

for CON-X, a next-generation telescope that could image emissions from black holes.

► **Department of Energy.** Research and development funding at DOE would increase 5.7% to \$8.5 billion, but most of that would go to defense activities. Funding for the Office of Science would remain flat at \$3.3 billion. There would be a significant boost in funding for nanoscience with the reallocation of money that has been going for construction of the nearly completed spallation neutron source.

► **NIST and NOAA.** The National Institute of Standards and Technology would see its R&D budget decline 11.8% to \$411 million. NIST's Advanced Technology Program would only receive enough money to close out contracts as the White House tries once again to kill the program. The National Oceanic and Atmospheric Administration's R&D budget would fall by 6.4% to \$764 million.

► **Department of Homeland Security.** This department, officially created in January, would become a significant funding agency with a proposed R&D budget of \$1 billion. Most of that money would be in the Directorate of Science and Technology. The directorate would have \$801 million, which would include the Homeland Security Advanced Research Projects Agency (HSARPA).

► **National Institutes of Health.** After five years of appropriations that nearly doubled the NIH budget, the agency would receive only a 2% increase in FY 2004. NIH's National Institute of Allergy and Infectious Diseases, seen as important in the war on terrorism, would receive an 8.9% increase, but overall R&D would rise only 2% to \$27 billion.

While the administration is promoting the substantial increases in its "priority programs," House Science Committee Chairman Sherwood Boehlert (R-N.Y.) described the overall science and technology budget as "disappoint-

US Plans to Rejoin ITER Collaboration

President Bush, heeding recommendations from the fusion science community, the National Research Council (NRC), and the Department of Energy (DOE), authorized the US to rejoin the International Thermonuclear Experimental Reactor project. In a 30 January statement issued by the White House at the same time Secretary of Energy Spencer Abraham was announcing the ITER decision at the Princeton Plasma Physics Laboratory, Bush said, "The results of ITER will advance the effort to produce clean, safe, renewable, and commercially available fusion energy by the middle of this century."

The decision is an apparent victory for Ray Orbach, director of DOE's Office of Science, who has pushed hard for several months to get the administration to rejoin ITER. In a 3 February briefing announcing the president's proposed fiscal year 2004 budget, Orbach described fusion as an "energy source with unlimited amounts of potential" that could produce both electricity for commercial use and, as a byproduct, hydrogen that could fuel the hydrogen-powered "freedom car." The administration has proposed spending more than \$720 million on R&D over five years to create the car.

In presentations last fall to the NRC's burning plasma assessment committee and DOE's independent Fusion Energy Sciences Advisory Committee (FESAC; see PHYSICS TODAY, November 2002, page 28), Orbach said the development of commercial fusion power was critical to help solve the global warming problem. President Bush and other administration officials don't share Orbach's alarm over global warming, however, and instead have tied the ITER decision to the hydrogen car development program.

Citing ITER's estimated cost of \$10 billion, the US dropped out of the project in 1998. ITER was then scaled back to a projected \$5 billion, which the administration deemed reasonable. The US expects to pay about 10% of the construction costs, or about \$500 million over eight years. For the moment, administration officials are talking about a US cost of \$50 million per year, but FESAC has estimated the US cost for becoming a full member to be about \$100 million per year. In his budget briefing, Orbach said the difference in the two amounts is tied to distinctions between construction costs and operating costs. Construction isn't expected to begin until at least 2006, he said, "so the really heavy expenditures are not in this year or even next, but in the ensuing years." The earliest that ITER is expected to become operational is 2014. In the FY 2004 budget, the administration is asking for \$12 million for "ITER negotiations and supporting R&D."

"Remember that all we've done so far is to rejoin the negotiations," Orbach said. "There are still going to be issues of site selection, the issues of what we will build, and so on. The \$12 million will help us in those negotiations." Orbach said other US fusion programs would continue, but those involving burning plasma would be refocused to better support the ITER initiative.

ITER's current partners—Canada, the European Union, Japan, and Russia—have indicated that they expect to choose the ITER site by 2004. Proposed sites are in Canada, Europe, and Japan. China is also seeking to become a partner in ITER.

Jim Dawson

ing." The administration "has acknowledged the importance of funding for basic research, particularly in the physical sciences," he said. "On the other hand, many science programs do not even keep up with inflation. In many areas . . . there aren't enough de-

tails yet to fully understand the proposals," Boehlert concluded. "Perhaps the best that can be said is that this budget document may have to be rethought in any event once Congress finally provides domestic appropriations for fiscal 2003." **Jim Dawson**

L'Oréal and UNESCO Award Women Physicists \$500 000

Not just cosmetic: L'Oréal and UNESCO are rewarding five women from around the globe for their scientific contributions in crystallography, disordered materials, scaling laws of fluids and complex systems, and electron microscopy of crystals and quasicrystals.

This year's "for women in science" awards by cosmetics giant L'Oréal and the United Nations Educational, Scientific and Cultural Organization (UNESCO) recognize lifetime achievements by women in condensed matter sciences. The awards are in their fifth

year, but this is the first time they've rewarded work in the physical sciences. The awards were also increased fivefold this year, with five women from five continents each receiving \$100 000.

