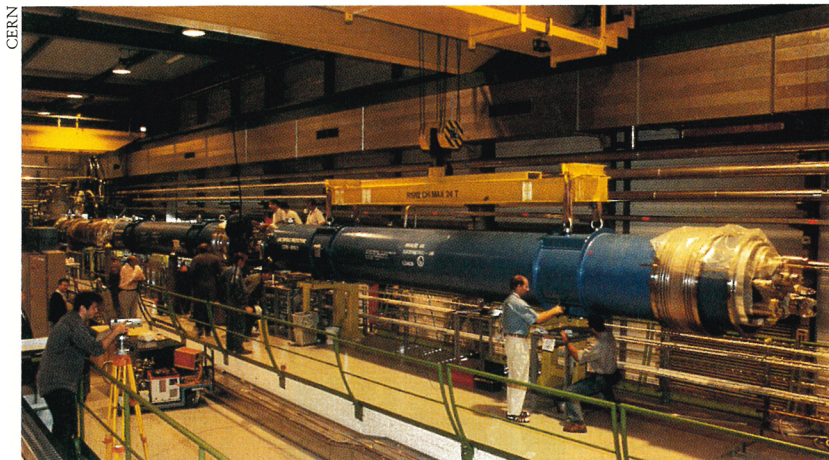




THE STRING OF 10-METER-LONG superconducting dipole magnets shown here sustained 8.36 tesla in a test in December 1994. Some 1232 such magnets will be used in the LHC.

Cutting corners

The latest tussle over CERN's budget began in August, when Germany announced that it needed to reduce its annual contribution. The other member states balked at the idea of granting Germany a special reduction—it was already paying a reduced rate in recognition of financial hardship due to German reunification. Instead, they felt that any reduction should apply to all—but they disagreed by how much to cut annual dues. The UK and a few others joined Germany in calling for steep cuts, while other countries favored smaller ones. Tensions rose further when Germany threatened to withdraw from CERN and to rejoin under different conditions. "We never wanted to leave CERN, but only to change our status," explains council delegate Hans Eschelbacher, deputy director general of science promotion and basic research in Germany's research ministry. "But Germany has to cut spending."

Together, the German and British contributions make up more than a third of CERN's annual budget of 938 million Swiss francs, "so it was clear that outvoting them wouldn't lead to a stable solution," says Llewellyn Smith. But there was some compromise: The council agreed to reduce dues by slightly less than Germany had initially wanted, if still by far more than some countries had hoped. Relative to the amounts foreseen in 1994 (dues are calculated from a GNP-based formula), dues will drop by 7.5% in 1997, 8.5% in 1998–2000 and 9.3% thereafter. "I was pleased with the very constructive atmosphere of the council meeting, right from the start," says Dutch delegate Bernard de Wit, of the University of Utrecht.

The council delegates also agreed to

spread out payment for the LHC up to three years beyond the building period, and to take out bank loans when needed. "On paper it all works. But we have no contingency, and some things can't be controlled," says de Wit. But, he adds, "all of the member states recognize that we have worries. This means they are willing to share in the responsibilities." Says UK council delegate Pounds, whose view is echoed by Eschelbacher and others, "The good thing is that we now have stability; CERN can count on the members paying up each year. And the total resources for the accelerator will not be reduced." Pounds adds that settling the budget squabbles "was crucial for getting nonmembers on board."

"Funding for the LHC shouldn't depend on yearly budget struggles," says Takahiko Kondo, a physicist at Japan's National Laboratory for High Energy Physics (KEK) and coleader of Japan's ATLAS team. "Otherwise, one can't ask students to be involved. It was a nightmare for me when the SSC was canceled. I don't want that to happen again."

But the budget shortfall will still have to be made up somehow. The

main target is the personnel budget—about half of CERN's total budget. To reduce total expenditure by 1%, salaries across the board will be cut 2.5% in 1997 in exchange for 5.5 days additional leave per person. And salaries are likely to remain frozen for awhile. "I wouldn't mind if my salary were cut even more," says Rolf Landua, a CERN physicist. "But proportional cuts are unfair to engineers, technicians and administrative personnel who aren't motivated by supersymmetry or finding the Higgs. They are forced to sacrifice for the interests of physicists."

Management will also conduct an internal review this year of the salary structure at CERN. "A reduction in staff numbers by 30% over the next ten years is already part of the laboratory's long-term planning," says Llewellyn Smith. Early retirements will be encouraged, and benefits such as family allowances, school fees, home leave and health care are also likely to be cut back. "We are not happy that the brunt of the cuts is falling on the personnel budget," says Derek Ball, vice president of CERN's staff association. He adds that the staff association will meet soon to decide whether—and what kind of—legal or industrial action (such as striking) should be taken.

