

physics department that his salary has first dibs on the group's research grant. So far, his salary has been made up by teaching and by stretching and reallocating other departmental money. But, whereas a regular faculty member would teach one course per quarter, "I'd have to do three to earn my keep," says RW. "There'd be no time for my research job."

Somewhat more fortunate is Jim Matthews. After eleven and a half years as a University of Michigan associate research scientist working on experiments such as the Auger Project to study high-energy cosmic rays, he left this fall to take a tenure-track faculty position at Louisiana State University. Things got tough in Michigan after the professor who was the group's principal investigator retired, Matthews says, because DOE, which funded the group, didn't want to transfer the grant to someone on soft money. "Our funding agent was pretty helpful. He wasn't our enemy, but he made it clear that we [Matthews and the other research scientist on the project] had to find our own salaries." The University of Michigan paid part of Matthews's salary as a "stopgap measure," and he and the other research scientist kept the DOE grant. But when Matthews got the offer from Louisiana State, he took it. "I know a lot of people on soft money. It's a real scramble," he says. "I was fortunate to land on my feet."

There are other stories, but there are no hard numbers. Nevertheless, there is a widespread sense in at least some fields within the physics community of growing pressure to cut senior research positions. "It's hard to quantify, but there's been increasing pressure for the order of a decade," says Michigan's Jones.

Easy targets

And soft-money positions are by definition easy targets for spending cuts. In high-energy physics, for example, the two main funding agencies' budgets for university research are not even keeping up with inflation: DOE's has dropped from about \$95 million in fiscal year 1993 to less than \$90 million this year, and NSF's has been \$40–45 million a year for the past five years. "Salaries are generally a large chunk of a research grant, and when the funding agencies come and say you have to cut back, you can save a lot of money" by reducing the number of people on a grant, says Matthews.

But many in the physics community feel that the funding agencies, particularly NSF, have been too aggressive about routing out senior researchers. For instance, CERN-based UCLA high-energy physics professor Peter Schlein's long-standing NSF support

was cut by 65% between 1992 and 1994. As a result, Schlein says, his research program shrank dramatically, and he was forced to let go two of his three senior researchers. "[NSF] was quite explicit" that they would not fund three senior researchers, says Schlein. "This hurts science."

Not surprisingly, NSF denies having a policy to cut back on senior researchers. "That would be age discrimination," says Goldberg. But, he concedes, "It's close to [NSF's] physics division practice. There is pressure on those kinds of appointments." Representatives from both NSF and DOE say that grant applicants must justify senior research positions more strongly than in the past. "People are starting to scrutinize senior postdocs, partly with our urging," says DOE's Williams. But, he adds, "It's not really our call. We don't micromanage. All we can do is jawbone, and say to look at everything."

The bottom line is that senior researchers on soft money never have had job security, and they are caught between funding agencies and universities—both of which face tight budgets these days. The funding agencies argue that the universities should do more to help support senior researchers. But universities mostly can't, or won't, provide permanent em-

ployment for senior researchers who have had their Federal funding cut. "In the absence of any binding legal document," says Michigan State's Abolins, a university may keep the person on for a while, but "then washes its hands of [the problem]." (DOE's high-energy physics advisory panel, or HEPAP, is looking at this issue in the context of broader infrastructure problems, and will release a report early next year.)

The funding agencies also argue that postdocs, which are much cheaper, should be favored over senior researchers. "Given the educational mission of NSF, our bias is toward people who are at the start of their careers," says Patricia Rankin, NSF's other program officer for high-energy physics. "It's a hard choice, but it's often better to shut down a senior position than [lose] 2–3 postdocs." But many in the physics community object that postdocs cannot be compared to more experienced researchers. "There is a huge difference between someone with 15 years of experience and a young postdoc," says UCLA's Schlein. "They're not in the same league." Heidi Schellman, a physics professor at Northwestern University, agrees, and asks, "Where are the postdocs to go?"

TONI FEDER

Web Site Brings Work of Women Physicists to Light

The 20th century has seen not only the breaking down of many of the barriers that had long prevented women from doing physics, but also an increasing number of important contributions to physics being made by women. To bring those contributions to light, a group of physicists has been compiling an on-line archive that describes and documents the achievements of women.

Although other Web sites and books deal with female scientists, most focus on personal histories and are aimed at the layperson, says Nina Byers, the UCLA physics professor who is overseeing the project. By contrast, Contributions of 20th Century Women to Physics (CWP) is a Web site (<http://www.physics.ucla.edu/~cwp/>) that concentrates on scientific contributions, listing the women's major discoveries and providing references to published papers. The site, initiated to help mark the American Physical Society's centenary in 1999, uses physicist volunteers to research and verify each citation. "For those women who

are still alive and can do so, we are asking them to describe their important contributions and identify the papers that document them," Byers says.

