already gone, says Stanford University's George Bunn, a former negotiator on the nuclear nonproliferation treaty. In recent years the United States has striven to help other countries convert research reactors that use weapons-grade nuclear fuel into ones that consume low-enriched uranium (LEU).

The U.S. government reviews U.S.-led projects to build reactors in foreign lands but has little sway over deals that other countries strike. In a press conference last week, a State Department spokesperson said the government expects Myanmar "to not produce unsafeguarded fissile material." According to the Defense official, the government is worried that the reactor could increase the threat of radioactive materials falling into the hands of terrorists (see p. 777).

Other analysts generally discount the proliferation risk. "From the size of it, it looks like an LEU reactor," says Fred Wehling of the Center for Nonproliferation Studies in Monterey, California. Indeed, as a member of the Southeast Asia Nuclear Weapon-Free Zone, Myanmar "has accepted significant restrictions on nuclear-related activities" under an agreement that allows member states to pursue peaceful research, says Ralph Cossa, president of the Center for Strategic and International Studies' Pacific Forum. "I see very little real threat," he says, "especially if the Russians insist on proper safety and monitoring procedures."

Whether that will happen is an open question. An IAEA team that visited Myanmar in November 2000 concluded that the country's radiation protection infrastructure was "not meeting the expected standards," says an agency official, and followed up with a list of improvements needed to operate the reactor safely. The agency has not yet received a response. Myanmar's foreign ministry declined to make officials available for interviews and referred inquiries to a press conference transcript on the government's Web site.

Perhaps most intriguing is what the deal may mean for regional stability. "It shows some concern [in Myanmar] with not getting too dependent on China, as well as Russia's efforts to increase its own footprint in Southeast Asia," says Cossa. Others add that Russia's cash-strapped energy industry could be tempted to strike additional deals if the Myanmar regime deems nuclear power vital to the country's future. **–RICHARD STONE**

CREDITS: (TOP TO BOTTOM) CENSUS BUREAU/DEPARTMENT OF COMMERCE; DOE

Role model? International authorities hope Myanmar will meet the same safety standards followed by U.S. reactors.

U.S. SUPREME COURT

Census Case Tests Statistical Method

Justices of the U.S. Supreme Court are hiking up their robes in preparation for another march through the political swamp of reapportionment. But more than a congressional seat may be at stake. In agreeing last week to hear a case (*Utah* v. *Evans*) stemming from the 2000 census, the high court will also be examining the legality of a time-honored statistical method for filling in the blanks.

The method, called "hot-deck imputation," goes back to the dawn of the computer age, says statistician Joseph Schafer of Pennsylvania State University, University Park. The term refers to the deck of punch cards that the Census Bureau once used to store data. When a statistician came across a card that was improperly or incompletely filled out, officials were forced to "impute"—essentially make an educated guess—about the missing data. One technique involved finding a household as similar as possible to the one with missing information. "Cold-deck" used cards from the previous census to do the imputation, whereas "hot-deck" drew on the then-current census.

Utah is the latest in a series of legal battles over census methods. In 1999, the Supreme Court declared in a 5–4 ruling that statistical "sampling"—performing a detailed survey of a subset of the population and using those data to compensate for flaws in the general census—could not be used to apportion congressional seats. Utah contends that it unfairly lost a congressional seat to North Carolina, because hot-deck imputation should not be allowed under the no-sampling rule. The Census Bureau and Commerce Department, two of several defendants, argue that imputation is consistent with the "actual enumeration" clause in the U.S. Constitution. They also argue that it is distinct from sampling.

"I've been wrestling with this [question] for a while," says Alan Zaslavsky, a statistician at Harvard Medical School in Boston. "It has some features in common, but it's not what I usually think of when I think of sampling." One complicating factor is that the census surveys the whole population rather than taking the more common approach of selecting a subset and then drawing inferences about the rest of the population. Clearly, that common use of sampling differs from imputation, which is used to draw conclusions from nonresponses and incomplete data.

Fighting mad. Old-fashioned punch cards lend their name to a statistical technique that is now before the court.

But getting rid of imputation would cause immense problems, according to Schafer and Zaslavsky, without obvious solutions. "Throw out imputation, and you throw out a lot of things," says Schafer. "You toss out editing of the data and making sure that it satisfies consistency checks. Now, if someone puts down an age of 145, that's not going to fly. [But] if imputation is not acceptable, what are we to do then?" Throwing the data away would be an implicit imputation, says Zaslavsky. "Another assumption is that there's no population in homes that don't respond. That doesn't seem like a likely story. But if you say you can't do any imputation, that's effectively what you're assuming."

Last year three Utah judges ruled that imputation was acceptable. If the Supreme Court disagrees, it could be difficult to impute the Census Bureau's strategy for 2010.
–CHARLES SEIFE

HIGH-ENERGY PHYSICS

Report Backs Collider And an Expanded Field

U.S. high-energy physicists want to redefine their field to include the entire cosmos. But they also have a very down-to-earth proposal for the government to back their next multibillion-dollar machine.

"Participation in a linear collider is absolutely essential to the field," says Barry Barish, a physicist at the California Institute of Technology in Pasadena and co-chair of the High Energy Physics Advisory Panel (HEPAP) subcommittee that drafted a 20-year road map with the Next Linear Collider

World in collision. The site of the Next Linear Collider is up for grabs; Batavia, Illinois, and Hamburg, Germany, are seen as the front-runners.

