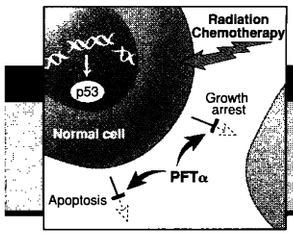
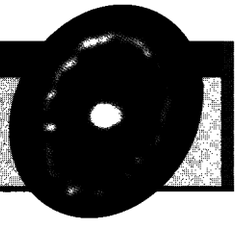


1651 Sparing healthy cells in cancer treatment

1654 A view from the top at NIH

1658 Shaky first step on the cosmic distance ladder

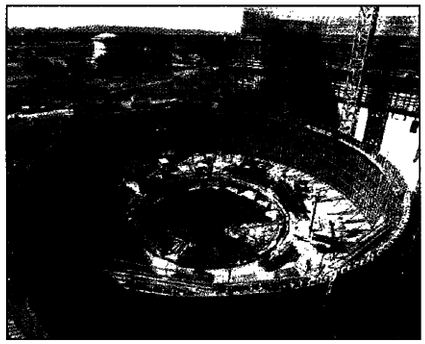


where the atoms—also fermions—pair up to create what's known as a superfluid. Physicists hope that if a fermionic atomic vapor can be cooled to still lower temperatures, the atoms will pair up to form a kind of atomic superconductor. But it won't be easy, Jin says, given the challenge of cooling fermions. "The possibility of getting pairs would be quite fabulous," adds Kleppner, "but it is not something you can do immediately." **–DAVID VOSS**

LASER PHYSICS

DOE Slams Livermore For Hiding NIF Problems

Halfway through its construction, the world's largest laser faces management turmoil and technical problems. Department of Energy (DOE) Secretary Bill Richardson last week ordered a major shake-up at the National Ignition Facility (NIF), a $1.2 billion device to simulate nuclear explosions and probe the practicality of fusion energy. Richardson said he was "gravely disappointed" to learn that officials at Lawrence Livermore National Laboratory in California, which manages the project, had failed to inform him of impending cost overruns and delays. The criticism, accompanied by a financial penalty assessed on the University of California, which runs the lab, comes on the heels of the sudden resignation of NIF's chief after it was revealed that he had improperly claimed to hold a doctoral degree.



Less than beaming. DOE criticizes Livermore's oversight of NIF, whose target capsule is shown under construction.

The tardy warning of NIF's woes, described in an internal report submitted shortly before Richardson made his 3 September announcement, "deeply disturbed" him, he said. NIF officials had assured him as recently as June that the project was "on cost and on schedule," he noted: "Clearly, we have had a major management surprise in our quest for a quantum-leap program for laser physics."

DOE has spent nearly $800 million on the stadium-sized NIF complex, which was originally due to be finished in 2003. Its 192 laser beams are supposed to ignite a tiny capsule of deuterium-tritium fuel in experiments designed to replicate the reactions that occur in exploding nuclear weapons. While many arms control experts say NIF is needed to ensure the safety and reliability of the U.S. nuclear stockpile now that the government has stopped underground tests, critics have challenged its feasibility and DOE's cost estimates (*Science*, 18 July 1997, p. 304).

Eleven scientific and management reviews over the last half-decade have concluded that the project is on solid technical and financial footing. In late March, for instance, a consulting firm carrying out a congressionally mandated review found "no major areas of concern" and concluded that NIF was "well-planned, documented, and managed." But last week, lab officials held a special meeting to look into problems that had been rumored for months.

"Denial of these kinds of problems is unacceptable," Richardson said, noting that he had asked Livermore officials to "take action against any personnel who kept these issues from the [DOE]." His six-point reform plan also stripped the lab of major construction responsibilities, ordering that "major assembly and integration" be "contracted out to the best in industry." In addition, Richardson will withhold "at least" $2 million of a $5.6 million management payment to the University of California, which manages Livermore.

