into electrons, that would tell us that this idea of unification is on the right track. And it would be important if it were true. It would tell us about the origins of the Big Bang and might tell us how to convert one type of matter into another."

Not only would Project X offer exciting science, says Oddone, "but we have come up with a clever idea in which we basically build 1.5% of the ILC but use it to accelerate protons for the machines we already have here." Because Project X would use the same type of superconducting RF cavities as the ILC, he adds, "we would be decreasing all the risks that are attendant to building such a big machine—we will be way ahead in industrializing the technology through Project X."

Coordination or competition?

Although an early start on industrializing some of the technology that the ILC would also use "might help in getting the US to play catch up," says Caltech's Barry Barish, who heads the global design effort for the ILC, "if I ask if the [ILC's] outstanding problems are addressed by [Project X], the answer is no." Those problems are the need to achieve a high acceleration gradient, reliably industrialize the high-gradient cavities, and make the industrialization cost efficient, he says. "These are our three biggest problems. Project X doesn't attack them."

Barish also worries that in putting Project X forward, Fermilab is sending the world the message of a weakened commitment to the ILC. "A decision that preempts international judgment of the ILC is a very unhealthy thing," he says. A second concern is that there is not enough expertise in the US for concurrent R&D on the two projects. "I'm worried about technical expertise—whether we will have to share a resource that we don't have enough of."

Oddone agrees that both personnel and the perception of diverting attention are concerns, but he says, "if we are ever so lucky to be in a position where the two [projects] are fighting each other, we clearly would go for the ILC." A detailed design for the ILC, including the cost, should be ready in 2010. At that time, says Young-Kee Kim, chair of the Fermilab steering committee that proposed Project X, "we will see what we know about LHC data and the status of ILC international agreements. We think we will have a lot of information and should be able to forecast a timeline for the ILC. When 2010 comes, we will make a judgment."

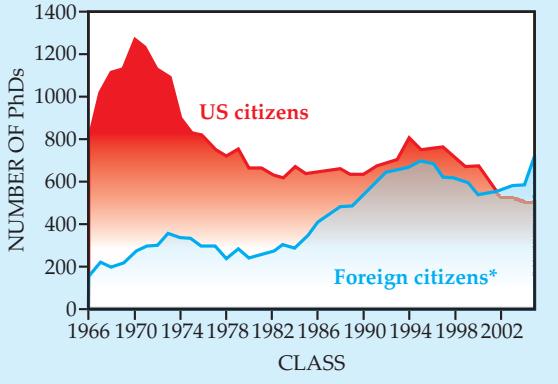
To get Project X ready to go, Oddone estimates R&D will cost about $50 million through 2010. If the project proceeds, construction could begin in 2011 and operations in 2015. If not, says Oddone, "we would patch up the existing complex to finish the program we have with neutrinos and enhance it somewhat, but not to the extent of Project X." The next step is for Fermilab to present Project X to P5, the Particle Physics Project Prioritization Panel of the High Energy Physics Advisory Panel, which advises the Department of Energy and NSF. If the project finds favor, next spring HEPAP would recommend that R&D be funded. **Toni Feder**

Enrollments up, but physics lacks women and minorities

The numbers of physics and astronomy degrees conferred in the US rose for the class of 2005, according to a recent report by the American Institute of Physics (AIP).

Some 1233 physics PhDs were awarded by 185 departments in 2005, up 14% from the previous year. The number of physics bachelor's degrees rose for the sixth straight year, with 5113 conferred in 2005, a 40% increase over a recent low in 1999. Astronomy stayed close to its recent average with 91 PhDs, and at the bachelor's level saw a new record high with 343 degrees awarded in 2005.

Citizenship of physics PhDs, 1966–2005



*Foreign citizens include individuals with permanent resident status and those with temporary visas.

For physics PhDs, the gains were due to non-US citizens, who in 2005 made up a record 60% of the graduating class. Over the past decade, the number of US citizens earning physics PhDs has fallen 34%, but according to the AIP report, recent trends in graduate enrollments suggest that US citizens will regain the majority in the next couple of years. In astronomy, one-third of PhD recipients in 2005 were non-US citizens.

At the undergraduate level, the rise in degrees awarded is attributed partly to a larger pool of 18-year-olds and an increase in the proportion who take high-school physics. About 15% of US physics bachelor's degree recipients eventually receive a physics or astronomy PhD.

