tions for one position. But the extreme case seems to be Amherst College, which has received 800 applications—albeit in response to an open-ended advertisement. “It’s a record, I’m sure,” says Larry Hunter, a member of the Amherst physics faculty. “The market looks awfully bleak right now,” Hunter says. “Glad I’m not looking for a job.” He notes that the employment situation is surprisingly good in his own subfield—atomic physics—with Harvard, MIT and the University of Virginia all trying to fill openings.

Hunter attributes the general malaise in the market to several factors: the decline in openings at industrial labs; the squeeze on state budgets, which is affecting almost all the physics departments at the larger state universities; and the large numbers of applications from Eastern Europe and the former Soviet Union and from Chinese graduating in the US.

### States cutting funds

Among the state schools suffering the effects of the recession, Amherst’s neighbor, the University of Massachusetts, Amherst, has been particularly hard hit. Faculty there have had no raises for four years and last year had to accept involuntary furloughs (for which they have since been reimbursed). Currently there is a hiring freeze. In practice, says physics department chair Robert B. Hallock, this means that roughly 20 people were hired campus-wide last year, compared to about 70 normally. In physics there will be no hires this year.

Massachusetts seems to differ from other state universities only in that it was hit earlier and harder than others. At institutions as diverse as the University of Washington, Ohio State and the University of Arizona, the stories are essentially the same: Modest but unexpected state budget cuts, some coming at the very end of last year, have forced some universities to cancel hires or curtail postdocs. Steven Pinsky, chairman of the physics department at Ohio State, reports, for example, that a minority-earmarked postdoc opening has been eliminated and that another postdoc position has been reduced from two years to one.

At the same time, Pinsky estimates that applications for faculty positions are up 20–30% from two years ago, and he notes that for the first time OSU is receiving significant numbers of graduate school applications from the former Soviet Union, 58 so far this year compared to none two years ago.

Of course there are exceptions among the state institutions. The

University of Michigan, for example, has hired 17 new tenure-track faculty in physics since 1987–88 and filled four other positions that opened up, and the number of postdocs has doubled. North Carolina State University and the University of Alabama, Huntsville, are also reported to be expanding their physics programs.

Universities in Texas are being newly invigorated by the Superconducting Super Collider. At Texas A&M, for example, a junior-level faculty member has been hired in connection with the SSC, and the department is now looking for a senior-level high-energy experimenter. The school has been promised 11 SSC-related positions over the next 10 years, according to Richard Arnowitz, department chair at Texas A&M. “At this point we’re on schedule.”

One might expect similar growth at the University of Florida and Florida State, which have been blessed with the new National High Magnetic Field Laboratory and an accompanying low-temperature physics lab (see PHYSICS TODAY, January 1991, page 53, and July 1991, page 52). The magnet lab plan calls for 34 faculty and 20 visiting appointments to be made. But a state budget crunch has forced a system-wide hiring freeze for both staff and faculty positions since 1991, and a 3% pay raise scheduled for last August has been eliminated.

According to Joseph F. Owens III, department chair at Florida State, only one faculty member has been added as a result of the magnet lab. Additional hiring may take place later this year, he says, but the department has not been interviewing candidates nor have any other job offers been made.

The Florida state schools now are in the same boat as Arizona, which had to suspend hiring before a major campaign of expansion is complete, and the University of Washington, which had to withdraw two positions after posting them.

Like his colleagues at liberal arts colleges, Mark McDermott, physics department chair at the University of Washington, notes the increasing number of applications from unsuited candidates, for example, fresh PhDs applying for tenure-track jobs. One explanation may be a proliferation of word processors, says Jim Maher of the University of Pittsburgh. “Essentially everyone who’s looking for a job applies for every job these days.” Another explanation, given by Beverly Porter, the head of AIP’s statistics division, is that postdocs who are non-US citizens tend to send out huge numbers of resumes.

### Industrial labs laying off

Like many other department chairs, McDermott says he’s received lots of applications—as impressive for their quality as their quantity—from Bellcore, which last fall sharply curtailed research in both basic and applied physics. Many of the other industrial labs are likewise restructuring or scaling back their research departments, and so recruiters from AT&T, IBM and Kodak are not being heard from much, according to sources at the University of Illinois, Urbana-Champaign. Similarly, Carnegie-Mellon hasn’t seen the usual recruiters from Westinghouse and US Steel.

The result is a scarcity of jobs in condensed matter physics, not only for theorists but also for experimenters. Department chairs at many universities report that a lot of high-level people are bailing out of industrial labs and turning to the universities for jobs. “We only wish we could snap more of them up,” said one source at the University of Illinois, a leader in condensed matter research.

The exodus from the industrial labs means that younger physicists now find themselves competing for jobs with seasoned and sometimes big-name researchers, says Kevin Aylesworth, an NSF postdoc at the Naval Research Lab who now acts as a kind of spokesperson for struggling postdocs. After hearing from friends who were frustrated with their job searches, Aylesworth started up an electronic mail bulletin board called the Young Scientists Network, where people can exchange tips and war stories about the job market.

As Aylesworth sees it, the younger researcher is at a disadvantage because the more experienced scientist can better leverage grant money and so is more likely to get hired. At the same time he sympathizes with mid-career researchers who have been “outplaced” from industry—sometimes replaced by younger and therefore cheaper colleagues—and must now find work elsewhere.

