

ergy and energy efficiency projects. But midway through the first morning, word arrived from DOE that all government-to-government talks were to stop. "We agreed to depart friends," recalls Douglas Arent, who had spent many months setting up the visit. "But it was disappointing." Because the photovoltaics project would have benefited poor rural communities in India, "there was talk of arguing for continuing it on humanitarian grounds," he adds. "But we didn't pursue it."

S. Muhammad Yusuf, the Indian postdoc whose contract at Argonne was abruptly terminated in June, was "quite confused and dejected after hearing the news," says his adviser, Gian Felcher. Yusuf had been using the lab's Intense Pulsed Neutron Source to study magnetism and superconductivity in thin films and multilayers; he was the only one among the 50 or so Indian nationals at the lab to be let go. Although Yusuf's home institution, the Bhabha Atomic Research Centre in Mumbai, had played a lead role in the nuclear tests, the postdoc's research "had absolutely no relevance to weapons applications," Felcher claims. (Yusuf has returned to India but could not be reached for comment.)

The DZero collaboration at Fermilab's Tevatron is also wondering why the nuclear sanctions are being applied to its efforts. Twelve of its members are based at TIFR, one of the US government's banned institutions. Following the July departure of two TIFR graduate students, Nirmalya Parua and Ambreesh Gupta, future visits by Tata researchers were suspended (although, like other off-site members, they still have access to DZero data on the World Wide Web). The group's other Indian participants, from the universities of Panjab and Delhi, have not been similarly restricted.

The ban on TIFR could set back the upgrade of the detector, says DZero's Tom Ferbel of the University of Rochester. "TIFR has provided about \$500 000 worth of scintillator material, and has borne the technical costs of preparing the scintillation counters that serve to shield the detector from cosmic-ray muons," explains Ferbel. "If the ban on TIFR continues to be enforced next year, it may jeopardize our ability to bring our detector up on schedule."

"Although many of us are very upset with the Indian nuclear tests," Ferbel adds, "I fail to see how closing off a collaboration that benefits our country can help advance the situation."

Another concern for American physicists is that the US may be prevented from hosting meetings sponsored by the International Union of Pure and Applied Physics and other

members of the International Council for Science (still known by its old acronym, ICSU). For ICSU to recommend that such meetings be held elsewhere, "we would need to see a clear pattern that Indian and Pakistani scientists are not being admitted to the US," explains Peter Schindler, executive secretary of ICSU's Standing Committee on Freedom in the Conduct of Science. Even then, "it's not a black-and-white situation," he says. For example, if the US government denies an entry visa to a foreigner it believes poses a national security risk, that would be allowed under ICSU rules, Schindler says. "Definitely, this is something the executive board of ICSU will discuss when it meets in October in Paris."

Pakistan in crisis

Unlike their impact on Indian scientists, US sanctions on Pakistani scientists have had negligible effect. That's mainly because, apart from the weapons establishment, the scientific community in Pakistan is "miniscule," says Pervez Hoodbhoy, a physics professor at Quaid-e-Azam University in Islamabad. But the sanctions are choking the country's already fragile economy, and edging Pakistan closer to defaulting on its international loans. It would be in nobody's interest to have that occur, Hoodbhoy says. "Here you have a state which is in the process of disintegration, and yet it possesses nuclear weapons." He also worries about what would happen if India and Pakistan's long-standing border dispute over Kashmir, where hundreds of civilians and soldiers have been killed in recent months, escalates further.

Pakistani physicist Zia Mian, a research scholar at Princeton University, agrees. "What is needed is a positive and constructive program to strengthen Pakistan's university science and, in particular, public interest in science," Mian says, "so that it becomes possible to educate people about the dangers of nuclear weapons and to challenge the dominant position of Pakistan's nuclear establishment." He

also hopes that physicists will consider the sanctions' impacts not just on their own work but on the broader population.

Opposition from within

Scientists in India were among the first in their country to raise a dissenting voice to the nuclear blasts. On 17 May, amidst the nationalistic euphoria generated by the nuclear tests, a group of 200 scientists from 27 institutions across India issued a joint statement condemning the tests. "We wish to recall here, emphatically, the horror that is nuclear war," their petition stated. "We stand firmly with the long tradition of eminent scientists who have consistently argued against the induction of nuclear weapons" (the statement can be read on-line at <http://www.geocities.com/CapitolHill/2959/>). "The tests came as a shock to most of us," recalls IMSc's Shankar. "But being scientists, we had already given a lot of thought to the issue of nuclear weapons and held strong opinions against them."

Indian scientists have continued to push for public debate on nuclear weapons. In Bangalore, for example, the group Science for Society has held a series of meetings and demonstrations and helped form a Coalition for Nuclear Disarmament, reports Sanjay Biswas of the Indian Institute of Science. On Hiroshima Day, 6 August, protest marches drew crowds in Calcutta, New Delhi, Mumbai and elsewhere. "I think the statements from scientists from all over the country were widely welcomed and emboldened many people to speak up against the tests and their consequences," says IMSc physicist M. V. N. Murthy.

"We will continue our efforts whether the sanctions are there or not," Murthy added. But, as he and many other point out, if the US and the other nuclear weapons states are serious about eliminating the nuclear threat, then they might start by looking at their own weapons stockpiles.

