

Press is appalled by accounts that a smaller fraction of the best and brightest US students are attracted to science. "It is argued that 'market forces' determine student choices, as ideally they should; that, as in the past, immigrants will fill the vacancies. Perhaps. But we cannot rely on the slow response and uncertain outcome of the labor market to deal with a national crisis," says Press. "I believe we urgently need an extraordinary and coordinated response that deals with the deficits of science

education, attacks the poor public image of science and better supports talented students wishing to embark on careers in science."

He calls for a campaign involving scientific and educational societies working with the media to improve the image of science as a career, breaking down the often antagonistic stereotypes of the "mad scientist" portrayed in films like "Dr. Strangelove" and even television sitcoms such as CBS's "Murphy Brown." Press likes the proposal by Richard Atkin-

son of the University of California at San Diego to create 3000 graduate fellowships in science and engineering to make up the shortfall in PhDs.

Press also believes the "quality of life" for scientists needs improving. The size of the average grant needs to be increased and the quantity of paperwork reduced. Some of Press's concerns require more sensitive management by university administrators and government bureaucrats if the American scientific enterprise is to run successfully. —IRWIN GOODWIN

WASHINGTON INS & OUTS KNAPP RESIGNS FROM URA LEADERSHIP; TRULY TO PILOT NASA, FIELDS AT DARPA

The board of trustees for Universities Research Association evinced some surprise at its meeting on 18 April when **Edward A. Knapp** announced his resignation as director of the organization. URA is the consortium of 72 universities in the US and Canada that operates Fermilab under contract to the Department of Energy and manages the proposed Superconducting Super Collider, to be built around Waxahachie, Texas. He is leaving URA, he explained, to pursue accelerator research at Los Alamos, from which he has been on leave of absence since 1985, and to continue his work at CERN on NA-12 Gams. The latter is an international fixed-target experiment, using the Super Proton Synchrotron, which seeks to understand the spectroscopy of low-mass mesons, including hybrid and "glueball" states.

Knapp has agreed to stay with URA until the end of the year, unless a new president is chosen earlier. "I'm not in any real hurry to leave," Knapp said in an interview. "When I came on board, I made it plain that I was doing so on a temporary basis—to do what I could to make the SSC a reality. Now that URA has a contract from the Energy Department to manage the SSC for its first nine years, now that Roy Schwitters has been chosen the first director of the collider project and now that John Peoples has been selected to succeed Leon Lederman as the head of Fermilab, it's time for a new person to take charge of the next stage of development."

Several physicists associated with the SSC have alluded to discord between Knapp and Robert O. Hunter Jr, director of DOE's Office of Energy Research. Hunter is accused of seek-

ing to "nanomanage" the project and of refusing to consult URA officials about anything to do with the SSC. Some say Knapp has not been assertive enough with DOE executives and has not made his problems known to sympathetic members of Congress.

Responding to these critics, Knapp says that his decision to return to research was made long before management differences arose with DOE and that serious discord with Hunter is news to him. "I believe I have led URA on a path that is realistic considering the political realities of the times," he says. "A more aggressive stance or Congressional interference would have been disastrous to the project."

Washington wags recall that Knapp resigned from the National Science Foundation just as abruptly in May 1984. His Senate confirmation took place amid charges that he sought to "politicize" the agency by firing three top foundation officials (PHYSICS TODAY, July 1983, page 60). He left NSF, he asserted at the time, because he longed to return to Los Alamos. During his two years as director, NSF experienced the largest budget increases in two decades—up 31% for research and related activities and 37% for the whole agency. "Honestly, I wanted to get back to my experiments then and I want to get a soldering iron back in my hand," he says.

It is no secret, though, that the SSC is on hold right now. The next phase awaits the decision of Congress whether to provide \$250 million in fiscal 1990, which begins on 1 October, to begin construction. In this project, however, construction during the first year means gathering geological site-specific data so that the preliminary

design engineering can proceed, and developing industrial certification for the 10 000 dipole magnets that are necessary for the 53-mile oval-shaped accelerator. The only construction at the site will be test labs for magnets and for cryogenics.