Nor will there be money for other new projects. In fact, some successful existing projects have been terminated. To free up funds for the LHC, the OMEGA spectrometer and the Low Energy Antiproton Ring projects were shut down at the end of last year. And once LEP is shut down (in 1999 or 2000) to make room for the LHC, there will be a period of "thin physics," as de Wit puts it, until 2005 when the LHC begins operations. "It will be hard to ensure the participation and training of young people, and collaborations with universities," he adds. The closures, agrees Llewellyn Smith, "are sad news. But this is the price we must pay for the LHC."

TONI FEDER

Prospects for Saving Chalk River Accelerator Look Dim

Canada's Tandem Accelerator Superconducting Cyclotron (TASCC) of Chalk River labs, in Ontario, appears doomed to die a quiet death next month, when its funding runs out. The heavy-ion accelerator, an Atomic Energy of Canada Ltd (AECL) facility, is a victim of the government-owned company's decision—in response to severe budget cuts—to axe all programs not

Barring an 11th hour reprieve—and badly needed funds—from the government, TASCC, Canada's only facility for research on nuclear structure, will be shut down next month.

directly tied to its commercial reactor business—including all basic research.

Since last March, when the govern-

ment announced that its AECL subsidy, which makes up about a third of AECL's budget, would be cut by 1998 from \$174.2 million to \$100 million (about US\$73 million), TASCC and other threatened programs have been scrambling to find other sources of funding. AECL's R&D center in Whiteshell, Manitoba, will be commercialized, and money has probably been found to save the Condensed Matter Science (CMS) materials and neutron beam research program at Chalk River. But so far, attempts by TASCC director John Hardy and others to secure alternate funding for the accelerator have failed.

At TASCC, ions from hydrogen to uranium can be accelerated to total energies from a few MeV to about 2.5 GeV. For low ion energies, TASCC's tandem van de Graaff accelerator is used alone; to boost ions to higher energies, the tandem is coupled to a superconducting cyclotron. "It's a world-class facility," says Peter Thieberger, who heads Brookhaven National Laboratory's tandem van de Graaff facility. "I am very saddened to see it go."

More than 40 research groups from university, industry and government labs in nine countries conduct research at TASCC. "TASCC's strengths are good accelerators and good people," says physicist Jim Waddington of McMaster University in Hamilton, Ontario, who heads TASCC's external users group. "The closure of TASCC will end a long tradition of excellent nuclear structure research in Canada."

Use of TASCC for commercial applications—particularly by aerospace industries—has grown rapidly since it began about three years ago. The accelerated ions are used to test the robustness of space-bound microelectronic components. "TASCC is one of the few facilities in North America that accelerates ions to GeVs, and we are discovering effects that you don't see at lower energies," says research physicist Bill Stapor of the Naval Research Laboratory in Washington, DC, who has used TASCC extensively to simulate cosmic-ray effects. (It is widely believed that the costly January 1994 failure of the Canadian Telesat telecommunications satellite Anik E2 would have been prevented had its components been tested at TASCC.) Other commercial uses of TASCC's ion beams (particularly chlorine-36 and iodine-129) include accelerator mass spectrometry of environmental samples, tests of reactor fuel and studies of radiation damage.

Last year, commercial measurements earned TASCC about \$750 000. For comparison, Brookhaven, where

URGENT APPEAL TO THE PRIME MINISTER AND THE GOVERNMENT OF CANADA concerning the Tandem Accelerator Superconducting Cyclotron Facility (TASCC) at Chalk River Laboratories.

The undersigned are 715 national and international scientists and members of the public from 36 countries, concerned for the future of TASCC, Canada's only heavy-ion research facility.

We understand that TASCC has been funded by Natural Resources Canada through its Crown corporation, AECL. AECL is now concentrating on the CANDU reactor business and all of AECL's basic research activities will be terminated unless alternative sources of funding can be found soon.

We urge the Canadian Government to find ways of allowing this premier facility to continue operation. Please prevent the irreversible destruction of a very valuable

Nobel Laureates

Bert Brockhouse (Canada) Hans Dehner (USA)
Ien Mottelson (Denmark) Martin Perl (USA)

Presidents, National Physicists

Daniel Bess (Argentina); Rex Robinson (Canada); Hiroshi Kameoka (Japan); and former Pres. European Phys. Soc., D. Bess

Directors, Major World Labs

A. Arima, Inst. Phys., Chalk River (Canada); R. K. Adair, MIT (USA); H. Auer, Chalk River (Canada); J. B. Birks, Chalk River (Canada); D. Guenzler, Grand Accel. Natl. d'Haute Energie (France); A. M. Donald, Sudbury Neutrino Observatory (Canada); J. P. Schiffer, Schiffer (USA); and 25 more...

