organization for 15 British societies, to stem a perceived brain drain to better paying Ph.D. programs outside the United Kingdom. It should also reduce the average debt of a science major entering graduate school, now roughly $8000, says Peter Campbell, a biochemist at University College London.

The move to beef up infrastructure and raise stipends "will go some way toward attracting and retaining good scientists in the U.K. science base," says Sir Aaron Klug, president of the Royal Society. However, Klug and others admit that it won't address another source of brain drain—U.K. postdocs headed to the United States for positions not available at home. **–RICHARD STONE**

PARTICLE PHYSICS

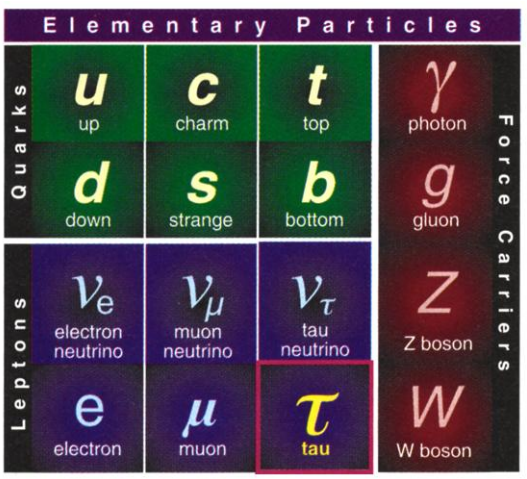
CERN Collider Glimpses Supersymmetry—Maybe

It's a notion worthy of *The X Files*: a shadowy world of doppelgangers, existing in eerie counterpoint to the one we know. Last week, particle physicists at the CERN laboratory in Switzerland announced that they may have caught the first glimpse of that world. By smashing together matter and antimatter in four experiments, they detected an unexpected effect in the sprays of particles that ensued. The anomaly is subtle, and physicists caution that it might still be a statistical fluke. If confirmed, however, it could mark the long-sought discovery of a whole zoo of new particles—and the end of a long-standing model of particle physics.

Other scientists are intrigued by the findings. "Often with an anomalous result, after a few hours' work, you say, 'This can't be right,' but here this is not the case," says Gordon Kane, a physicist at the University of Michigan, Ann Arbor. But they are also skeptical. "After having been bitten 15 times, I'm twice shy," jokes CERN physicist John Ellis. "I think it's probably going to turn out to be some background fluctuation, unfortunately."

The finding threatens the slightly creaky Standard Model of particle physics, which provides a mathematical framework that binds together all of the fundamental particles (quarks, neutrinos, electrons, taus, muons, gluons, and so forth). And it supports a newer, fancier model known as supersymmetry. By linking the particles that make up matter (fermions) with those that carry forces (bosons), supersymmetry unifies all the quantum forces at very high energies. In the process, it also doubles the roster of particles. Each fermion, such as a quark, neutrino, electron, or tau, has a bosonic twin: an s-quark, neutralino, s-electron, or s-tau. Likewise, every boson has a fermionic twin: The photon has the photino, and each gluon has a gluino.

The CERN scientists put the models to the test at the Large Electron-Positron Collider (LEP), a 27-kilometer magnetic ring near Geneva where physicists had long been smashing electrons and antielectrons together, creating showers of subatomic debris. They were particularly interested in showers containing pairs of tau particles. Like electrons, muons, and quarks, tau particles are thought to be fundamental particles—indivisible chunks of matter. The Standard Model allows several different chains of particle interactions, known as channels, by which a colliding electron and antielectron can produce a pair of tau particles. Supersymmetry allows not only all of those channels, but also others that involve the twin particles unknown in the Standard Model. Each theory also predicts how many tau particles ought to result from collisions at different energies—but the answers aren't always the same.



Half full? Swiss results hint that each "standard" particle (above) has a shadowy supersymmetric twin.

Those differences were the test. At low energies, the number of tau particles LEP produced matched calculations based on the Standard Model. But in 1998, when engineers at CERN pushed the energies of the collisions above 189 billion electron volts, things began to change. "Over the last couple of years, there has been a slight excess," says CERN physicist Gerardo Ganis. Instead of observing about 170 tau pairs of a certain type, as the Standard Model predicts, physicists have seen 228—a figure consistent with supersymmetry.