"It seems to me that giving due

recognition to women scientists can create a useful psychological shock," Nobel laureate Pierre-Gilles de Gennes, who served as president of the awards committee, said in a statement when the winners were selected. Women are "often more perceptive" than men and they "know how to stand by" someone whose morale is flagging, de Gennes said of women in their capacity as research group leaders. "Men are not so good at this." He added that "women know better than

**Sengers (US)****Erzan (Turkey)****Weissmann (Argentina)****Li (China)****El-Sayed (Egypt)**

men how to preserve the freedom of student researchers. The result is that their students are more mature.”

The awards were bestowed at UNESCO's Paris headquarters on 27 February.

L'Oréal laurels

In North America, L'Oréal and UNESCO honored Johanna Levelt Sengers, an emeritus scientist at NIST in Gaithersburg, Maryland, for her application of scaling laws to fluids near their critical points (see the historical article she coauthored with her brother in *PHYSICS TODAY*, December 2002, page 47). In particular, she has worked extensively on properties of water and steam and, in recent years, on dilute near-critical fluid mixtures and supercritical solvents. Driving much of her work, Levelt Sengers says, are the practical applications in chemistry and engineering. Examples include characterizing the properties of water and steam for the electric power industry, of ethylene for the plastics industry, and of supercritical fluids for uses from nontoxic extraction of fragrances and flavors to the destruction of hazardous waste. A native of the Netherlands, Levelt Sengers joined the National Bureau of Standards (now NIST) four decades ago. “I am looking forward to meeting the other awardees,” she said a few weeks before the ceremony in Paris. “Compared to what they've had to go through to do physics, I've had it easy.”

Ayşe Erzan, a statistical physicist at Istanbul Technical University in Turkey, is this year's laureate for Europe. After completing her studies in the US—she holds a bachelor's degree from Bryn Mawr College and a PhD from SUNY at Stony Brook—Erzan went home to Turkey, only to leave a few years later in the wake of a military coup. That launched an itinerant decade, during which she worked at institutions in Switzerland, Portugal, Germany, the Netherlands, and Italy before returning to Turkey in 1990.

Over the course of her career, Erzan has studied phase transitions and scaling behavior in a slew of complex systems: spin glasses, fractal growth models, sand piles, charge density waves, surface catalysis, earthquakes, and, recently, biologically motivated problems such as protein folding and the evolution of sexual reproduction.

Mariana Weissmann of Argentina is the awardee in Latin America. A senior researcher at the Atomic Energy Commission in Buenos Aires, Weissmann does theoretical and computational modeling of disordered materials. She was the first woman to be elected to her country's National Academy of Exact Sciences. Over the past 30 years, she has calculated electronic, magnetic, and transport properties of interfaces, clusters, and other nonperiodic systems. Recently, she and her group have been using quantum molecular dynamics methods to study the motion of atoms on silicon surfaces and the stability and fragmentation of doped fullerenes. Like Erzan's, Weissmann's early career was interrupted by military coups. Weissmann resigned from the University of Buenos Aires, along with nearly 1000 other professors, in 1966. She left the country for Chile, returned, and left again after the 1976 coup—this time spending two years in Venezuela. She returned to Argentina, but not to her early studies on ice defects, which had been motivated by local interest in cloud seeding and hail growth. “The subject of hail prevention has gone out of fashion,” Weissmann says. “The lesson I learned from this experience is that applied research is much harder in the less developed world.”

In Asia, L'Oréal and UNESCO honored Fang-hua Li of the Institute of Physics in Beijing, China, for her electron microscopy studies of crystals and quasicrystals. The foundation of much of Li's work is the pseudo weak-phase object approximation, which she developed in the 1980s. This the-

ory provides a basis for the interpretation of EM imaging of crystals up to about 100 Å—thicker than previously possible—and for combining high-resolution EM with diffraction crystallography to obtain better resolution images and pinpoint the positions of smaller atoms. Thus armed, Li and her colleagues have studied high-temperature superconductors and semiconductors. For a decade during the cultural revolution, scientific research ground to a halt in China. In terms of equipment, Li's lab is still coming up to speed: This year she is getting her first new electron microscope in 22 years. “In the past two years, conditions have become much better,” she says. “The government can afford to spend more on science than before.”

Egypt's Karimat El-Sayed is the awardee in Africa. El-Sayed specializes in crystallography as a probe of material structures and properties. Her most important work to date, she says, was showing, at the atomic level, how diffusion of oxygen into semiconductors alters the material's electrical response. Her other work includes showing that kidney stones grow in layers of crystalline calcium oxalate oriented by alternating layers of organic material, and studying the structure and behavior of compounds extracted from Egyptian medicinal plants. El-Sayed earned her PhD in the UK, and then joined the physics faculty at Ain Shams University in Cairo, where, as the first scientist in her field, she says, “I have faced many difficult situations—lack of money, books, and equipment. I have worked in a very difficult atmosphere.”