Another reason that SSC now seems to be immobilized is that newly appointed Energy Secretary James D. Watkins is making a complete review of DOE structure and practices. Knapp calls Watkins's actions "DOE soul searching." He quickly adds: "What Admiral Watkins is doing is exactly right. He's looking carefully at what's gone wrong and what's gone right."

President Bush announced on 12 April that he would nominate Rear Admiral **Richard H. Truly** as NASA administrator. For the past two years, Truly has served as associate administrator for space flight, which put him in the agency's "hot seat" for returning the space shuttle to flight after the Challenger disaster. Prior to joining NASA he was the first commander of the Naval Space Command, based in Dahlgren, Virginia. If confirmed by the Senate, Truly will succeed **James C. Fletcher**, who resigned his second hitch as NASA chief on 8 April. Actually, Truly became NASA's acting administrator on 15 May, when **Dale D. Myers**, who was Fletcher's deputy and became acting administrator when Fletcher departed, also left on 12 May.

At a brief ceremony in the White House's Roosevelt Room, Bush introduced Truly as a "hero" of NASA's own making. Truly will become the first astronaut to command the whole space agency. He was the pilot

of Columbia in 1981, when it became the first shuttle to be flown more than once. The President noted that as a Navy flag officer still on active duty, Truly will need not only the assent of the Senate but legislation to make the appointment legal. The National Aeronautics and Space Act of 1958 requires that the administrator "shall be appointed from civilian life by the President with the consent of the Senate."

Under existing law, Truly would have to retire from the Navy, with a loss of full pension and benefit rights, to take the NASA post. Though Truly is highly regarded on Capitol Hill for rebuilding the shuttle program, some members of Congress are reluctant to change the law or to provide a waiver for fear of opening the way to further militarization of space. After sputnik, President Eisenhower himself insisted that the US space program needs to be open and peaceful, by contrast with the Soviet program, which operated in strict secrecy within the country's missile military program and with Red Army generals in charge at the time.

Bush also proposed that **James R. Thompson Jr.**, director of NASA's Marshall Space Flight Center in Huntsville, Alabama, would soon be nominated as the agency's deputy administrator, succeeding Myers. Like Truly, Thompson is a graduate in aeronautical engineering from Georgia Institute of Technology. He managed the shuttle's main engine project in the 1960s and 1970s and was associate head of NASA's engineering directorate in the early 1980s. He left the agency in 1983 to be deputy director for technical operations at the Princeton University Plasma Physics Laboratory. He returned to NASA in March 1986, at Truly's urging, to head Marshall and later to take part in the agency's internal investigation of the Challenger tragedy.

In the wake of Challenger, dozens of managers resigned, retired or were reassigned from the Huntsville center, which is the base for manned flight R&D. Thompson is widely credited with restoring badly battered morale at Marshall and for correcting management mistakes and technical deficiencies uncovered after the Challenger explosion.

Truly and Thompson are old friends at NASA. Each enjoys a reputation for candor and a strong sense of ethics, as well as expertise in space flight. On Capitol Hill, a House space committee staffer wisecracked that NASA's new leaders "could be a marriage made in heaven." He also

observed that the selection of Truly and Thompson "sends a message that guys who perform well within the agency can take charge."

Two major problems loom before them at the agency: One is the impending loss of key managers, scientists and technicians, the other the loss of much of NASA's 1990 budget request for such "megaprojects" as the space station and the National Aerospace Plane. The first problem came to light late last year when internal studies showed that 45% of the top 2500 senior and middle managers were already eligible for retirement and that in the next two years some 70% of NASA's old hands might be gone. Another study indicated that in the next two years about 50% of its principal scientists and engineers would either retire or leave for other jobs. Within NASA the manpower situation is simply called "a crisis."

Among those who have already left NASA are two of its key figures—**Noel W. Hinners**, associate deputy director, the agency's third ranking executive and its chief scientist, who departed on 14 May, and **James B. Odom**, director of the space station program and once head of R&D for the Hubble Space Telescope, who quit on 30 April. Each attributed his abrupt departure to the effective date of new Federal ethics regulations, which make it harder for senior government workers to take jobs in commercial firms that make products they may have dealt with at their agency.