Richardson plans to name an independent panel to get NIF "back on track." Although he said its problems are primarily managerial, "not technological—the underlying science of the NIF remains sound"—Livermore sources have identified at least one technical glitch. They say that dust particles in the building holding the lasers, which include hundreds of specialized lenses and windows, could undermine scientific measurements. "There has been a realization that they may have to make [the building] cleaner," says one academic familiar with the situation. "The intensity of the light is so strong that even specks of dust can burn up and damage the optics by etching or pitting them." The problem poses an unwelcome choice for NIF planners, he says: Spend more to make the building cleaner, or accept a device that may operate less efficiently and require expensive maintenance later.

How much it will cost to solve this and other problems remains unclear. Although some observers say the overrun could be $300 million, DOE sources suggest it will be less. Whatever the cost, Richardson said DOE will not ask Congress for additional funding but instead will divert money from existing DOE and Livermore budgets. Although that approach will be unpopular with researchers whose programs are affected, it should help mute criticism in Congress, which has so far supported DOE's $254 million NIF request for next year.

Still, lawmakers are unlikely to let these events go unnoticed. At a minimum, says one House aide, the overruns could prompt an audit by the General Accounting Office, Congress's investigative arm. Other staffers are pushing Livermore officials to explain what happened to NIF chief Michael Campbell, who stepped down on 25 August after an anonymous whistleblower informed Livermore brass that Campbell had never finished his Ph.D. dissertation despite claiming to hold a doctoral degree from Princeton University. Indeed, says one aide, Richardson's displeasure may be just the first of a series of new problems facing NIF. **–DAVID MALAKOFF**

THE OZONE LAYER

Burnt by the Sun Down Under

When it's winter in the north and summer in the south, many cold-weary tourists from Europe and North America flock to New Zealand for its wild backcountry and radiant sunshine. They may be getting more than they bargained for.

On page 1709, scientists at the National Institute of Water and Atmospheric Re-

CREDITS: LAWRENCE LIVERMORE NATIONAL LABORATORY

search (NIWA) in Lauder, New Zealand, report that over the past 10 years peak levels of skin-frying and DNA-damaging ultraviolet (UV) rays have gradually been increasing in New Zealand, just as concentrations of protective stratospheric ozone have decreased. By the summer of 1998–99, peak sunburning UV levels were about 12% higher than they were during similar periods earlier this decade. Experts say that the NIWA study provides the strongest evidence yet that a degraded stratospheric ozone layer causes more hazardous conditions for life on the planet's surface. "They have done about as careful a study as you can do," says atmospheric physicist Paul Newman of Goddard Space Flight Center in Greenbelt, Maryland.

Atmospheric scientists first detected the notorious "ozone hole" over the South Pole 14 years ago, the apparent result of chemical reactions caused by chlorofluorocarbons and other pollutants in the stratosphere. Ever since, their calculations have predicted that loss of stratospheric ozone—which acts like a protective sheath around the planet, absorbing much of the harmful UV-B radiation (290 to 315 nanometers)—would let through more of the rays. And not just in the sparsely populated polar regions: Researchers soon began to realize that stratospheric ozone was also thinning above populous midlatitude regions such as northern Europe, Canada, New Zealand, and Australia.

But nailing the expected relationship between ozone loss and increased UV-B radiation has proven to be anything but simple, says atmospheric physicist William Randel of the National Center for Atmospheric Research in Boulder, Colorado (see Randel's Review, p. 1689). Efforts to find a definitive link have been complicated by the fact that transient environmental features—such as clouds, snow cover, volcanic ash, or pollution—can filter or reflect UV-B. In 1993, for example, James Kerr and Thomas McElroy of Canada's Atmospheric Environment Service reported that winter levels of UV-B radiation reaching Toronto had risen more than 5% a year over the previous 4 years, a rate in step with declining peak ozone levels. But that study came under fire for being too short to detect a trend.

