

ical Society, and membership in the society will be open to teachers who have contributed in an original way to physics teaching. The USSR already has a physics teachers' journal, *Physics at School*, with a circulation of 200 000. For high school students, there is *Kvant*, which popularizes physics and mathematics, and has a circulation of 500 000. An English edition, called *Quantum*, is now being published in the US by the National Science Teachers Association.

Kapitsa says one of the primary missions of the society is to promote basic research and protect it from undue commercialization. He also feels the society should put a high priority on recognition and protection of the professional rights of scientists. These include funding, rights to travel and patent rights. The society will promote international cooperation and exchange of students, especially for graduate work.

The Physical Society plans to publish a bulletin or newsletter and to initiate new publications. For example, some physicists have suggested publishing in English a *Journal of Soviet Physics*, to promote direct communication with foreign colleagues. The society also hopes to promote public understanding of scientific concepts, in part to counteract the increasing power of antisocial and anti-intellectual activities such as astrology and witchcraft, which have suddenly become fashionable in the Soviet Union.

Kapitsa hopes to promote productive collaboration between individuals and industry. "For many decades," he told us, "due to institutional, economic and other reasons, the influence of the generally high standards of fundamental research on industry was very low, and this has to change." He hopes that the new society, as yet uncorrupted by bureaucracy (which he says has compartmentalized research and development excessively), will open some new possibilities for such interaction. Another of Kapitsa's aspirations for the society is contributing to the conversion of military establishments into industrial establishments. He also envisions the society as giving advice to the public, the new parliament and the broader scientific community on major projects, "cutting across established borders." The society will promote interdisciplinary research in energy, ecology, economics and global problems.

The Russian Physical and Chemical Society was founded 100 years ago by Dmitri Mendeleev and lasted until Stalin disbanded it. In 1937 the Mendeleev Chemical Society was founded; it now has a budget of 12 million rubles per year. When the physicists tried to revive their own society in 1946, Kapitsa says that Stalin told them they should mind their business—namely bombs. Another attempt was made in 1971, but the society was never formed.

—GLORIA B. LUBKIN

AIP REPORT DESCRIBES WHO TAKES—AND WHO DOES NOT TAKE—SCIENCE

By the year 2000, American students should be "first in the world in math and science achievement," President George Bush told Congress in his 31 January State of the Union address. US governors echoed the President's optimistic goal in their collaborative report issued a month later.

The nation's leaders have picked a pretty tough row to hoe, according to a new report on the state of US high school math and science education prepared by the American Institute of Physics. Entitled "Who Takes Science?" the report points out that most American students aren't exposed to a rigorous math and science curriculum, despite reforms in graduation requirements, and that only a small percentage of students benefit from the present system.

The report underscores one of the most widely recognized problems in

science education: the underrepresentation of females and minorities. For example, 25% of male students took a physics course in high school, while only 13% of females did so. The percentages of males and females who took calculus were 10% and 6%, respectively. And among male and female students who scored equally well on math aptitude tests, the proportions of boys who took physics exceeded the proportions of girls by as much as 20-percentage points. "There appear to be unique barriers keeping females out of physics classes, and these barriers are social rather than aptitude," the report concludes.

The AIP report is based largely on data the US Department of Education's National Center for Education Statistics gathered in 1980 for its "High School and Beyond" study. The study surveyed over 28 000 high

school seniors and tested them in reading, math and vocabulary; the same individuals were also queried about their work and education in 1982, 1984 and 1986.

To prepare "Who Takes Science?" AIP's Education and Employment Statistics Division analyzed the 1980 data pertaining to math and science coursework. Though the data is ten years old, the results are still relevant to today's school system, because they "serve as an important benchmark against which recent changes can be judged," the report says. "While a number of important changes have occurred in the education system since 1980, not all of the changes have been positive and most of them have not had a profound effect," the report concludes.

For example, since the 1980 data were collected, state regulations governing the minimum years of science and math required for graduation from high school have increased and become more strict. In 1980 most states had few specific requirements: Fifteen states had no graduation requirements at all, and another 22 required only one year each of mathematics and science. By 1985, 36 states had passed laws requiring two or more years each of math and science to get a high school diploma. Even so, the newer standards are unlikely to increase enrollment in upper level courses because students often fulfill the requirements by taking remedial, introductory or business classes, the report concludes. And, according to a 1987 report released by the Research Triangle Institute in North Carolina, the proportion of high schools that offer upper level math and science courses has changed little since 1980.

Overall, less than one-fifth of the students in the high school class of 1980 took physics, only one-third took chemistry, and most took neither physics nor chemistry. Enrollment in advanced math courses was similarly low. Among black and Hispanic high schoolers, 15% and 12%, respectively, took a physics course. By contrast, 27% of Asian students and 19% of white students took physics.

The report also reveals that students in certain regions of the US fare far worse than their peers from other parts of the country in terms of performance on aptitude tests and the amount of science and math studied. For example, among students attending high schools in the Central Southern states (Alabama, Mississippi, Kentucky, Tennessee, Texas, Louisiana, Oklahoma and Arkansas) less than 20% took two years of science,

while in the New England and Mid-Atlantic states, nearly 40% did so. In those areas where the student-age population is expected to grow in the next decade, namely the West Coast, the Western Mountain regions and certain parts of the South, students typically had lower graduation rates and math aptitude test scores, and they studied less science. The projected population growth may further strain the education systems in these areas, the report says.

