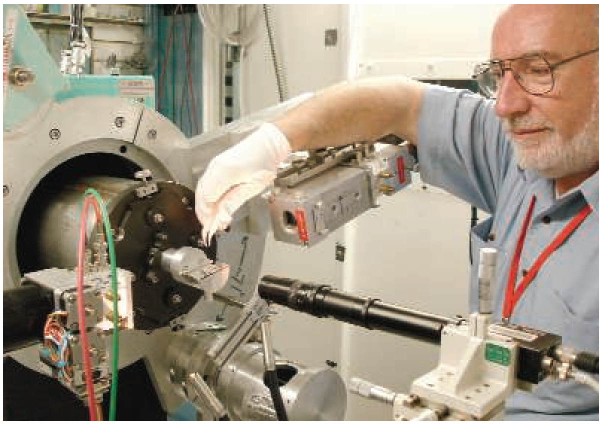
ENERGY SCIENCE

Tight Budgets Force Lab Layoffs



Beaming down. Stanford's synchrotron lab has dropped a beamline used by Michigan's John Bilello to study thin metallic films.

Shifting priorities and the expectation of worsening budgets have triggered layoffs at two U.S. synchrotron facilities in California. Officials at the Department of Energy's (DOE's) Advanced Light Source (ALS) at Lawrence Berkeley National Laboratory and the Stanford Synchrotron Radiation Laboratory (SSRL) say the cutbacks, which include shutting down one beamline at each facility, are necessary to free up money for new projects, such as brighter beams. The cuts may not be reversed, managers say, even if Congress beefs up the lean 2006 DOE budget proposed by the Bush Administration.

"I had to make some tough choices," says SSRL director Keith Hodgson, who in April let go eight scientists and technicians and stopped scheduling users on one beamline doing materials research. "I could have stopped advanced beamline development and saved jobs" in response to the president's proposal to cut the lab's 2006 budget by 8%. Instead, Hodgson says, he chose to protect his most promising programs in the face of uncertainty.

The two labs are funded by DOE's $1.1 billion Office of Basic Energy Sciences (BES), which received a $41 million boost in the president's request for 2006. But that 4% increase includes $151 million in new funds to expand nanoscale research facilities and begin work on the Linac Coherent Light Source at Stanford and a high-flux neutron beam under construction in Oak Ridge, Tennessee, the pair of which should benefit physicists, doctors, and chemists. Taking into account $52 million in construction costs that DOE will save in 2006, the result is a proposed $58 million belt tightening within existing BES programs, including 7% at ALS.

Pat Dehmer, DOE associate director of science for BES, says funds for new projects have led to similar tradeoffs elsewhere in the DOE budget. "As a result of those high priorities, cuts had to be made virtually across the Office of Science," she says.

Two other DOE-funded synchrotron sources, at the Argonne (Illinois) and Brookhaven (New York) national labs, have so far avoided layoffs. But there are hiring cutbacks at each facility that affect about a dozen positions now vacant.

In addition to financial pressures, the cutbacks also reflect shifting science trends on a local scale. This spring, ALS acting Director Janos Kirz shuttered an x-ray spectroscopy line used for diagnosing silicon wafers and removed from the Berkeley lab's payroll 16 scientists and support staff. New analysis methods have been shown to be "simpler or better," he said. At the same time, Stanford's Hodgson stopped scheduling users for an undersubscribed topography imaging beamline used to characterize ▶

NONLINEAR OPTICS

To Physicists' Surprise, a Light Touch Sets Tiny Objects Aquiver

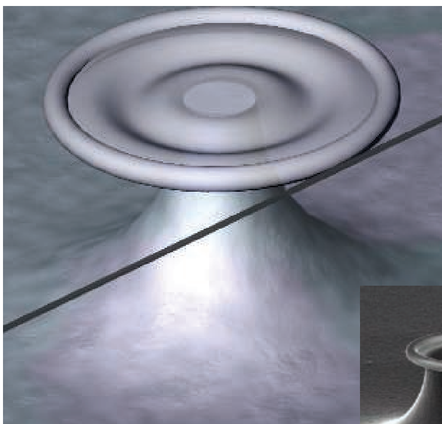
Much as a child might make a soda bottle shake by blowing across its top and filling it with sound waves, physicists have set a tiny disk of glass vibrating by "whistling" light through it. The effect could lead to optically controlled micromachines but might also limit the sensitivity of giant gravitational-wave detectors.

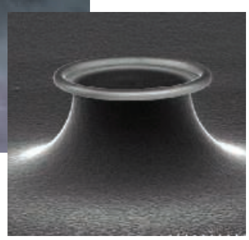
"I'm deeply impressed," says Dirk Bouwmeester, a physicist at the University of California, Santa Barbara. "The findings add a completely new tool to the fields of optical interferometry and information processing."

The fat-rimmed disk of silica used by physicist Kerry Vahala and colleagues at the California Institute of Technology (Caltech) in Pasadena is an "optical microcavity" that "rings" with light of distinct frequencies, just as a soda bottle whistles at specific pitches. Optical microcavities control lasers in CD and DVD players, and higher-quality cavities that can hold more light might help shuttle photons through "photonic" circuits. This week, the Caltech researchers report online in the journal *Optics Express* that light coursing through a microcavity can set the thing in motion.

In the experiment, light from a nearby optical fiber bled into the disk and raced around its rim. Pressure from the circulating light set the disk vibrating. The vibrations stretched the disk and altered the frequency of the light in telltale ways, the researchers found.

Theorists had predicted that light pressure might cause an optical cavity to vibrate, but the rattling caught the researchers off-guard. "We were studying the nonlinear optical properties of these cavities," Vahala says. "This one really came out of the blue."





Hum along. Light pressure sets a tiny glass disk vibrating, as exaggerated in the drawing above.

The effect could prove useful, says Ming Wu, an electrical engineer at the University of California, Berkeley. For example, researchers are already developing micrometer-sized mechanical oscillators that interact with microwaves. So the light-to-vibrations connection might make it possible to control microwaves with light, Wu says.

On the other hand, the vibrations could prove a nuisance for researchers working on the Laser Interferometer Gravitational-Wave Observatory (LIGO). With installations near Livingston, Louisiana, and in Hanford, Washington, LIGO relies on high-power, 4-kilometer-long optical cavities to search for gravitational waves, which would stretch the cavities. Vibrations caused by light pressure might limit LIGO's ultimate sensitivity, Bouwmeester says, and that's no small shakes.

–ADRIAN CHO

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