Congress that "the future of nuclear power today is symbolized by empty college classrooms and discontinued nuclear engineering programs, by decommissioned university reactors, and by students turning away from nuclear science and engineering to major in areas such as software engineering and biotechnology, where they see the real action." NERAC's previous recommendations that the government step in to aid nuclear science education had been met, Duderstadt said, with "procrastination and a deaf ear."

This year, DOE is finally adding to the couple million dollars it had been doling out annually for instruments and for reactor time for outside users. The agency's new program, Innovations in Nuclear Infrastructure and Education (INIE), is intended to revitalize some of the country's university reactors and get them to pool resources and people. Most, if not all, of the country's university reactors are vying for a piece of the new pie.

"I think that the DOE is making an attempt for the first time in a long time," says the University of Wisconsin's Michael Corradini, who chaired a 1999 panel that spelled out recommendations for saving university reactors and nuclear know-how. "I think you'll see that facilities will improve. They'll upgrade critical things to extend reactor life. Then they'll expand the capabilities to expand the research. And third, people will start to think outside the box."

"It's a fresh bucket of money," adds Texas A&M's Waltar. "And competition sometimes brings up some really good innovative thinking. It's a fairly paltry amount so far, but there is optimism that if this works, Congress might beef it up."

DOE's call for proposals says "the typical award" is expected to be between $100 000 and $2 million per year. But INIE starts off with $3 million for the last quarter of fiscal year 2002, and only $3 million is in the budget for FY 2003. If funding isn't brought back to the requested $12 million, says Michigan's Wehe, "all that serves to be gained will largely be lost." Even $12 million is low for 27 facilities, says Jim Stubbins, chair of nuclear, plasma, and radiological engineering at the University of Illinois at Urbana-Champaign, noting that DOE spent $32 million a year just to keep FFTF on standby.

Indeed, while nuclear scientists and engineers welcome DOE's new investment in reactor upkeep, they also fear that it is too little, too late. "Some of us think the philosophy is flawed," says Stubbins. "The program supports some reactors at the expense of others. The ones that don't get funding will have a weaker position with their [university] administrations."

But Robert Long, chair of the NERAC task force on whose recommendations the INIE program is based, says that "to argue that something new shouldn't be started because some reactors will fail is not a good argument. [The task force] concluded that unless we could convince DOE to do things differently, many reactors would fail."

"In my gut," Long adds, "probably the reactors that are operating are for the most part useful and needed at their particular locations. And a smaller number, perhaps one-third, are truly national resources. The key is going to be to get DOE to commit sufficient funds to support the [INIE] program in the coming years."

TONI FEDER

DOE Will Stop Funding Particle Physics at Brookhaven Accelerator

Faced with a very tight presidential budget, the US Department of Energy has announced that it will no longer fund the operation of high-energy physics experiments at Brookhaven National Laboratory's Alternating Gradient Synchroton in fiscal year 2003. The AGS, a 30-GeV proton accelerator, began its illustrious career in 1961. Barring a congressional reprieve, DOE's announcement means the abrupt end of the venerable accelerator's two ongoing particle physics experiments.

In this era of TeV colliders, it sounds quaint to speak of high-energy physics experiments with 30-GeV protons. But the two highly visible AGS experiments—a search for an extremely rare K^+ decay mode and a precision measurement of $g_\mu-2$, the anomalous magnetic moment of the muon—are oft-cited examples of the unique contributions that experiments at accelerators of modest energy but very high beam intensity can make to particle physics.

When it's not accelerating protons, the AGS nowadays accelerates heavy ions for injection into Brookhaven's two-year-old Relativistic Heavy Ion Collider. RHIC, which is now Brookhaven's flagship program, accelerates ions as heavy as gold to 100 GeV per nucleon. It is funded by DOE's nuclear physics program, which will continue to run the AGS as RHIC's injector. But filling the big collider takes only a few hours a day. What will no longer be funded is the relatively small incremental cost ($7–8 million a year) of operating the AGS as a proton accelerator for particle physics experiments during the remaining 20 hours a day. The operating cost of RHIC, by comparison, is about $100 million a year.

If AGS funding is restricted to nuclear physics, two ongoing experiments will be abruptly axed.

Looking for one in ten billion

The rare K^+ decay experiment, designated E949, is a particularly hard case, facing extinction just a few months into its run. In a decade of running, its predecessor experiment, E787, found only two $K^+ \to \pi^+\nu\bar{\nu}$ events in a total of some 10 billion K^+ decays [S. Adler et al., *Phys. Rev. Lett.* **88**, 041803 (2002)].

That's not far from what the standard model of particle theory predicts for such a "flavor-changing neutral-current" process. But with its much upgraded sensitivity, E949 was expected to harvest 10 times as many of the rare decay events in the next three years, making it possible to confront crucial aspects of the standard model with extraordinary precision.

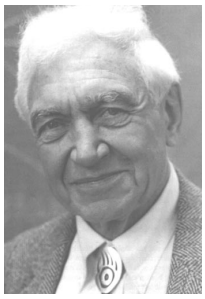
"On the strength of DOE's assurance, admittedly with caveats about budget catastrophes, that we'd be able to finish the run, our foreign collaborators spent about $5 million, not to mention their time, on upgrades for E949," says Brookhaven group leader Laurence Littenberg. "It's a horrendous breach of faith. Two-thirds of the collaboration are from groups in Japan, Canada, and Russia. Good luck to us when we go looking for foreign contributions to the Next Linear Collider." (See PHYSICS TODAY, January 2002, page 23.)