The regulations, which were to go into effect on 16 May, prohibit government officials who have "participated personally and substantially" in the awarding of a procurement contract from taking part "in any manner" in virtually anything having to do with the contract—from periods of two years to life. Currently, former government employees who go to work for commercial contractors are forbidden only from representing their new companies with their old agency.

The new conflict-of-interest rules were devised by Representative Jack Brooks, the Texas Democrat who heads the important Committee on Government Operations. They are designed to prevent a practice known as the "revolving door." Through that door, officials at the Defense and Energy departments as well as NASA and other agencies that deal with millions and even billions of dollars in procurements often pass into commercial companies they once did business with as government employees.

Just in the nick of time, a day

before the rules were to become law, the House and Senate agreed to delay its imposition for 60 days, until 16 July. In voting the extension, Congress made it clear, however, that it still intends to apply the restrictions on the kind of jobs some former government officials can hold with contractors.

On 3 May Defense Secretary Richard B. Cheney appointed **Craig I. Fields** director of the Defense Advanced Research Projects Agency, where he has been working since 1974—most recently as deputy director for research. As DARPA's chief he succeeds **Raymond S. Colladay**, who resigned a few days before to become vice president for advanced technology at Martin Marietta Corp. Before joining DARPA in February 1988, Colladay spent 19 years at NASA, the last three as associate administrator for the Office of Aeronautics and Space Technology.

DARPA has been called America's closest thing to Japan's MITI, the Ministry of International Trade and Industry, which organizes companies and universities into developing and producing new technologies. In the past four years DARPA has been propelled, only partly by its own choosing, into the role of venture capitalist for the nation's high-risk high-tech activities. Its 1989 budget provides \$100 million for SEMATECH, the research consortium formed to help the US semiconductor industry reassert its world leadership in microchips. This year it is laying out \$25 million to researchers in industry and academe for high- T_c superconductivity, \$67 million for microwave and millimeter-wave monolithic integrated circuits using principally gallium arsenide, which may make chips considerably faster than those made of silicon, and about \$15 million for studies of brain functions that could result in designing neural networks for optical and speech recognition in a new generation of computers. DARPA also has begun a multiyear project to support R&D in high-definition television displays, which holds promise for consumer electronics and such military applications as sharper radar images.

Fields claims that half of US computer scientists are funded by DARPA and that the agency also supports a large proportion of the nation's materials scientists and seismologists. This is unusual for a small agency that had its origins in 1958 in the aftermath of the Soviet sputnik. Over the years DARPA's budget has risen slowly and this year reached \$1.3

billion—though the Pentagon proposes to trim the funding to \$1.1 billion in fiscal 1990, just when greater demands are being made on it by Congress to support new technologies with important implications for improving US economic competitiveness in world markets.

"Around 1983," says Fields, "the Pentagon began to realize that something was wrong in America: Industry was cutting R&D jobs; production and R&D were moving abroad; capital costs were rising and savings rates were falling." With few exceptions, he declares, "most companies are unwilling to invest in new scientific ideas because of the technical and market risks and the expected delays in attaining profits." So DARPA stepped in "to bridge the gap between scientific breakthroughs and a technology base for products to support national security and prevent technology surprises."

DARPA has no laboratories and does no research on its own. Still, as C. Gordon Bell, head of research at Ardent Computer Corp and one of the nation's leading computer designers, puts it: "The agency is the main drive of computer innovation. Period." DARPA prides itself on being lean and unbureaucratic. It has a staff of only about 75 program managers who can dispense relatively large amounts to the best and brightest scientists and engineers, with few strings attached to a specific project.

Nonetheless, many university and corporate leaders as well as many political leaders would prefer a civilian counterpart to DARPA, more mindful of industrial and commercial needs. DARPA, after all, is required to be relevant to the Defense Department's mission, not the national economy. "We can't assume the role of savior of our GNP," says Fields.