The ubiquitous practice of "tracking," which channels students into separate curricula based on their career plans and, to a certain extent, their abilities, seems to exclude many high schoolers from taking more than the minimum amount of science. A small, academically elite group made up of the 28% of students who were both in a college preparatory track and scored above average on achievement tests accounted for four-fifths of the enrollment in calculus and two-thirds in physics. Very few students who were not in a college preparatory track took any advanced math or science courses, regardless of their aptitude.

For a copy of "Who Takes Science?" contact Roman Czujko, Education and Employment Statistics Division, American Institute of Physics, 335 East 45 Street, New York NY 10017.

—JEAN KUMAGAI

AIP SURVEY FINDS WEAKER 1988-89 JOB MARKET

The job market for physics graduates deteriorated somewhat in 1988, according to the latest employment survey prepared by the American Institute of Physics. The survey found that 1988 physics master's and bachelor's degree recipients took longer to find jobs, that PhD recipients commanded lower starting salaries and newly employed PhDs expressed lower job satisfaction than their counterparts did in 1987.

The survey is conducted annually by AIP's Education and Employment Statistics Division to find out how those physics and astronomy graduates who were interested in full-time employment, as opposed to further schooling or temporary postdoctoral positions, coped with the transition from school to the workplace during the half-year following graduation.

Only 38% of physics bachelor's degree recipients and 36% of master's degree recipients had jobs lined up when they graduated, compared with

44% for both groups the previous year; among 1988 PhD recipients, 11% had jobs upon graduation, compared with 13% the year before. The proportions of graduates who spent more than seven months searching for employment also rose slightly in 1988.

Newly employed PhDs showed lower job satisfaction than did their 1987 counterparts. Overall, more than a third of the PhD holders responding to the survey said they were interested in changing jobs, compared with 22% the previous year. Job dissatisfaction rose most sharply among those hired by industrial employers: 33% said they were interested in a job switch, compared with only 13% a year earlier.

The average monthly salary for newly employed PhDs fell from \$3500 in 1987 to \$3340 in 1988. During the same period, the average monthly salary for newly employed astronomers jumped from \$2300 to \$2900, a 26% increase. A smaller rise was seen in the average salary for physics masters, from \$2400 to \$2580, while the average salary for physics bachelors remained about the same at \$1920 per month.

Industry remained the largest employer of new physics PhD recipients who took permanent jobs, but the proportion hired by industry fell by 13 percentage points from the previous year, from 52% in 1987 to 39% in 1988. This significant drop was coupled with smaller increases in hiring by other types of employers. For example, the proportion of new PhDs hired by government labs rose from 8% in 1987 to 14% in 1988.

Industry was also the biggest source of jobs for physics bachelor's and master's degree recipients, and its relative position grew in 1988, the survey found. From 1987 to 1988, the proportions of physics masters and bachelors working for industry rose from 50% to 55% and from 47% to 50%, respectively.

The 1988 employment survey is available from Susanne D. Ellis, Education and Employment Statistics Division, American Institute of Physics, 335 East 45 Street, New York NY 10017.

—JEAN KUMAGAI

EC FRAMEWORK PROGRAM ADOPTED FOR 1990-94

In December the 12 member nations of the European Community have adopted a new framework program, amounting to 5.7 billion ECUs (ap-

proximately \$6.25 billion), for European research and development during the years 1990-94. The EC Commission had proposed a hefty increase for the framework program, but members opted instead for a no-growth budget—the previous five-year program amounted to 5.4 billion ECUs.

The largest single elements within the framework will remain the ESPRIT and RACE programs, which are devoted to information technology and telecommunications, respectively. In addition, a "European Nervous System" is to be established—a super-network linking government and industry computer-communication systems throughout Europe.

Environmental research programs in climatology, marine science and atmospheric chemistry—EPOCH, MAST and STEP—are to be expanded to embrace regions beyond the EC's boundaries, social and economic aspects of climate change and environmental monitoring technologies.

Continuation of the Joint European Torus project to 1996 is recommended, subject to ministerial approval, and it is anticipated that construction of a successor fusion reactor might begin toward the end of the new framework period.

New initiatives include a program to send graduates for two-year postdocs at institutions outside their native countries and a project exploring subterranean disposal of radioactive waste, with pilot sites in Belgium, France, West Germany and Britain.

FRG DESIGNATES NEW 'SPECIAL RESEARCH AREAS' IN PHYSICS

The German Research Society, the Federal Republic's equivalent of NSF, has designated eight new *Sonderforschungsbereiche*, or "special research areas"—cross-disciplinary and cross-institutional collaborations deemed worthy of long-term support. Two of the newly established special research areas are in physics.

A *Sonderforschungsbereich* described as dedicated to "physical foundations of low-temperature plasmas" has been set up at the University of Bochum, with participation by the University of Düsseldorf and the Jülich Research Center (the KFA). Researchers at the three institutions have been collaborating since 1986 in a plasma working group and wish to explore low-temperature phenomena, which have received less attention than high-temperature plasmas de-