University Professors

A. Arima, Inst. Phys., Chalk River (Canada); R. K. Adair, MIT (USA); H. Auer, Chalk River (Canada); J. B. Birks, Chalk River (Canada); D. Guenzler, Grand Accel. Natl. d'Haute Energie (France); A. M. Donald, Sudbury Neutrino Observatory (Canada); J. P. Schiffer, Schiffer (USA); and 25 more...

Industrial and Other Scientists

B. Brockhouse, Chalk River (Canada); H. Dehner, Chalk River (Canada); I. Mottelson, Chalk River (Canada); D. Bess, Chalk River (Canada); R. Robinson, Chalk River (Canada); H. Kameoka, Chalk River (Canada); and 25 more...

"I really believe that [TASCC] is the best such anywhere in the world today and I think I have seen them all."

D. Allan Bromley
Former Science Advisor to the President (USA)

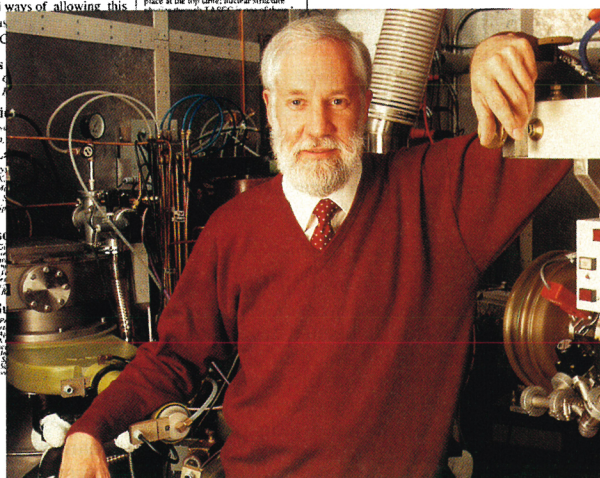
"...the TASCC center, an internationally recognized facility for fundamental research."

Fabrizio Sisti
Group Director, CERN (Switzerland)

Quotes from a few of more than 200 letters of support written to the Hon. Anne McLellan:

"[There are very few areas in respect to which Canada occupies an unenviable place at the very table; nuclear structure research is one of them.]"

Dr. J. P. Schiffer



TASCC director John Hardy (below) in front of the on-line isotope separator he built and works on at the lab. The open letter to Prime Minister Jean Chrétien (left).

the highest attainable ion energies are about one-sixth those at TASCC, earned about US\$1 million from chip testing in FY1996.

Proposals and pleas

The threat of TASCC's closure has rallied much moral, but little financial, support. On 18 September, the *Toronto Globe and Mail*, a nationally distributed newspaper, published a letter to Prime Minister Jean Chrétien (see figure). Signed by more than 700 scientists worldwide, the letter urged that TASCC be kept open. "Part of the problem," explains Hardy, "is that TASCC, as part of AECL, reports to the Ministry of Natural Resources, which really doesn't handle basic research. We fall through the cracks." Len Hopkins, a member of parliament and staunch TASCC supporter, says that "we have lobbied all the likely ministries. But while everyone agrees that TASCC is valuable, no one has come up with money."

Hardy and other TASCC administrators are still trying to find a way to keep the lab open. In 1996, TASCC's budget was \$7.1 million. Hardy reckons that by economizing, this can be trimmed to \$6.5 million. And, based on growing commercial demand for TASCC, he says that within five years income from these paying users could cover about \$3 million annually, leaving only \$3.5 million still needed from public funds. In Hardy's plan, use of

the facility would be divided equally between basic research and government and commercial applications. (Last year 80% of use was for basic research.) "Applications can continue to be competitive only if they are backed by basic research," stresses Hardy. And, he adds, should funds be found, Canada's National Research Council has stated its readiness to take over administration and make TASCC officially a national lab.

The future looks brighter for Chalk River's other threatened program, CMS, Canada's only neutron scattering research program, which is expected to come under the National Research Council's aegis on 1 April. (This lab was founded by Bertram Brockhouse, and is where he carried out the work that won him, with Clifford G. Shull, the 1994 Nobel Prize in Physics.) AECL will let the CMS group use neutrons from its research reactor, NRU, at no cost, and—though it wasn't officially confirmed when PHYSICS TODAY went to press—the Ministries of Natural Resources and Industry have come up with \$1.5 million a year for CMS for three years. That is 25% less than the current budget, "but it should be enough to allow the group to continue operating," says CMS head Bill Buyers, adding that commercial revenues, which now make up 20% of the budget, "will have to increase to deal with the cut."

Jobs for waste?

Until just before New Year's Eve, Hardy and others had hoped that the government might save TASCC as part of the solution to an independent problem: low-level radioactive waste disposal. Their hope was that in exchange for establishing a disposal site in the town of Deep River—in whose jurisdiction the Chalk River labs lie—the government would guarantee jobs at the labs, including TASCC.

