

PHYSICS COMMUNITY

Canada's Physicists Hope to Reverse Recent Losses through Funding Reshuffle

Four years ago, the Canadian academic physics community got a nasty shock when its main federal grant funding was cut by 8.5%. Now it awaits this summer's decisions from Canada's Natural Sciences and Engineering Research Council (NSERC), which is forcing 25 scientific subfields to compete for a pot consisting of 10% of their own annual operating budgets.

In January, grant selection committees (GSCs) representing each subfield submitted proposals to win money from the reallocation pool. The exercise could result in some GSCs getting nothing back, and the theoretical limit for a budget boost is for one winner to take all—or \$19.1 million (about US \$13.4 million); changes resulting from the reallocation will be phased in over four years.

Redistributing funds in this way is meant to free up money for new and priority research, explains NSERC's Elizabeth Boston, who is overseeing the reallocation process. The agency, which funds the bulk of Canada's university-based science and engineering research, has seen its funding fall by 14% over the past three years, Boston adds, although those decreases will be largely offset by the government's late February announcement of a \$71 million hike in the NSERC budget, to \$494 million, for fiscal year 1998.

For physicists, the stakes are especially high. That's because, in the 1994 reallocation process, the general, condensed matter and subatomic physics GSCs, along with the math GSC, each took an 8.5% loss—the maximum possible in that go-round. (Space and astronomy was the only one of the four physics GSCs to get an increase, and, with funding increases of more than 5%, chemistry, electrical engineering, cell biology and computing and information sciences were the biggest winners.) The effect of both reallocations is cumulative, notes Paul Vincett, an industrial physicist who acts as a liaison between the physics community and NSERC. "If you cut [a GSC's funding], you seriously weaken it, and it could look worse the next time around."

Despite the setbacks, the general feeling among both physicists and other scientists is that "some reallocation is not bad in itself—it gives oxygen

For the second time in four years, part of the Canadian academic community's research funding has been turned into a lottery.

to emerging fields," as David Senechal, a condensed matter theorist at the University of Sherbrooke, puts it.

Stretched thin

The cutbacks from the first reallocation have forced the losing GSCs to become more selective in awarding both new and continuing grants. Grants have also been cut in size, with renewal awards in general physics (which includes atomic and molecular physics, laser physics and mathematical physics) having an average of 87% of their former value—the lowest of all the GSCs. This means less money for graduate students, postdocs and new faculty. There is also a "lack of funding for ramping up the support of really good midcareer people," laments Michael Wortis, a theorist at Vancouver's Simon Fraser University (SFU).

The squeeze on grant money has also caused delays or cutbacks for large projects. "We have had to significantly descope the scientific program across all fronts," says University of Toronto particle physicist Pekka Sinervo. For example, ISAC, the new isotope separator and accelerator at TRIUMF, Canada's subatomic physics lab in Vancouver, is "doing well, but TRIUMF's more traditional programs based on the proton, muon and pion beams have been scaled back." Sinervo adds that the shortfall in Canada's commitment to CERN's ATLAS experiment "puts the international collaboration in a bind."

Says SFU condensed matter experimentalist Michael Thewalt, "We are all scratching to survive. It's a continual hunt for the next dollar."

So why did physics fare badly in the first round of reallocation? According to SFU's Wortis and others, it was partly because the wider scientific community saw the physics GSCs as being too lax, for having continued to support mediocre research. There was also the perception, adds Bev Robertson, the past president of the Canadian Association of Physicists (CAP), "that physics has had its day." And, Robertson admits, "the physics community didn't take the

first reallocation exercise seriously enough."

A belief common in the physics community—but refuted by NSERC—is that the funding agency used that reallocation to strengthen research with obvious commercial potential. Says Gordon Drake, a theorist at the University of Windsor, "longer term and more basic research are what suffer. People don't feel they can undertake speculative, higher risk research. The mood favors direct industrial applications." Saskatchewan Accelerator Laboratory director Dennis Skopik agrees: "At the end of the day, [the government] wants a gizmo."

But the main reason that the general, condensed matter and subatomic physics GSCs failed to win back any money, many physicists feel, was that NSERC's reallocation committee was biased, lacking representation from, and sympathy for, physics. Not surprisingly, scientists who belong to GSCs that came out on top in the first go-round don't share this view—though they admit that they've had no reason to scrutinize the system. In any case, says Robertson, whose view is widely echoed, "I feel that NSERC has been very careful not to be subject to the same types of criticism this time around."