Prize plans

The L'Oréal laureates are still hatching plans for their prize money. Most say they will split it between personal and research uses. El-Sayed, for example, plans to create several awards for young scientists, including one for new female PhDs in condensed matter physics. The rest, she says, she

will spend on her research, her children, and a new apartment.

Next year, the awards will revert to the life sciences, but it's undecided how they'll be distributed in future

years. The L'Oréal-UNESCO "for women in science" program also awards fellowships to young researchers. The fellowships were increased in both number and value

this year—15 fellowships worth \$20 000 each were bestowed in 2003—but so far have remained limited to the life sciences.

Toni Feder

MacArthur Pumps Funds Into Science Policy Positions

Next month sees the launch of the greatest expansion of faculty positions for science, technology, and security policy since the end of the cold war.

Jonathan Fanton is worried. "Policy-makers and the public need reliable, independent advice from scientists in making choices that shape relations among nations and enhance the prospects for peace and security," says Fanton, president of the John D. and Catherine T. MacArthur Foundation, which is based in Chicago. "A generation of scientists—and their students—drawn into public policy by the Manhattan Project and the cold war is passing from service... and we need a successor generation." Next month, at an American Association for the Advancement of Science (AAAS) workshop on science and technology policy in Washington, DC, Fanton will announce the winners of a new \$7 million-a-year program designed to increase the pool of independent experts on science, technology, and security policy.

Under the MacArthur Foundation's science, technology, and security initiative (STSI), nine US universities will receive three years of funding to create a series of appointments, including five tenured posts. Seven additional grants will help fund independent science policy experts in China, Russia, and the UK.

A big expansion

Three years ago, the collapse of the stock market, especially the stock of technology companies, dramatically reduced the assets of many foundations. In an additional shock to the arms control community, two sources of funds, the W. Alton Jones Foundation in Virginia and the Merck Company Foundation in New Jersey, pulled out of international security policy during the autumn of 2001. Smaller funding sources, such as the Washington, DC-based Nuclear Threat Initiative (NTI), which had lost millions of dollars in AOL Time Warner stock, its sole revenue source, suddenly found themselves inundated

with requests. They reacted by restricting consideration to invited proposals. "Although we were already developing STSI at the time, the pullout of the W. Alton Jones Foundation made us feel we had a large obligation to remain in this field," says Kennette Benedict, director of international peace and security at the MacArthur Foundation.

The foundation consulted a number of independent science policy experts and solicited advice from other like-minded funders—the San Francisco-based Ploughshares Foundation, the Ford Foundation (New York), the Carnegie Corporation of New York, and

their own expertise. They all hope to double or triple the number of PhDs they award in the field through their STSI grants. The program is also funding nonuniversity organizations such as the Council on Foreign Relations, AAAS, and the Federation of American Scientists.

Tenured positions

Interest in using scientific techniques in security policy has been declining for some time. "We haven't got a single PhD candidate studying nuclear weapons," says Judith Reppy of the peace studies program at Cornell. "Unfortunately, physics departments do not see nuclear weapons policy analysis as physics—and the same with molecular biology departments and biological weapons policy," says Frank von Hippel, a leading security policy expert at Princeton. He adds that "although many physicists consult with the government on these problems, few teach or do unclassified research on them at their home universities." The result, says Clifford Singer, director of the program in arms control, disarmament, and international security at Urbana-Champaign, "is that it has been

difficult for scientists working in interdisciplinary work to obtain tenure."

Falling interest and a lack of tenured positions, says Benedict, have led to the body of "scientists working [on policy research] outside industry or the military getting rather slim.... The events of September 11, 2001, only confirmed the growing need for more experts."

The MacArthur Foundation approached a number of institutions requesting proposals to help young and midcareer scientists work in security policy areas. "The universities actually responded in ways we hadn't anticipated," says Benedict. "We suggested creating a tenured position," says William Long, chairman of Georgia Tech's Sam Nunn School of International Affairs. Georgia Tech, Cornell, Princeton, Urbana-Champaign, and Carnegie Mellon are all using their MacArthur grants to offer tenured posts devoted to science-based policy issues. The universities



The effectiveness of sterilizing anthrax spores, such as those carried in a letter addressed to Senator Patrick Leahy, is one area of research the MacArthur Foundation will fund at Carnegie Mellon.

the NTI—on what it should do. Many of those consulted recommended "institution building"—beefing up existing university centers and departments that deal with science and security policy and helping to create new ones.

In its first round of grants, the STSI will fund Carnegie Mellon University (\$1.16 million), Cornell University (\$1.1 million), Georgia Institute of Technology (\$1.25 million), Harvard University (\$946 000), the University of Illinois at Urbana-Champaign (\$1.35 million), the University of Maryland, College Park (\$1.2 million), MIT (\$707 000 over two years), Princeton University (\$1.35 million), and Stanford University (\$1.35 million). Those institutions will look at security issues that match