In his testimony before Congressional committees over the past year, it is obvious that Fields is DARPA's point-man for HDTV, semiconductors and other electronics programs. A graduate of the Bronx High School of Science and MIT in physics, he got a PhD from Rockefeller University, where he took his oral exams in physiology, mathematics and psychology. He taught at Harvard before joining DARPA in 1974. He has been a controversial figure both within the agency and outside it. Computer scientists have complained about his assertive tactics as head of the agency's Strategic Computer Program. One focus of criticism has been DARPA's substantial backing of the Connection Machine, a 64 000-processor computer developed by Thinking Machines Corp, at the same time the agency's funding of artificial intelligence has fallen considerably. Fields is impatient with such grouching. "I always ask the question: 'How would you do it differently?' and I have yet to hear one substantive answer."

—IRWIN GOODWIN

NSAC DELAYS CLEAR DECISION ON CANADA'S KAON FACTORY

The 45-page report of the Nuclear Science Advisory Committee's Kaon subcommittee, led by Herman Feshbach of MIT, was the subject of an energetic discussion by the full committee on 29 April in Baltimore. The report examines whether the US ought to participate in building a so-called kaon factory near Vancouver, British Columbia. This proposed accelerator, which the Canadian government has not yet approved for construction, would generate intense beams of protons to produce K mesons in profusion. In the US scheme of things, a project of this sort was called "exciting" in NSAC's last Long Range Plan for Nuclear Science, issued in December 1983, but placed well behind in priority to a relativistic heavy ion collider and a continuous beam electron accelerator. The collider, known as RHIC, has not yet received any funding for construction, though

CEBAF is now being built.

A kaon factory would enable physicists to study a broad range of fundamental phenomena. These include better understanding of the baryon-baryon interaction and the structure of nucleons, observing hyperon-nucleon scattering, which is considered essential in getting to the bottom of the "hypernuclei" and neutron densities within nuclei, and searching for rare K decays that are both predicted and forbidden by the electroweak "standard model."

With all this in mind, Feshbach's group examined the capabilities of three proposals for kaon factories: The first is an extension of Canada's TRIUMF cyclotron, now producing H⁻ beams with currents up to 140 μ A at 520 MeV, which would operate with a 100- μ A beam at 30 GeV using an rf system; the second calls for another upgrade of Brookhaven's Alternating

Gradient Synchrotron, now undergoing a major boost in its injection energy from 200 MeV to 1.5 GeV, and, by adding a stretcher, improve its flux and duty cycle; the third is an Advanced Hadron Facility, with an energy of 60 GeV and an average current of 25 μ A, at Los Alamos's LAMPF linac (see PHYSICS TODAY, May, page 17).

Feshbach told the committee that its recommendation should be made on scientific grounds, "but there are many aspects of this facility that have nothing to do with physics—namely costs, timing, national prestige and old-fashioned politics." At the Baltimore meeting, LAMPF's Gerald Garvey read a prepared statement that virtually took the Los Alamos contender out of the running. As Garvey put it, the cost and timing of nuclear and high-energy accelerators now under construction and on the drawing boards, such as CEBAF, RHIC and the Superconducting Super Collider, virtually preclude building any major new machines or making large upgrades in this era of Federal budget crunches.

Beyond this, the Department of Energy and National Science Foundation, which had asked NSAC to respond to Canada's request that the US join in funding a kaon facility, also want to know how the project might affect the future of nuclear and high-energy physics research in the US. Deciding to go ahead with Canada on its factory, which is written in capital letters as KAON (and stands for kaons, antiprotons, other hadrons and neutrinos) involves a US outlay of \$75 million over five years and another \$30 million for detectors and other equipment. The total cost of the project is \$450 million (in US equivalent dollars).

To satisfy DOE and NSF, the committee decided it would need to consider the factory as an integral part of its new long-range plan. Thus, NSAC proposed to consider the Canadian concept and the alternatives when it deliberates on the new plan in Boulder, Colorado, next August. By finessing any immediate recommendation, NSAC frustrated Canada's hope of an early response from the US. DOE officials, accordingly, could offer no encouragement when they met with the Canadians on 9 May to discuss KAON. It's unlikely that the NSAC report will be completed before early October. Still, it is time enough for Canada's Department of Industry, Science and Technology, which is engaged in an \$11 million (Canadian) feasibility study on KAON scheduled for completion by the end of this year.

—IRWIN GOODWIN