"We haven't seen any strong leaders emerge with the same sort of long-term understanding of science."

"It will be difficult times for Los Alamos, New Mexico, and DOE," Hecker said. Domenici's retirement comes at a time when the labs already are "under enormous siege and fighting for their survival." Currently undergoing painful downsizings and preoccupied with day-to-day management crises, the weapons labs haven't had the opportunity to develop the long-term vision and strategy they need to justify their continuation in the post-cold war era, he said.

"[Domenici] was able to buy the labs some time to allow them to regenerate. The immediate impact of his departure," Hecker said, "will be to not buy [the labs] more time."

David Kramer

Early start for experiments at Homestake underground lab

South Dakota has taken the initiative to begin installing a variety of experiments in the 8000-foot-deep mine this year—long before the federal government can make its final decision.

Four months after choosing the disused Homestake gold mine in South Dakota as the site for the proposed Deep Underground Science and Engineering Laboratory (see PHYSICS TODAY, August 2007, page 34), NSF convened a "town meeting" in Washington, DC, in November to introduce a broad range of prospective DUSEL users to the facility's site-specific conceptual design and its scientific potential. For experiments in nuclear, particle, and astrophysics, the primary attraction of laboratory space deep underground is the reduction—by many orders of magnitude—of the inescapable flux of cosmic-ray muons that can swamp delicate signals.

Lesko

Led by Kevin Lesko (University of California, Berkeley), the team that championed the Homestake proposal has now been funded for the next three years to prepare a detailed engineering design for DUSEL. That effort must, of course, take account of the first group of major experiments that will be chosen from among competing proposals during the design phase. But the start of full-scale construction of the $500 million DUSEL facility has to await approval from the funding agencies and ultimately from Congress. That's unlikely to happen before 2011.

Starting with SUSEL

But the state of South Dakota, which has a considerable stake in the enterprise, is not sitting idly by, waiting for Washington to decide. Funded by a $70 million gift from South Dakota banker and philanthropist T. Denny Sanford and by appropriations of some $45 million from its legislature plus a modest congressional earmark, the state hopes to jump-start DUSEL with its own Sanford Underground Science and Engineering Laboratory. Part of the impetus for SUSEL is the specter of inexorably rising ground water in the 8000-foot (2400 m) mine—the deepest in North America—since the pumps were shut off when the 126-year-old mine ceased operation in 2003. If nothing is done, by the end of February the water will reach the cavern at the 4850-foot (1480 m) level that for 37 years hosted the detector with which Raymond Davis discovered the shortfall of neutrinos from the Sun and won a Nobel Prize (see PHYSICS TODAY, December 2002, page 16).

"We expect pumping to recommence in January," says newly appointed SUSEL director Jose Alonso, "and we hope to begin preparing the 4850-foot level for reoccupation by April." SUSEL has initiated an Early Implementation Program (EIP) under which moderate-scale experiments in a variety of fields will be invited to get started in suitably refurbished parts of the mine as early as this year. The EIP foresees the possibility of significant scientific and engineering results by 2009. "That certainly couldn't hurt DUSEL's prospects," says Lesko.

In November 2005, almost two years before NSF chose Homestake from among competing sites, the South Dakota Science and Technology Authority invited letters of interest from prospective Homestake experimenters. It then put together a program advisory committee, chaired by physicist Frank Sciulli (Columbia University) and geologist Derek Elsworth (Pennsylvania State University) to vet some 85 letters. From among the proposals it deemed good candidates or the Homestake facility, the committee in its May 2006 report took special note of those that seemed suitable for the EIP.

SUSEL

Alonso

Now that Homestake has won the site competition, Alonso and his SUSEL colleagues have been in conversation with those EIP candidates. Some have, in the meantime, opted to accept invitations from existing underground labs like the 6800-foot-deep Sudbury Neutrino Observatory in Ontario. But from those conversations have emerged a number of prospective EIP projects that already have funding and could move expeditiously into the 4850-foot cavern and shallower levels at Homestake.

EIP candidates

A list of nine such proposals was presented at the November town meeting. Four were particle-physics experiments. Among them is LUX, a collaboration led by Rick Gaitskell (Brown University) and Tom Shutt (Case Western Reserve University) that has already begun building a large liquid-xenon dark-matter detector to follow up on the pioneering XENON10 experiment carried out at the Gran Sasso laboratory in Italy (see PHYSICS TODAY, August 2007, page 16). Another is Majorana, a collaboration, headed by John Wilkerson (University of Washington) and Steven Elliott (Los Alamos National Laboratory), that would look for nuclear double-beta decay that emits no neutrinos. The existence of such a decay mode would mean that the neutrino, unlike the charged leptons, is a Majorana particle—a lepton that's its own antiparticle.

