

trial Planet Finder (TPF), a \$200 million free-flying infrared interferometer that would be "a promising opportunity" for collaborating with the European Space Agency (ESA), which is considering a similar mission named Darwin. TPF, said McKee, would be "the most technically ambitious science mission NASA has ever attempted." Though ranked third among space-based missions, it is a personal favorite of NASA Administrator Dan Goldin.

The list of a dozen moderately sized instruments is topped by the \$300 million Gamma-ray Large Area Space Telescope (GLAST), a joint NASA and Department of Energy (DOE) project with 30 times the sensitivity of the Compton Gamma Ray Observatory. (The Compton spacecraft was jettisoned in the Pacific Ocean early last month after one of its three gyros failed.) Another recommendation was the \$250 million Laser Interferometer Space Antenna (LISA), a joint mission of NASA and the ESA, to pioneer the study of low-frequency gravitational waves from galactic binary star systems and the coalescence of supermassive black holes. A mission of this sort was recommended in the report of a physics survey panel last year to complement the ground-based Laser Interferometer Gravitational Wave Observatory (LIGO), an NSF project designed to track gravitational waves at much higher frequencies from the coalescence of neutron stars and stellar mass black holes, as well as from the core collapse of supernovae.

Smaller missions were not ranked, except for the first, a National Virtual Observatory to enable "a new mode of research" for astronomers seeking a one-stop shop for data as well as a potent public classroom.

The committee also calls for NASA, NSF, and DOE to place stronger emphasis on funding astrophysical theory, data archiving and mining, and laboratory astrophysics. More daunting is the panel's recommendation to reorganize the US optical astronomy community, now divided between observatories operated by private organizations, universities, or foundations and those that are government funded. The report proposes a new paradigm: "All facilities, whether nationally or independently operated, should be viewed as a single integrated system." Whereas the solar and radio astronomy communities cooperate, those in the optical community tend to operate on their own, with no coordination. The report suggests fixing the problem by having NSF fund equipment at private obser-

vatories in exchange for viewing time by outside astronomers.

NSF is blamed for shortchanging astronomy and astrophysics, noting that the fields have not shared proportionately in the agency's budget increases in recent years. During the 1990s, about 65% of NSF's budget for astronomy went to such facilities as the National Optical Astronomy Observatory, the National Radio Astronomy Observatory, the National Solar Observatory, and the National Astronomy and Ionospheric Center, while 22% was available for individual investigators and the remaining funds for instrumentation and university radio observatories. As a consequence of this allocation process, national facilities have cut services, maintenance, and improvements. Moreover, even as the number of astronomy proposals to NSF increased by about 50% between 1990 and 1999, the number of grants declined by 30%.

If previous decadal surveys are any guide, the new report should be well received on Capitol Hill and at the White House budget office. The four major projects proposed by Bahcall's 1991 committee have either been built or are under construction; the same is true for nine out of 11 moderate-sized projects. Though a space telescope was first suggested by Hermann Oberth in the 1920s and championed by Princeton University's Lyman Spitzer in the 1940s, it only ranked ninth among the priorities of US astronomers in 1972, when the survey committee was chaired by Jesse Greenstein of Caltech. But NASA's

enthusiasm for a somewhat smaller version won Congress's support for the space telescope, later named for Edwin Hubble. The 1982 survey, headed by George Field of the Harvard-Smithsonian Center for Astrophysics, recommended the Very Long Baseline Array, capable of milliarc-second imaging and the 8 m twin Gemini telescopes, both of which were delayed by tightened federal budgets during the 1980s and the Challenger space shuttle disaster in 1986. Field has calculated that about 60% of the 1992 recommended concepts were adopted. "I was grateful to the agencies for backing our recommendations before Congress and to Congress for its financial support despite the country's pressing problems," he says.