Benefiting Canada

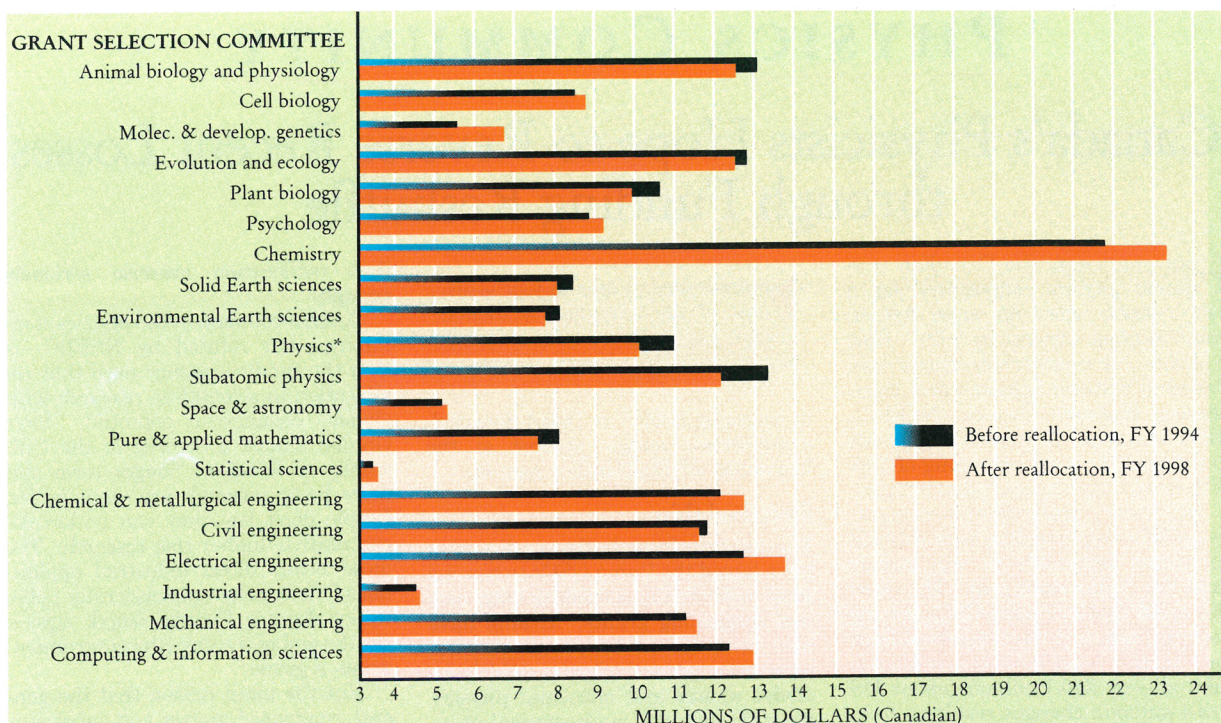
Indeed, NSERC has made changes in the reallocation process. In the first competition, bids were judged on the cost and quality of research, the training of scientists and the degree to which a subfield attracts new blood and evolves scientifically. This time there is only one criterion: The research must benefit Canada. "This can mean economic, social or environmental benefit," says NSERC's Boston. "It could also mean adding to the basic pool of knowledge. We purposely

left it very broad." Last time, adds the agency's president, Thomas Brzustowski, decisions were "more con-



T. BRZUSTOWSKI

COUETTE/OTTAWA



FUNDING LEVELS for Canada's science and engineering grant selection committees before and after the Natural Sciences and Engineering Research Council's first reallocation exercise.

* The general physics and condensed matter physics GSCs teamed up for the 1994 exercise, but have submitted separate proposals for the 1998 one.

strained by the criteria, so the process was considered to be more mechanical. This reallocation will be based on judgment." In addition, the makeup of the new reallocations committee is considered to more fairly represent all of the competing scientific subfields. Above all, says Sinervo, "the process is more transparent now."

For their part, Canadian physicists have put enormous effort into their proposals this time around. Spurred by the outcome of the first reallocation, CAP has coordinated, and NSERC has funded, an independent nationwide review of physics. Among other things, "We found that, contrary to assumptions, commercial spin-offs are stronger in physics than in other fields," says Robertson. Backed by the review's findings, physicists are now arguing strongly that their research benefits Canada by generating technological innovations and economic activity, and by influencing and interacting with scientific research in other fields.

A nil reallocations award would be devastating to any of the physics GSCs, according to the review. The general physics GSC has an annual budget of about \$3.72 million, and it's asking NSERC for \$1.78 million per year—enough to offset both the 8.5% decrease from the first reallocation and the ad-

ditional 10%—to support scientists working in spectroscopy, optoelectronics, atom lasers and laser applications in monitoring and sensing, materials processing microelectronics and related areas.

The condensed matter physics GSC, for which the FY 1998 budget is \$6.10 million, is asking for \$2.75 million per year from the reallocation pool. "We desperately need to bolster the support for electronic, optical and magnetic and soft materials research," says University of British Columbia solid-state physicist Jeff Young, who headed up the GSC's proposal writing team. "We need funds to maintain epitaxial growth, microfabrication, x-ray diffraction and other facilities." Award money would also be used for supplies and for participating in international collaborations.

The subatomic physics GSC, in its bid for reallocation funds, is arguing to keep the part of its operating budget that's up for grabs, as well as for additional funds for faculty research grants and instrumentation. The proposal, written by a team headed by Sinervo, says any loss would cause long-term damage to the field. It would mean paring operating funds for the Sudbury Neutrino Observatory, and a delay in building components for

ISAC and ATLAS; these three experiments are the GSC's top priorities. The \$17.3 million that the GSC is slated to get from NSERC for FY 1998 is about one-third of the GSC's total funding, and its main source of university support. About \$1.17 million of this (6.8% of the total, but 10% of the portion intended for operations) is up for reallocation. The GSC is asking for \$3.2 million annually, plus \$2.1 million for specific equipment, from the reallocation pool.

Not surprisingly, all 25 GSCs are asking for more than their own shares back. However, "It's a zero-sum game," says NSERC's Brzustowski, adding that he hopes to use the proposals "from the best brains in the country" to convince the government to increase support of science and engineering. As for the agency's own recent budget hike, the government has stipulated that the new money be used to "enhance partnerships between universities and industry" and to "support graduate students engaged in research." But it's too soon to say more exactly what the money will go for, Brzustowski says. That, along with the results of the current reallocation, will be announced this summer.

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