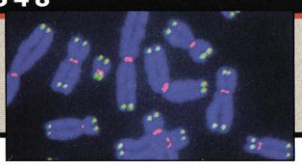

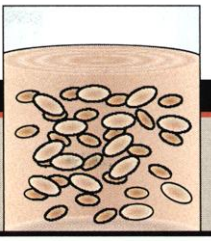

HIGH-ENERGY PHYSICS

Cost Overruns Will Hit Research at CERN

ALLSCHWIL, SWITZERLAND—Last June, CERN, the European particle physics laboratory near Geneva, issued a press release trumpeting "1754 days to the LHC and counting!" Make that at least 2000 days.

To cope with cost overruns on the Large Hadron Collider, CERN managers have drafted a preliminary plan that would delay start-up of the massive proton accelerator until sometime in 2007, slash spending on long-term research programs, and require belt-tightening across the lab. The embryo plan, outlined to CERN's governing council last week, would shift some $300 million from other operations into the LHC and stretch out payments for the facility until 2010.

Tunneling for funds. CERN director-general Luciano Maiani plans to focus the lab's resources on completing the LHC.

CREDIT: CERN

CERN's budget troubles came to light in September, when members of the facility's finance committee learned that the LHC—intended to hunt down an elusive particle called the Higgs boson—would cost about 30% more to build than the originally budgeted $1.6 billion (*Science*, 5 October 2001, p. 29). Excavations, industrial services, and LHC's 1236 "horribly complicated" superconducting magnets share the blame for the cost overruns.

CERN director-general Luciano Maiani had known about a budget shortfall for months but failed to disclose it, a move he has publicly regretted and one that "created an enormous amount of bad feelings," says Walter Hoogland, a scientific delegate to the governing council from the Netherlands. Seeking to reassure CERN's overseers, Maiani in December announced the formation of five internal task forces to look for efficiencies. An external review committee (ERC) was also set up to assess the LHC and CERN's other research programs in light of the LHC funding needs.

According to delegates present at last week's closed-door sessions, the good news from the ERC's early deliberations is that the committee sees no technical problems that would prevent delivery of the LHC. On the negative side, says Ian Halliday, chief executive of the United Kingdom's Particle Physics and Astronomy Research Council, the ERC is not yet persuaded that CERN is sufficiently focused. "CERN really needs to be seen to be finding credible solutions by June," when the governing council next meets and the ERC presents its final report, Halliday told *Science*. (Maiani was not available for comment last week.)

Even before the projected $510 million shortfall on the LHC came to light, CERN was coping with cutbacks required by member states when they approved the LHC in 1996. They include a substantial drop in member contributions and a staff reduction of one-third, from 3000 to 2000, a number that will be reached in 2006.

To help in the current crisis, the Swiss delegation has offered to advance $54 million over 3 years, to be deducted from later contributions. According to CERN spokesperson James Gillies, another $300 million can be saved by "cutting back very drastically on long-term research and development" as well as smaller research activities, and by slashing costs such as office overheads, support for visiting fellows and associates, and industrial services for infrastructure and installation. Maiani urged the council last week to increase CERN's budget to enable limited research and development to continue, and to speed financing of the LHC, but his plea is unlikely to be heeded.

On the research front, running time at the laboratory's existing proton accelerators will be cut 30% for the foreseeable future. In addition, the superproton synchrotron will be shut down for all of 2005, which in turn will put off the scheduled firing of a neutrino beam 780 kilometers to Gran Sasso, Italy, to 2006. Planning will also be curtailed, although high priority will be given to research and development on the compact linear collider, a "CERN invention," says Roger Cashmore, CERN's director of research, and the "only way to get to very high-energy electron-positron collisions."

Frans Verbeure, a scientific delegate to the council from Belgium, calls the emerging plan a "rather sound proposal." But Daniel Froidevaux, a physicist who has been at CERN for 25 years, says that the situation at the lab is "more difficult than I've ever seen it before." Cashmore is hopeful that the lab will emerge from the turmoil a better, leaner, more effective organization. And, he emphasizes, no one doubts that the LHC will be completed. **–GISELLE WEISS**

Giselle Weiss is a writer in Allschwil, Switzerland.

COSMOLOGY

Cosmic Ripples Confirm Universe Speeding Up

Four years ago, cosmologists astonished their colleagues by announcing that the universe appears to be expanding at ever-increasing speed—and that a mysterious antigravity force must be doing the pushing. Since then, other scientists have scanned space in vain for evidence that the unexpected acceleration might be an illusion. Now an international consortium of astronomers has confirmed the original finding by taking a completely different approach. "A compelling case has been made that the universe is accelerating," says Max Tegmark, a cosmologist at the University of Pennsylvania in Philadelphia.

"This is an important piece of work," says Neil Turok, a cosmologist at the University of Cambridge, U.K. In combination with earlier results, Turok says, the new research adds to the mounting evidence that ordinary matter alone cannot mold space into the geometry that cosmologists believe it has. Instead, many now believe, "dark energy" must be added to the mix—a repulsive force similar to one that Albert Einstein once considered and then forcefully rejected.

The original finding and the new study reflect the two different strategies that scientists use to map the structure and geometry of far-flung corners of the universe. One is to take a "standard candle"—an object of