Barring some unknown type of systematic error that affects each of the four experiments, each experiment has roughly a 5% probability of seeing the excess because of a chance statistical fluctuation, Ganis says. "But when put together, it's a fraction of a

CREDIT: CERN

ScienceScope

Life Count It's a Herculean bookkeeping exercise, but taxonomists the world over are completing the first phase of an international effort to compile an Internet-based directory of all known life-forms. Dubbed Species 2000, the collaborative research project begun in 1996 aims to link existing databases on everything from blue whales to microscopic bacteria. The result would be a boon for basic research as well as biodiversity and conservation efforts.

It's no easy task. "Our virtual catalog has to be created from an array of autonomous databases all around the world, which are on different platforms and quite variable in terms of quality and content," says project coordinator Frank Bisby of the University of Reading, U.K. The software to make the links, however, is now in place, and by the end of the year, taxonomists will connect as many as 20 databases, comprising about 300,000 species. To complete the final catalog encompassing all 106 global databases and nearly a million species, however, researchers will need a hefty cash injection. "It costs well over $100 per species to set up a global database," says Bisby.

Sowing Solutions Genetically modified (GM) crops are critical to feeding the world's booming population, but scientists and industry must find ways to enhance and share their benefits, according to a report issued by seven science academies around the world this week. The backlash in Europe and the United States against GM foods was one impetus for the report, says U.S. National Academy of Sciences president Bruce Alberts. Partly to counter what he calls the "hysteria," his institution worked with the Royal Society of London and the Brazilian, Chinese, Indian, Mexican, and Third World science academies. The resulting report calls for more research on GM crops useful in developing countries, such as nutrient-enchanced foods and salt-tolerant plants.

Perhaps the strongest message concerns patents and technologies that would prevent farmers from saving seeds. The academies urge companies and research institutions to "make arrangements to share GM technology," including "special exemptions" for poor farmers. Says Alberts: "There has to be a solution that would help everybody to come out better."

Contributors: Eliot Marshall, Dennis Normile, Michael Hagmann, Jocelyn Kaiser

percent." That's still too high for physicists to break open the champagne (to declare a bona fide detection, they would need to push the probability of error below 0.001%), but it is enough to raise eyebrows.

If real, the tau-pair excess would signal the end of the Standard Model and the beginning of the supersymmetric era. However, the result may also be a fluke that will disappear with more data, as other supersymmetry sightings have done in the past. More data are due to be released on July 20, and the experiments will continue until September. That probably won't be enough time to resolve the issue, the physicists say.

Ironically, if the death knell for the Standard Model comes, it probably won't toll at LEP: This fall, the device is slated to be dismantled to make way for the Large Hadron Collider experiment. **–CHARLES SEIFE**

MOUNT GRAHAM

Report Finds Squirrels Survived 3 Telescopes

TUCSON, ARIZONA—For 15 years, Mount Graham has been a battleground for astronomers, who want to build a cluster of telescopes, and environmentalists, who say that such activity could wipe out an endangered subspecies of red squirrel. In 1988 Congress allowed construction of three telescopes on the mountain, a desert "sky island" northeast of here, prompting the U.S. Forest Service to order a long-range study to monitor the squirrel's population. The results are now in. But the findings—that the work to date has had "no significant effect" on the rare rodents—have done little to resolve a debate that is expected to heat up again next year when the University of Arizona (UA) seeks permission to build four more telescopes.

"We tried hard to find something that would display a negative effect, but we couldn't," says UA population ecologist Paul Young, who directed the 10-year, $2.5 million monitoring program. "What really determined what happened were variations in the [pine]cone crops the squirrels depend on in the fir, spruce, and mixed conifer forest, not these three telescopes."

The UA-funded study, which the forest service approved when it allowed construction on 3.4 hectares of squirrel habitat near the 3300-meter summit, began in 1989. Since then Young has led a five-member team that conducted monthly, and then quarterly, censuses of the squirrels' middens. They found that the population increased from a low of 33 squirrels in 1989 to 102 late last year, with a spike of 225 at mid-decade. The changes were based on food supply, and the pattern within the construction area paralleled that in a control site elsewhere on the mountain.