"We take no pleasure in these cuts," says Peter Rosen, director of nuclear and high-energy physics programs at DOE. "But we have to confront severe budget constraints. In making these

painful decisions, we're guided by the priorities set by HEPAP [the High Energy Physics Advisory Panel]."

In the president's FY 2003 budget, the $725 million for DOE high-energy physics programs is an increase of only 1.7% over this year's appropriation (see the story on page 30 of this issue). That's less than inflation. Among existing particle physics experiments funded by DOE, HEPAP has assigned the highest priorities to the search for manifestations of the Higgs mechanism and supersymmetry at the Fermilab Tevatron, and the study of B-meson physics at the SLAC B factory. The tight FY 2003 budget certainly affects Fermilab and SLAC. But at those labs, the result is expected to be a general belt-tightening rather than the shutdown of ongoing experiments.

The rare K decay experiment was intended to measure the same *CP*-violating parameters one measures, at much higher cost, at the B factories (see PHYSICS TODAY, May 2001, page 17). "Whether one gets the same result for K and B mesons is a major theoretical issue," says Brookhaven associate director Tom Kirk.



VERNON HUGHES has been striving for 20 years to measure the muon's anomalous magnetic moment to within a few parts in 10 million.

Measuring the moment

The prospective fate of the $g_\mu-2$ experiment is not as egregious as that of E949. Running since 1999, the $g_\mu-2$ collaboration was not explicitly promised any more AGS time beyond this year. "But one more year would bring the precision of our measurement to our goal of 0.4 parts per million," says Vernon Hughes (Yale University), who began this undertaking 20 years ago. "That would give us a unique opportunity to test, with unusual sensitivity, for supersymmetric departures from the standard model." (See PHYSICS TODAY, April 2001, page 18.) The collaboration's muon storage ring and its detectors represent a $25 million capital investment that can provide a measurement of a key supersymmetric parameter (a ratio of Higgs expectation values called $\tan\beta$) not easily accessible to the TeV proton colliders.

Unlike the precision measurement of $g_\mu-2$, the study of rare K decays has foreseeable prospects for life after the end of DOE funding for particle physics at the AGS. In FY 2004, NSF is expected to fund construction, at the AGS, of an ambitious experiment called KOPIO, which will search for $K^0 \to \pi^0\nu\bar{\nu}$. The standard-model prediction of this rare decay of the *neutral* kaon is even freer of obscuring hadronic complications than is its prediction for the corresponding K^+ decay. A few years further on would be DOE funding of a new K^+ experiment called CKM, at Fermilab's Tevatron, which would have 10 times the sensitivity of Brookhaven's unceremoniously cancelled E949.

BERTRAM SCHWARZSCHILD

Bonanza for Selected Science in Ireland

Ireland's new NSF-inspired funding agency has more money than scientists had dared hope for.

"Everything is benefiting. Institutions are benefiting. Morale is benefiting. And we are confident that the economy will benefit," says Ireland's Minister for Science, Technology and Commerce Noel Treacy, referring to Science Foundation Ireland, a new funding agency that by 2006 will dish out 635 million euros (about $560 million) for information and communications technology and biotechnology. The SFI money is the largest single chunk from a €2.5 billion program, Ireland's biggest-ever investment in research and education.

Attracting world-class scientists to Ireland and building up niche areas of science to be internationally competitive are key goals of SFI. The overarching aim, however, is to transform the economic success that made SFI possible—the Celtic tiger has been growing at nearly 10% a year—into long-term economic robustness. "We have a fantastically strong and happy group of blue-chip multinationals," says Edward Walsh, chairman of the Irish Council for Science, Technology and Innovation and a member of SFI's advisory board. "But for the most part, they are not doing research. It's manufacturing. That's unstable if you look 10 to 20 years ahead. Intellectual infrastructure is now the target."

Even with its emphasis on the economy, SFI is a boon to fundamental research. "We will fund the science that underpins biotechnology and information and communications technology," says agency Director General William Harris, himself a recruit from the US, where, in the early 1990s, he headed NSF's physical sciences directorate. "We are trying to borrow good ideas from NSF. The openness, competition, things like that," says Harris. "But we are smaller and we want to be more flexible than NSF can be, and faster in terms of decision making."

SFI

"I'VE NEVER SEEN POLITICIANS that I've enjoyed working with more," says Science Foundation Ireland's Director General William Harris (right), shown here with Ireland's Minister for Enterprise, Trade and Employment Mary Harney and Minister for Science, Technology and Commerce Noel Treacy.

Research payoffs

"SFI represents an interesting challenge," says John Pethica, who, as one of the 11 scientists awarded up to €6.5 million each over five years in the first batch of SFI grants, is moving his work in nanomechanics and tribology from Oxford University to Trinity College Dublin. "The structure of research facilities [in Ireland] has until now been fairly primitive. This is a tremendous opportunity to really shape things. We are not tied by traditional rules."

"It's support of a type