Women received 33% of PhDs and 40% of bachelor's degrees in astronomy, compared with 14% and 21%, respectively, in physics. The representation of women at the PhD level in physics fell for the second year in a row, following a sharp rise that was largely due to non-US citizens. Despite recent overall gains, physics has among the lowest representation of women of all undergraduate fields. Other fields with similarly low percentages of women include engineering and computer science.

African Americans were awarded 3% of bachelor's degrees and 2% of PhDs in physics in 2005. Some 51% of those physics bachelor's were bestowed by historically black colleges and universities. Hispanic Americans received 4% and 3%, respectively, of physics bachelor's and PhD degrees. California confers the greatest number of physics bachelor's overall, and the largest number to Hispanic Americans, accounting for more than a quarter of them in 2005.

Physics degrees conferred to the class of 2005 represent less than 0.04% of all US bachelor's degrees and about 2% of those in the natural sciences, math, and engineering. At the PhD level, physics made up 2.8% of all degrees conferred and 4.4% of all degrees in the natural sciences, math, and engineering.

These and other data are presented in the *Enrollments and Degrees Report, 2005*, available free of charge at http://www.aip.org/statistics/trends/reports/ed.pdf or from AIP Statistical Research Center, One Physics Ellipse, College Park, MD 20740; e-mail stats@aip.org; phone 301-209-3070. **Toni Feder**

news notes

Probing backgrounds. Twenty-eight scientists at NASA's Jet Propulsion Laboratory (JPL) went to court last month to block implementation of new background security

checks at the lab. By the end of this year, all employees at federal facilities, including contract workers, must undergo the checks required by Homeland Security Presidential Directive 12. NASA'S version of HSPD-12 is unduly invasive and "is an invitation to an open-ended fishing expedition," says JPL physicist Robert N. Nelson, one of the plaintiffs.

NASA is requiring all its employees to disclose where they have lived; their school, medical, bank, and criminal records; previous employment; and illegal drug use over the past five years. Employees also have to waive their privacy rights and give permission to the government to obtain additional information about them from other sources. While other NASA employees are grumbling, JPL's are the only ones with pro-bono legal representation.

According to William Jeffrey, who headed NIST when that organization set the standards for HSPD-12, only a fingerprint and a few other details are required as a background check. "There is no requirement for the review of the financial or medical history of any federal employee or contractor," he wrote in response to a query from Representative Rush Holt (D-NJ), who had been contacted by the JPL scientists. Jeffrey's letter also states that NASA Administrator Michael Griffin has wide discretion in how he implements HSPD-12. "Some other agencies have elected to do nothing at all in response to HSPD-12," Nelson says.

By 5 October all 5000 JPL employees must start the security checks or be fired three weeks later. "We will miss those folks who do not comply with the order," Griffin told JPL's staff in June. **PKG**

Europe's S&T jobs. The science and technology sector in the European Union has grown more than 30% over the past five years, with education providing the bulk of new jobs, according to a recent European Office of Statistics report, *Highly Qualified Workers in Science and Technology.*

Of the 214 million people employed in the EU's 27 member countries, 74.9 million, or 35%, now work in S&T occupations. Of those, 34 million are highly qualified, that is, they hold a master's degree or higher or work as a professional or technician in an S&T field, the report says. Luxembourg and Denmark have the largest percentages of their employed populations working in highly qualified positions in S&T, each with about a quarter. The sector is growing fastest in Cyprus and Poland, a result, the report says, of "several activities [by the EU and the individual governments] to increase the involvement of young people in science." In contrast, Germany saw a 2.6% drop from 2001 to 2006 in the number of highly qualified S&T workers aged 25–34. More than half of the highly qualified workers in Ireland, Finland, and Switzerland work as scientists and engineers. The report is available online at http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1073,46587259&_dad=portal&_schema=PORTAL&p_product_code=KS-SF-07-103. **PKG** ■

web watch

To suggest topics or sites for Web Watch, please visit http://www.physicstoday.org/suggestwebwatch.html. Compiled and edited by Charles Day

http://blog.khymos.org

In his blog **Khymos**, Martin Lersch describes and illustrates his experiments in the field of molecular gastronomy, the application of physics and chemistry to produce culinary innovations. Among his experiments are marshmallowed bananas, carbonated grapes, and foamed strawberries.

http://www.galaxiki.org

Jos Kirps has applied the wiki concept of community-based editing to create **Galaxiki**, a fictional online galaxy that users can fill with their own stars, planets, and moons.

http://www.worldmapper.org

Worldmapper, a multidisciplinary project, combines topical data from various countries and creates global maps. In each map, the countries' areas are expanded or shrunk according to the quantity plotted. The example here shows national R&D expenditure.