Both findings are exactly what Chris Smith, an evolutionary ecologist at Kansas State University in Manhattan with no stake in the outcome, would have predicted. "They looked at the narrow question of the observatory's impact on the immediate population, did it thoroughly, and turned up no surprises," he says. "Those squirrels get used to people easily."

Proponents of the telescopes say the results vindicate their position—both past and future. "This report confirms what we have been saying all along, that the telescopes would not affect the squirrels at all," says Buddy Powell, associate director of the UA's Steward Observatory, a partner in the Mount Graham facilities. Powell also believes the study bolsters plans to build additional telescopes on an adjacent site. "It suggests the squirrels would not be harmed by four more," Powell says.

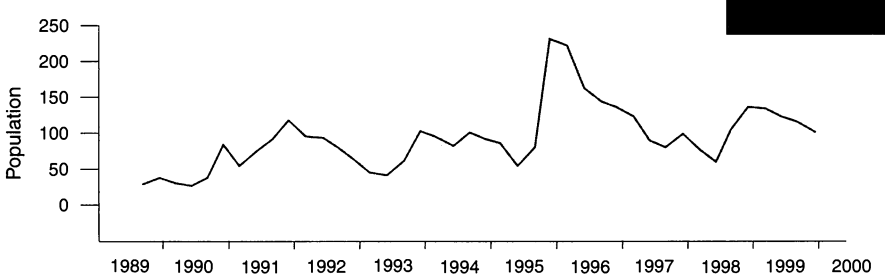
Environmentalists, however, disagree with Powell on both points. Robin Silver, conservation director of the Southwest Center for Biological Diversity in Phoenix and longtime opponent of the telescopes, says the data are tainted by Young's university financing and the lack of outside review. "They should have given this project to another university or an outside company," Silver says.

Peter Warshall, a San Francisco–based ecologist who produced the original environmental impact statement for the observatory project in 1986, disputes Powell's view that the monitoring justifies more telescopes. Instead, Warshall, who leads Scientists for the Preservation of Mount Graham, believes that the sharp fluctuations demonstrate the squirrel's long-term vulnerability to environmental assaults. "There are so many uncontrollable forces threatening these squirrels, from cone crop failures and forest fires to tree diseases and windfalls," Warshall says. "The question is whether there's room to add the controllable impact of destroying more forest to build more telescopes—and this study doesn't answer that." To underline their concern, on 30 June Warshall's and Silver's groups filed a federal lawsuit to block construction of a buried 37-kilometer power line to the telescopes.

Young agrees that his results don't represent a green light for astronomers. "There hasn't been any significant impact from the first three telescopes, but that doesn't mean we should build more," he says. "I definitely think the red squirrel is in a precarious place. ... This is an island species, and in general island species go extinct."

The next major battle over the mountain will be a formal proposal to the forest service to build other instruments, including possibly a wide-field camera and a 6.5-meter telescope. But that won't be submitted for at least a year, until work is completed on the third and largest current project, the $83.5 million Large Binocular Telescope. In the meantime, Young—who is preparing to hand off responsibility for the monitoring project and take on another position—doesn't expect to have the last word. "Something tells me both sides will continue to have a field day with the data," he says. **–MARK MURO**

Mark Muro writes from Tucson.



Holding on. Census shows a rise in red squirrel population (*inset*) during construction of three telescopes on Mount Graham in southern Arizona.

CREDITS: (LEFT TO RIGHT) P. L YOUNG; V. L. GREER

EUROPEAN SCIENCE

Pathogens Lab Chief Stripped of Duties

PARIS—Europe's most advanced high-security pathogen lab has claimed its first human casualty—and it hasn't even opened for business. On 28 June, the Marcel Mérieux Foundation, which funded the construction of the $8 million facility in Lyons, banned lab director Susan Fisher-Hoch from the premises and launched legal proceedings to dismiss her. Fisher-Hoch's most egregious offense, it appears, was speaking with the press.