Canada has over a million cubic meters of historic low-level waste in temporary storage, for which the federal government is responsible. (The bulk is from uranium ore processing begun in the 1930s.) And the town of Deep River is the sole surviving candidate (of more than 800) from an eight-year, \$20 million search for a community that would accept the waste voluntarily. The town—many of whose residents work at the labs—was willing to take the waste: "People here feel that they know how to deal with radioactivity, and that since they would have their own safety to think about, they would do the job well," explains Deep River mayor John Murphy.

In the summer of 1995, the town signed an agreement-in-principle with a government-appointed task force. But the deal fell through when the government let the agreement's 30 December 1996 deadline slip quietly by. The stalling point was jobs. The government went back on its promise to maintain employment levels at Chalk River labs as part of the compensation package for taking the waste. Or so says Murphy. David Hill, chief negotiator for the federal government says, "Nobody gives employment guarantees anymore. It's unrealistic to expect it." Moreover, says Hill, "the task force had recommendation powers only." He adds that "the federal government very much wants the project to go ahead."

Before the town, weary and wary from the dealings to date, will agree to start new negotiations, it wants some things clarified. On 8 January, the Deep River council wrote to Natural Resources minister Anne McLellan asking, among other things, exactly who would be authorized to sign a binding contract ("We won't go down that road again," says Murphy) and whether the government is still committed to a cooperative siting process. And, says Murphy, "we would ask for far more financial compensation now."

Preparing to close

But at this point, with TASCC's funding expiring soon, it's probably too late to link these issues to save the lab.

"More than half of my time is now taken up with overseeing the disbanding of the lab and dismantling of equipment," says Hardy. The lab had over 70 people—scientists and technical staff—and is now down to just over 50. "Everyone's sent résumés out," says Hardy.

Two major pieces of TASCC equipment, the Canadian Penning Trap mass spectrometer and the 8π spectrometer, will probably end up at TRIUMF in Vancouver. (The 8π spectrometer was the best instrument of its kind until it was superseded recently by Gammasphere at Lawrence Berkeley National Laboratory and EUROGAN in Europe—from which a newer model, EUROBALL, is now being built.) "We have begun dismantling and packing the 8π in boxes, though nothing irreversible has been done," says David Ward, who leads the 8π spectrometer group. Probably, he continues, "it will first be loaned to Berkeley, with the understanding that it be moved to TRIUMF in around 2000."

The government has yet to issue termination notices to TASCC employees. While no news may be good news, those at TASCC are already preparing to shut the facility down. The hope, says Ward, "is that the government will provide some bridging funds to establish new jobs" so that scientists can move with the equipment. "As much as possible, things should stay in Canada. TASCC was paid for by Canadian tax dollars," adds Hardy.

To meet the 31 March shutdown deadline, "we have to warm up the cyclotron," says Hardy. And, he explains, there is no guarantee that this process, which takes about a month, will be reversible. "Things may shift and crack, and leaks may form." Moreover, says Hardy, "I am not going to initiate the destruction of a \$70 million facility—a destruction I don't agree with anyway—without a written directive from the government." The *Toronto Globe and Mail* and other Canadian newspapers reported again in early January about the imminent closure of TASCC. "I am hoping that this press coverage prompts the government, which has typically dragged its feet, to act," says Hardy. "Frankly, I'm not optimistic."

TONI FEDER

Codding Is New Vice President of ACA

On 1 January, Penelope W. Codding of the University of Victoria became vice president of the American Crystallographic Association. Elected last fall, she succeeds Jon Clardy, who is now ACA president.



PENELOPE CODDING

Codding received her BS in chemistry and PhD in physical chemistry in 1968 and 1971, respectively, from Michigan State University. After working as a postdoc at the University of Alberta, she moved in 1976 to the University of Calgary, where she was first a research associate, then a scholar of the Alberta Heritage Foundation for Medical Research and later a professor in and head of the department of chemistry. She recently became the vice president academic and provost at the University of Victoria.

Codding's research has involved crystallographic and molecular modeling for structure-based drug design. In particular, she has studied the pharmacophores of the benzodiazepine receptor, the excitatory amino acid receptor and the sodium channel.

In other results of the ACA elections, Virginia Pett of Wooster College was elected to a three-year term as secretary.

More Physics PhDs Find Permanent Jobs

According to a recent report from the American Institute of Physics, a smaller proportion of physicists who earned their PhDs in 1994–95 took postdocs compared to the previous year's graduates (53% versus 60%), while a greater share found permanent positions (37% versus 26%). The percentage of 1994–95 PhDs who were unemployed in the winter following their graduation was 4%; the comparable figure for the previous year was 5%.

The report is based on a survey conducted in the winter of 1996 to determine how recent physics degree recipients had fared in the job market following graduation. Among other things, the survey found that PhD un-