Now, NIWA atmospheric scientists Richard McKenzie, Brian Connor, and Greg Bodeker have come up with data that appear to clinch the connection between ozone and UV-B in the midlatitudes. They began their study in 1989, positioning their spectroradiometers and other equipment on the ground at Lauder, a rural region on New Zealand's South Island that enjoys unpolluted, cloudless days much of the year. In measurements taken each year since, the team has found that the maximum summertime UV-B levels crested higher and higher until they are now at least 12% above what they were at the beginning of the study. That agrees remarkably well with the roughly 15% increase the researchers had predicted based on the known decline in stratospheric ozone levels measured since 1978 in Lauder. Meanwhile, the longer wavelength UV-A radiation (315 to 400 nanometers), which is unimpeded by ozone, remained relatively constant.

According to meteorologist Jim Miller at the National Oceanic and Atmospheric Administration's National Centers for Environmental Prediction in Camp Springs, Maryland, New Zealand's peak UV-B levels, which are about 20% higher than those that bathe Toronto, could put inhabitants at increased risk of skin cancer, cataracts, and perhaps immune problems. What's more, elevated UV-B levels may perturb marine ecology, killing important algae and bacteria, says Ottawa University ecologist David Lean. Despite the increases, McKenzie notes that UV levels in New Zealand are still lower than levels in unpolluted, low-latitude regions of Australia, Africa, and South America.

Researchers should have plenty of time to study possible effects in New Zealand and elsewhere. The 1987 Montreal Protocol and its amendments, which restrict the use of ozone-destroying chemicals, have stemmed the flood of damaging pollutants reaching the stratosphere. But it will take decades for the ozone layer to recover, says McKenzie, because chlorine and bromine compounds can hang around in the atmosphere for years. "The problem isn't going to go away until the middle of the next century, at the earliest," he says. **–KATHRYN S. BROWN**

Kathryn S. Brown is a writer in Columbia, Missouri.

ANIMAL RESEARCH

Research Lab to Surrender Chimps

In a move that animal rights activists claim as a victory, the Coulston Foundation, the largest primate research facility in the United States, agreed last week to surrender up to 300 chimpanzees—half its current chimp

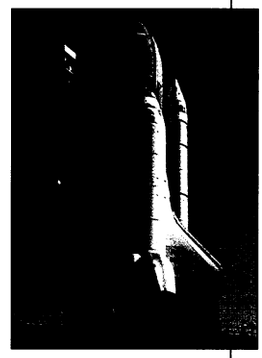
CREDIT: NASA

Founding father. Ham, being prepared for space flight in 1961, was one of the first of the Air Force chimps to be housed at the Coulston Foundation.

ScienceScope

On the Fritz Space shuttle wiring problems have forced NASA to delay several upcoming launches, including one to deliver an urgently needed spare part to the Hubble Space Telescope.

Earlier this year, Hubble researchers became alarmed after three of the spacecraft's six gyroscopes failed, leaving it with the minimum number of working stabilizers needed to do science. To prevent another loss from shutting down the $2 billion telescope, NASA officials announced in March that an emergency repair mission would visit Hubble in October (*Science*, 19 March, p. 1827). But a short circuit on the shuttle Columbia in July, and the subsequent discovery of more than 60 frayed wires aboard three shuttles, has prompted NASA to ground the fleet. The Hubble mission may not leave the pad until November.



Can the healthy gyros last that long? Says John Campbell, Hubble project director at NASA's Goddard Space Flight Center in Greenbelt, Maryland, "We've got our fingers crossed."

Out of Sync Protesting a government decision to fund a new foreign synchrotron, French scientists are refusing to fire up two major x-ray sources.

Last month, science minister Claude Allègre decided that France would help build the DIAMOND synchrotron in the United Kingdom, rather than a competing French device called SOLEIL (*Science*, 6 August, p. 819). Now, scientists at LURE, an x-ray laboratory in Orsay near Paris, are condemning that decision. This week, they voted to refuse to collaborate with DIAMOND's planners, and announced that they will idle the aging SUPER-ACCO and DCI x-ray sources for at least a week in a bid to pressure the government to open negotiations on building a new synchrotron in France.

As *Science* went to press, French officials hadn't responded to the shutdown, which could affect the work of 1800 materials scientists, chemists, and other users. In the meantime, LURE director Robert Comès is promising that his protesters will meet again next week "to discuss the situation."