### Private universities

Because of the highly publicized financial problems at a few private universities, there has been a growing perception that the whole private university sector may be heading into a major crisis. *The New York Times* has run front-page stories about university-wide problems at Columbia and Yale. Cutbacks at both schools are under discussion, and at Yale consolidation of the physics and applied physics departments has been proposed. Perhaps even more widely known is Stanford’s \$45 million bud-



get deficit this year, arising in part from the controversy surrounding its overhead accounting practices.

The subject of overhead rates is of course receiving attention throughout the university system, but the effects of the current governmental scrutiny will probably be drastic in only a few cases. Most state universities, which charge lower overhead rates to begin with, may be almost entirely unaffected by tighter regulations. It's the private universities where much of the impact will be felt. Department chairs at those institutions say research is bound to be affected, if only because more time and money will go into bookkeeping.

A. J. Stewart Smith, physics department chair at Princeton, points out that the vast majority of indirect costs are legitimate. "That money will have to come from somewhere. . . . It's bound to stifle [university-based] research in some way."

At one private university in the Northeast, known for its skill at political logrolling, the department chair says the number of graduate students there may have to be cut 50% if the NSF really imposes the kind of overhead regulations that have been discussed.

Despite that kind of scenario, the general situation of the elite private institutions is still felt to be rather strong. Their highly selective admissions render them relatively impervious to demographic fluctuations among the college-age population, and their endowments give them a cushion most state schools lack (although falling interest rates have meant less endowment income). As a rule, their graduates fare far better in the job market.

### Demographics versus recession

Complicating the current employment picture is the convergence of several demographic trends—in particular, the shrinking high school population and the growing number of retirement-age faculty. The prospect of retirements, widely noted since the early 1980s, has been interpreted by some to mean that we need to train more scientists.

But the recession has altered this picture, at least temporarily. We are hearing of positions created by retirements going unfilled. At the University of North Carolina, Chapel Hill, to take just one example, four professors retired this past year but only two will be immediately replaced. Of course the general expectation is that once the recession is over, replacement of retiring professors will resume. But what if the recession is longer lasting

than is now predicted? Other questions also arise: Will US schools, which now award 40% of their physics PhDs to foreigners, also be keen on having that same cohort as their faculty? And what if there are simply not as many jobs as forecast, if it becomes apparent that graduating PhDs are not getting positions after completing their postdocs?

"Unlike law school or business school, the graduate physics training is treated like an apprenticeship," says Kate Kirby, a research physicist and associate director at the Harvard-Smithsonian Center for Astrophysics, who was chair of the APS committee on membership in 1990–91. "Students have the expectation that when they arrive at the other end of the process they will continue to do basic research," she says, in industry or academia or at a national lab. That somewhat overly optimistic expectation, Kirby says, has left many young physicists feeling confused and misled.

With the job prospects in the traditional sectors drying up, groups such as the APS physics planning committee and the APS committee on membership have become interested in identifying alternative career paths

for PhD physicists, Kirby notes. "This is a really hot topic."

The statistics division of the American Institute of Physics currently is completing a special study of the postdoc population, designed precisely to cast light on whether current postdocs are experiencing trouble in securing permanent jobs. This study, which tracks new PhDs for up to three years after graduation, is the first the division has conducted since 1977. Beverly Porter notes that the latest study "clearly indicates that PhDs emerging from their postdocs are having difficulties locating permanent physics research employment." Academic positions are still limited, she says, while industry and national lab positions have been severely curtailed by the recession. Although unemployment is still rare, Porter says, "many appear to be prolonging their postdocs."

Meanwhile, the forthcoming AIP survey of 1991 bachelor's degree recipients shows a shift into graduate study—as a means of riding out the recession—and a growing proportion of physics bachelors doing work unrelated to their major.

—JEAN KUMAGAI  
AND WILLIAM SWEET

## PHDS FARED WORSE IN 1990 JOB MARKET, SURVEY SHOWS

The latest employment survey of recent physics graduates reveals a noticeably grimmer job market for new physicists. Conducted in the winter of 1990–91 by the American Institute of Physics, the survey polled those who had received degrees in 1990 to see how they fared in the job market during the months following graduation. What the survey found was that, compared to the previous year, respondents took longer to find jobs, unemployment increased, and starting salaries for PhDs dropped.

The amount of time recent graduates spent looking for work increased significantly during the past several years and was up sharply from 1989 to 1990. Since the early 1980s, for example, the proportions of bachelor's and master's degree recipients who took more than six months to find a job more than doubled. From 1989 to 1990, the proportion of physics doctorates who took three months or more to find work rose from 58% to 70%.

Unemployment among recent graduates was also higher in 1990 than in 1989. Among physics bachelors, 10% said they were unemployed at the

time of the survey, compared to 7% the year before, although at least one-third of the unemployed held some kind of job during the six months between graduation and the survey. Underemployment was also a problem among physics bachelors, with 7% working only part-time and primarily in jobs that did not make use of their physics training. Five percent of the 145 master's degree holders and 3% of the 495 PhDs who responded to the survey said they were not working, compared to 4% and 1%, respectively, in 1989.

Among the new PhDs who found work in the US in 1990, two-thirds took postdocs, the same as in 1989. The proportion of PhDs accepting jobs outside the US increased slightly from 8% to 10%, while the number finding full-time work in the US fell from 31% to 27%.

Physics doctoral recipients earned less in 1990 than in 1989. The median monthly salary was \$3580 for those who took potentially permanent jobs, as opposed to \$3760 the year before. For postdocs the \$2460 monthly salary in 1990 was less than the \$2400