A browse through the CWP Web site can turn up unusual bits of history. One such item is a June 1936 letter from Robert A. Millikan to the president of Duke University, written around the time that Hertha Spöner joined the physics faculty there. The letter suggests that the school's money would be better spent hiring male, rather than female, physicists. Millikan's advice notwithstanding, Spöner remained at Duke until her death in 1968.

Caroline Herzenberg, a physicist at Argonne National Laboratory who has long been interested in the history of women in science, says that through the CWP project, she learned of "a number of interesting women with whom I wasn't previously acquainted." She hopes the site will be expanded to include more younger women; because of funding and personnel constraints, it is limited at present to those whose major contributions came before 1975.



"It's going to be an important resource for physicists and for encouraging girls to go into physics," Herzenberg predicts.

The site currently contains citations for about 50 women, and the plan is to add about 100 more, with hypertext links to the actual research papers, says Betty Anderson, a UCLA historian

who is the project's research associate. She and other contributors are also preparing essays that will "tie the women's stories together and give the bigger picture." One essay she is working on will discuss the affects of the Nazi rise to power on women physicists in Germany and Austria during the 1920s and 1930s (Peter Galison's article, on page 42, describes the ordeals of one of those women, Marietta Blau).

The success of the CWP Web site has inspired the APS committee on minorities to commission a similar site for minority physicists. George Ofori-Boadu of Hampton University is now gathering biographical information on African-American, Native American and Hispanic American physicists for possible inclusion in such an on-line archive.

JEAN KUMAGAI

"suits from D'Amato's office."

The APS fellow for 1997, Joseph Michels, serves as a staffer for Joseph Lieberman, a Connecticut Democrat and a founding member of the bipartisan Senate Science and Technology Caucus. Michels helped to plan the caucus's first roundtable discussion, at which ten guests from academia, industry and government shared their insights on how government can encourage technological innovation. Lieberman is also on the subcommittee that authorizes military R&D, and Michels reports that Department of Defense officials caught the attention of the subcommittee members with testimony that cutbacks in defense research were imperiling the military's technology base. (Both the House and Senate subsequently called for increases in DOD's funding of basic and applied research.) Michels has found his doctoral work in experimental condensed matter physics at the University of Oxford invaluable in convincing others on Capitol Hill of the potential of technologies such as x-ray lithography.



J. MICHELS

Michal Freedhoff could not have expected her 1997 OSA/MRS fellowship to lead to an encounter with Mikhail Gorbachev. She works in the office of Representative Edward Markey, a Massachusetts Democratic and a founder and cochair of the House Bipartisan Task Force on Nonproliferation. Charged with finding a speaker for the inaugural meeting of the task force, she scored a coup when a spur-of-the-moment phone call she made resulted in Gorbachev's acceptance. Prior to her fellowship, Freedhoff, a physical chemist from the University of Rochester, helped develop "Physics Success Story" flyers for AIP. In Markey's office, in addition to working on nuclear nonproliferation issues, she has tackled issues of high-level nuclear waste disposal, Superfund cleanup of hazardous waste sites and electric utility deregulation. She also has had the thrill of seeing a quote from a floor speech she wrote for Markey, in which he ridiculed the furor over the United Nations' designating certain US na-

Physics and Politics Mix on Capitol Hill

What do x-ray lithography, cloning, groundwater contamination and Mikhail Gorbachev have in common? They are all topics encountered by the four physicists serving as Congressional Science Fellows this year. The American Institute of Physics (AIP) and several of its member societies—the American Physical Society (APS), the American Geophysical Union (AGU) and the Optical Society of America (OSA) jointly with the Materials Research Society (MRS)—each sponsor scientists to spend a year working on Capitol Hill. More than 30 professional societies participate annually in the fellows program, which is run under the auspices of the American Association for the Advancement of Science.

One of the suits

"My impressions keep changing as I go," comments Steve Hagen, a biological physicist who worked on protein folding at the National Institutes of Health before accepting AIP's 1997 fellowship. In his staff position with the Senate Banking, Housing, and Urban Affairs Committee, Hagen has been

involved in oversight of the banking industry and exploring how encryption technologies, privacy issues and the year 2000 computer problem could affect electronic banking. He finds it "interesting to see how public pressure drives Congress." Although banking issues are his primary focus, Hagen found himself on more familiar ground when constitu-

ent concerns prompted the committee chairman, Alfonse D'Amato, a New York Republican, to have staffers investigate reports of tritium leakage thought to be from a spent fuel storage pool at Brookhaven National Laboratory. At the same time, Hagen found it disconcerting to be viewed by the Brookhaven scientists as one of the



S. HAGEN



M. FREEDHOFF