The reason that astronomers have been so successful in the past on Capitol Hill, says William Wulf, president of the National Academy of Engineering and the NRC's vice chair, is because "these are not typical 'please send money' reports. They represent some tough decisions." Bahcall characterizes the decadal surveys as a "heart-wrenching" process in which astronomers "have to turn down proposals that were sometimes a decade in the making. That's one reason the reports are so credible."

Early in its deliberations, the committee asked NASA and NSF how fiscally conservative it should be in proposing expensive new instruments and was told to "be bold" and "not to restrain ourselves," said Taylor.

IRWIN GOODWIN

Washington Ins & Outs

Rosenfeld, Creedon and Kelly Advance

Barely four months after leaving the Department of Energy (DOE) last December to cofound the Center for Energy and Climate Solutions (CECS), a nonprofit consulting organization in Annandale, Virginia, **Arthur H. Rosenfeld** was surprised to learn on 4 April that he had been appointed by California governor Gray Davis to the California Energy Commission. As the only scientist among the five commission members, each serving rotating five-year terms, Rosenfeld expects to have a "bully pulpit" for expressing his ideas on energy policy and planning, which have been shaped by his career as professor of physics at the University of California, Berkeley, as founder and director of the Center for Building Science at Lawrence Berkeley National Laboratory, and at DOE, where he

served since 1994 as senior adviser to the assistant secretary for energy efficiency and renewable energy.

Though Rosenfeld was pleased by the news of his appointment to the California Energy Commission, he was nonetheless pained to give up his participation in CECS. The other CECS cofounder, **Joe Romm**, left DOE last year to form the organization. Rosenfeld characterizes Romm as his "most productive and stimulating collaborator" at DOE. After receiving a PhD in physics from MIT in 1987, Romm worked in the early 1990s with Amory Lovins, the influential energy and environmental guru at the Rocky Mountain Institute. Lovins recommended Romm to Hazel O'Leary, then Secretary of Energy, who snapped him up as principal deputy to the department's assistant secretary for energy

efficiency and renewable energy, who, it turned out, later brought Rosenfeld into the department.

The last PhD student of Enrico Fermi at the University of Chicago, Rosenfeld left Chicago after Fermi's death in 1954 to join Luis Alvarez in later discovering particles and resonant states in the bubble chambers built for the new Bevatron at the University of California, Berkeley. By 1969 Alvarez's group had identified a dozen new particles, and Alvarez had won a Nobel Prize in Physics. Tired of herding a pride of some 200 physicists, engineers, and data analysts around the Berkeley lab and, anyway, preferring to work on his own, Alvarez switched his interests to astrophysics. When that happened, Rosenfeld became chairman of Alvarez's particle physics group.

Rosenfeld also made a career change during the 1973 oil embargo of western nations by the Organization of Petroleum Exporting Countries (OPEC). "I had learned from the time I spent at CERN and at other European accelerator laboratories that per capita energy use by Europeans was only about half of ours, yet they had comparable living standards," Rosenfeld recalled. They didn't freeze in the winter, but they did drive smaller cars and turn off lights in unoccupied rooms and buildings, he noted. "If we Americans used energy as efficiently as do the Europeans or Japanese, we would have been exporting oil in 1973, so OPEC would have posed little threat to the American economy."

At the annual meeting of the American Physical Society in February 1974, Rosenfeld ran into Sam Berman of Stanford University and a former Berkeley colleague, Robert Socolow, who had joined the Princeton Center for Energy and Environmental Studies. Together with Marc Ross of the University of Michigan, they organized a summer study that year on energy efficiency. The one-month study led to a book, *Efficient Use of Energy*, which for many years was the best seller of the American Institute of Physics. Another effect of the study was to convince Rosenfeld to agitate Berkeley's establishment to introduce the Energy Efficient Buildings program, which later developed into the Center for Building Science. The center has devised high-frequency solid-state ballasts for fluorescent lamps, low-emissivity windows, and the DOE-2 computer program for analyzing and designing energy-efficient buildings, refrigerators, and other products.