(NLC) at its center. Whether or not it is the host, the panel argues, the United States must have a central role in building the machine. HEPAP adopted the report this week at a meeting in Washington, D.C.

Current cost estimates put the linear collider, which will smash electrons and antielectrons together at about half a trillion electron volts of energy, at about $5 billion to $7 billion. The HEPAP plan, which ratifies the consensus hammered out at Snowmass, Colorado, last summer (*Science*, 27 July 2001, p. 582), calls for the host country to pay two-thirds of the bill. The panel recommends that the United States bid to host the facility at a site using existing expertise at a national laboratory such as Fermi National Accelerator Laboratory in Batavia, Illinois, or the Stanford Linear Accelerator Center in California.

Hosting NLC would require an annual high-energy physics budget some 30% higher than the $716 million now being spent by the Department of Energy (DOE). Building it overseas—most likely in Germany or Japan—would mean only a 10% boost. If the budget doesn't increase by at least 10%, says Barish, "we can't have a significant role in the linear collider." James Decker, acting director of DOE's Office of Science, declined to comment on the budgetary implications of the proposal. "But let me assure you that we will take the plan very, very seriously," he says.

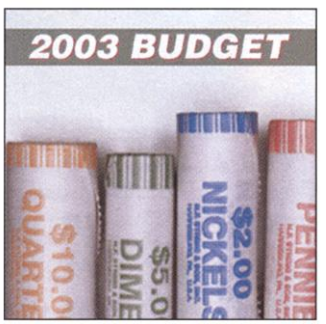
The road map also calls for a panel to rank upcoming experiments and discusses opportunities in particle physics other than those presented by colliders, such as neutrino physics, symmetry-breaking experiments at B factories, and cosmological tests of the mysterious "dark energy" that seems to be causing the universe to expand faster and faster. This agenda reflects a shift in the definition of particle physics from a field concerned with the fundamental building blocks of matter and the forces that act upon them. "That's narrower than what the field is today," says Barish. The road map dubs particle physics the study of "matter, energy, space, and time," which encompasses studying dark energy and extra dimensions, as well as traditional topics such as quarks and leptons.

The breadth of the report should mollify high-energy physicists who are not associated with collider work and are afraid of being left behind, but the panel made clear that it would not sacrifice the next collider in favor of new ventures. "[NLC] promises to be one of the great scientific adventures of our time," says Jonathan Bagger, a physicist at Johns Hopkins University in Baltimore, Maryland, and co-chair of the subpanel. "It's a rare opportunity and one that should be seized by the U.S." —CHARLES SEIFE

2003 BUDGET

Bioterrorism Drives Record NIH Request

President George W. Bush will propose another record increase for the National Institutes of Health (NIH) next week in his 2003 budget request to Congress. The additional $3.7 billion represents a 16% rise and would complete a long-cherished 5-year doubling of NIH's budget, to $27.3 billion. But the victory isn't entirely sweet: More than half of the new money would go to combat bioterrorism and to cancer research, meaning that most of NIH's 27 institutes will likely get much smaller increases than their supporters had hoped.



Administration officials released the good news about NIH, which fulfills a campaign promise, some 10 days before the president's overall budget is unveiled on 4 February. The 2003 request follows on a $3 billion rise for the current fiscal year, to $23.6 billion.

The $1.5 billion jump for bioterrorism is a sixfold increase over the current $300 million being spent by NIH. And the big winner on the Bethesda, Maryland, campus is the National Institute of Allergy and Infectious Diseases (NIAID), which would receive 95% of the bioterrorism dollars, according to its director, Anthony Fauci. The projects would include basic research, such as genome sequencing of bioterrorism agents, as well as work on anthrax vaccines and construction of new high-containment facilities that would let researchers at NIH and elsewhere work on dangerous pathogens (see table). The agency's budget is now $2.4 billion, and the 2003 request may bump up other research areas as well.

The other area the Bush budget favors, as pledged during the campaign, is cancer-related research, most of which is done by the National Cancer Institute (NCI). Cancer research across NIH would receive $5.5 billion, a nearly 13% increase.

The doubling "is really good news" in an era of rising defense spending and a return of deficit spending, says budget analyst Dave Moore of the Association of American Medical Colleges. However, institutes other than NCI and NIAID may get as little as an 8% increase, biomedical groups expect. "I think it will be of concern to some people in the community," says Moore, noting recent annual rises of roughly 13%.

NIH acting director Ruth Kirschstein sees the budget as affirmation of the doubling campaign. "The president considers this a doubling, and as far as I'm concerned, it's a doubling. ... We are very pleased." The next step, as always, is up to Congress, where legislators are expected to be similarly generous. —JOCELYN KAISER

PROPOSED NEW BIOTERRORISM FUNDING FOR NIH

Category	Amount (in $ millions)	Includes
Basic R&D	$376	Four to seven extramural centers ($10M each), pathogen genomics, proteomics
Drug/vaccine discovery	$533	Drug screening, diagnostics, animal models
Clinical studies	$134	Smallpox vaccine trials
Research facilities construction	$430	Biosafety level 3 and 4 facilities at three NIH campuses and new extramural centers; security
Total	$1473	

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