JEAN KUMAGAI

British Science Gets Big Budget Boost

The UK's science community heartily welcomed the government's planned increase in science funding, announced in mid-July. Following a long lean period, the science budget will be fattened by about £1.4 billion (\$2.3 billion) over the next three fiscal years. A hefty portion of this money, £400 million, has been committed by the Wellcome Trust, the world's wealthiest biomedical foundation, and is the largest-ever contribution made

The biosciences are poised to get a windfall from the UK's new science money, whilst the physics community is still waiting to find out what its share will be.

by the private sector to the UK's public spending. The Wellcome money may be used only for research related to life sciences and, in an unusual arrangement, the foundation's new head, Mi-

chael Dexter, will be involved in overseeing its distribution. Not surprisingly, with the government also stressing life sciences, physicists' enthusiasm about the budget hike is tempered by apprehension about how much their field will actually reap.

Broadly, for fiscal years 1999–2001, the government will divvy up £403 million (of the £1.4 billion total) among its six research councils (which will also share an extra £25 million this year) for new projects “in priority areas like life sciences”; £300 million will be distributed to university researchers by the government's Higher Education Funding Council of England; £600 million, in equal parts from the government and the Wellcome Trust, will be used for improving university infrastructure, including modernizing laboratories and equipment; and the Wellcome Trust will put £100 million, or about half the predicted total cost, toward building a third-generation x-ray synchrotron light source. Wellcome's support for the new machine—which would replace the world's oldest second-generation synchrotron light source, the 18-year-old facility at Daresbury Laboratory in Cheshire—reflects the foundation's interest in resolving molecular structures to exploit information about the human genome.

In terms of specific new measures, the government will switch from an annual to a three-year funding cycle, the minimum annual stipend for science graduate students will increase by £1000, to £6455, and the dual-support system, under which academics can apply for grants either from a research council or directly from their university department, will be retained (university accountability under this system will be reviewed over the next few months). Scientists like having the two sources for funding because it increases flexibility, “so that bright cheap ideas can be funded at the grass roots without the long costly grant applications” typical of the research council process, as Brian Foster, a high-energy physicist at the University of Bristol, puts it.

A welcome budget hike

Even before the July announcement, there were hints that science would fare well in the 14-month, government-wide Comprehensive Spending Review (CSR) initiated by the Labour Party when it came to power last year. But, says physicist John Mulvey, the outgoing head of the lobbying group Save British Science, the sum earmarked for science “is rather more than most people dared to hope. Most people were pretty stunned by the size of the increase. It's not something we have

seen for a long long time.” Research spending across the sciences by the research councils and universities combined has gone up in real terms over the past 15 years, but by only 1% a year on average, he adds. “The problem we have is that research funding started low, and the gap between funding levels in the UK and at universities in other countries has widened.”

“We all see [this boost in science funding] as a decisive change in the government's attitude,” continues Mulvey. “They are now accepting that investment in the science base is an investment in the nation's future.” But, he adds, “we still have a long way to go.” Lending the Wellcome contribution—“it's a ‘one-off,’ not something we can count on in future years”—Mulvey calculates that the science budget increase will average out to about 6% a year for three years. “If it keeps going, we'll double science spending in five years. That's what we shall prefer. With anything less, we will not be able to sustain a world-class science base.”

announcing the CSR results, Margaret Beckett, secretary of state for trade and industry and cabinet minister for science and technology, said “years of underinvestment in laboratories and equipment—and in people themselves” have jeopardized science in the UK. The Wellcome Trust's Dexter agreed, and in a speech at the foundation's contribution, he said it is “really distressing to see our generation of scientists being tied to obsolete technology. . . . [The Wellcome Trust money] will help put

UK Science Policy Posts Are Reshuffled

The UK dealt itself a new hand of science policy players this summer:

▷ David Sainsbury, a grocery store magnate and member of the House of Lords, is the new science minister. His responsibilities include overseeing the research councils and space matters. To avoid potential conflicts of interest, Sainsbury pushed forward his retirement as chair of J. Sainsbury PLC, the company founded in 1869 by his great-grandfather (and today the UK's second largest supermarket chain) and put his wealth in a blind trust. Science was previously part of the broad portfolio of Minister of State John Battle (see PHYSICS TODAY, August 1997, page 50), who retains responsibility for energy and industry.

▷ Peter Mandelson, one of the Labour Party's key image managers in last year's election, is the new secretary of state for trade and industry and cabinet minister for science and technology; his predecessor, Margaret Beckett, is now leader of the House of Commons.

▷ Chemist Jack Cunningham, who's been in the House of Commons since 1970, lately as minister for agriculture, fisheries and food, has been promoted to minister for the cabinet office to coordinate policy across government.

▷ And, outside the government, retired University of Oxford physicist John Mulvey passed the reins of the lobbying group Save British Science to Peter Cotgreave, a biologist. The organization also moved its headquarters from Oxford to London.



DAVID SAINSBURY

the whole of the UK science base back where it belongs—at the forefront internationally—and will make a major difference in our ability to retain and recruit the highest caliber scientists.”

Physicists' fare

Particle Physics and Astronomy Research Council (PPARC) boss Ian Halliday is “nervous but hopeful” about how the new money will be allocated. The particle physics and astronomy budget, the main funding source for about half of the UK's physics research, has fallen in real terms by 12.4% since 1979, and the University of Leicester's Ken Pounds, who last March stepped down as PPARC head, says things are to the point “where it is now crucial to avoid undermining the value of our membership in CERN and ESA [the European Space Agency], and to allow investment in new projects such as Mars Express and [the NASA-led] Next Generation Space Telescope.”

Indeed, PPARC has a long list of projects that it wants to fund with its share of the new money. They include the LHC-B, the CERN experiment to check for CP violation; ESA's Planck Surveyor for mapping the cosmic microwave background; the Millimeter Wave Array planned by the US's National Radio Astronomy Observatory and the European Southern Observatory; and an experiment for detecting dark matter, located in the Boulby potash mine in Yorkshire.

And the Engineering and Physical Sciences Research Council, which funds the bulk of physics research not covered by PPARC, will use the CSR