Rosenfeld arrived at the California Energy Commission on 4 June in the

midst of the state's persistent energy crisis. In the past decade, the state's population has surged nearly 12%, which largely accounts for the surging demand for houses, electricity, gasoline, and other energy products. Rosenfeld is certain to bring his commitment to scientific research to bear on the energy problems confronted by California—and perhaps other parts of the world.

Just one month before proposing Air Force General **John A. Gordon** as the first head of the National Nuclear Security Administration (NNSA) last May, President Clinton nominated **Madelyn R. Creedon** to be the agency's deputy administrator. Creedon is currently legal counsel for the Democratic minority of the Senate Armed Services subcommittee on strategic forces. The subcommittee is headed by Robert (Bob) Smith, a feisty New Hampshire Republican who often jousts with Energy Secretary Bill Richardson at hearings. Richardson was strongly criticized in Congress last month after it was revealed that two computer hard drives containing sensitive nuclear weapons data had disappeared from a vault at Los Alamos National Laboratory in early May. The Senate's reaction was to unanimously confirm Gordon on 14 June.

From 1995 to 1997, Creedon served as DOE's associate deputy secretary for national security programs. She was general counsel for the Defense Base Closure and Realignment Commission in 1994–95, and, before that, she had been counsel for the majority staff of the Senate Armed Services Committee. Previously, Creedon, a graduate of St. Louis University School of Law, spent 10 years as a trial attorney and acting assistant general counsel at DOE.

Henry C. Kelly, assistant director for technology at the White House's Office of Science and Technology Policy (OSTP) since 1993, became president of the Federation of American Scientists and the FAS Fund on 1 June. He succeeded **Jeremy J. Stone**, who completed 30 years of service as FAS's president and CEO earlier this year. Stone left the organization to found Catalytic Diplomacy, a Washington group that is an extension of his own outreach activities at FAS to normalize scientific and security matters with former Soviet Union countries and in China, Taiwan, and Iran.

Kelly, now 54, has wide experience in the fields of arms control and environmental technologies. After receiving his PhD in physics from Harvard University in 1971, he worked at the US Arms Control and Disarmament

Agency for three years and spent two years as a Congressional Fellow at Congress's Office of Technology Assessment (OTA). Then followed two years at the Solar Energy Research Institute and a similar period at the Department of Energy. He then returned to OTA for 11 years. In 1993, Kelly was tapped by **Jack Gibbons**, who had been director of OTA before President Clinton appointed him to be his science adviser and director of OSTP, to join the White House organization. Two years later, OTA was abolished by Congress (see *PHYSICS TODAY*, October 1995, page 53).

At OSTP, Kelly negotiated several notable research partnerships whose goal was to improve the environmental and mileage performance of automobiles, the construction of housing, and the production of fuels and feedstocks from renewable biological sources. He was largely responsible for transferring the recommendations of the President's Information Technology Advisory Committee to the Clinton administration's programs in information technology research programs at such agencies as the National Science Foundation, the Defense Advanced Research Projects Agency, and NASA.

During his first stint at OTA as a Congressional Fellow, Kelly organized a memorable review of the claim put forward by James R. Schlesinger, then Secretary of Defense, that a Soviet attack on US nuclear missile sites and bomber fields was "thinkable" because only 15 000 to 20 000 civilians would be killed. Following the OTA report on the subject, Defense Department strategists revised their estimates of fatalities to up to 20 million and concluded that American society would be in tatters.

IRWIN GOODWIN ■

Irwin Goodwin Moves On

After four and a half decades as a newspaper and magazine correspondent and science editor, 17 years of which were spent with *PHYSICS TODAY* and its readers, Irwin Goodwin is moving on. His insightful coverage of physics-related science policy issues has been superb, as has his devotion to accuracy and the highest of journalistic standards. Following a brief hiatus, we will again provide you with the finest possible coverage of the complex interfaces between our science, government, and society. We already miss Irwin, yet don't be surprised if you hear from him again. As he puts it, he will "embrace a strikingly different career with many creative possibilities." *Bonne vie, Irwin!*

STEPHEN G. BENKA