Also on the EIP list is a proposal by a seismological collaboration headed by Steven Glaser (UC Berkeley) and Bill Roggenthen (South Dakota School of Mines and Technology) to create a unique large-volume seismic observatory that extends throughout the mine from instruments at the surface all the way down to probes at 8000 feet.

Then there is a planned undertaking, led by Sookie Bang (SDSM&T) and Mark Conrad (Lawrence Berkeley National Laboratory), to extensively sample material during early excavation for the purpose of establishing baselines for future experiments in geology, biology, chemistry, and hydrology. And two projects on the EIP list are regarded as essential precursors for future large-scale experiments at DUSEL: A collaboration headed by

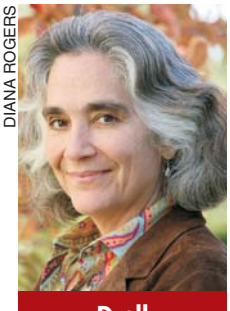
Milind Diwan (Brookhaven National Laboratory) and Kenneth Lande (University of Pennsylvania) seeks to characterize the rock structure at the 4850-foot level in preparation for excavating an enormous new cavern that would house a megaton water-Cherenkov detector for long-baseline neutrino experiments and a search for proton decay. Also at the 4850-foot level, William Roggenthen (SDSM&T), Dongming Mei (University of South Dakota), and collaborators propose to build a low-background counting facility that would be used to measure residual radioactivity in ultrapure materials intended for incorporation into sensitive experiments.

Addressing the town meeting, South Dakota Governor Mike Rounds admitted that, for a state whose population barely exceeds 700 000, the allocation of so much money before DUSEL is approved is "a calculated risk." But he spoke passionately of the educational and intellectual benefits such a world-class facility would bring to his state, which until now has had little to show its schoolchildren or offer its college graduates in the way of scientific research. **Bertram Schwarzschild**

news notes

New SLAC director. Last month Persis Drell became the new director of the Stanford Linear Accelerator Center. Since Jonathan Dorfan's retirement from that post in September, Drell had been serving as SLAC's acting director. She was a professor of physics at Cornell University for 14 years before going to SLAC in 2002 to be director of the lab's research division. As a high-energy-physics experimenter at Cornell, she had been deputy director of the university's laboratory for nuclear studies and chair of its synchrotron-radiation committee.

DIANA ROGERS



Drell

Her father, Stanford particle theorist Sidney Drell, served for many years as SLAC's deputy director. As the fourth director in the laboratory's illustrious 45-year history, she takes up her post at a time of transition. For most of its history, SLAC was concerned mostly with particle physics. But now its centerpiece three-kilometer-long linear accelerator, which used to provide particle physicists with high-energy electrons and positrons, will be serving biologists and materials scientists as the injector for the world's first x-ray free-electron-laser facility.

The role of astrophysics at SLAC is also growing. The lab hosts the Kavli Institute for Particle Astrophysics and Cosmology and the team that designed and will run the soon-to-be launched *GLAST* gamma-ray orbiter. "My goal," says Drell, "is to position the laboratory to make a smooth transition to these exciting future programs while continuing the lab's tradition of outstanding scientific achievement." **BMS**

Wyoming telescope celebrations. The University of Wyoming department of physics and astronomy hosted a free public presentation in Ocober to celebrate the 30th anniversary of its 2.3-meter IR telescope located 25 miles southwest of Laramie on Jelm Mountain. Featured speakers included the telescope's initiators and former UW faculty Robert Gehrz and John Hackwell. Gehrz and Hackwell led a team in the mid-1970s to build what was then the largest IR telescope in the world. Housed in the Wyoming Infrared Observatory (WIRO), the telescope has been widely used to study planet formation, stars, and other astrophysical phenomena.

Coinciding with the celebrations was news that WIRO was awarded

UNIVERSITY OF WYOMING

Wyoming Infrared Observatory.

$400 000 from NSF and $100 000 from the university's research office to upgrade the telescope's aging electronics-control system. Increasing failures in the circuitry had led to inaccuracies in both pointing and tracking and had prompted the large-scale upgrades. "We can't wait to replace all the antiquated electronics with streamlined versions using newer technology," says WIRO director Daniel Dale. The revamped telescope will be accurate to better than 10^{-5} of a degree, "good enough to see a dime at the distance of the moon," says project designer and UW professor Henry Kobulnicky. The upgrades are scheduled to be completed by June; users outside of the Wyoming research community will have access on a competitive basis starting in 2009. **JNAM** ■

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://lima.usgs.gov

Now available online, the **Landsat Image Mosaic of Antarctica** is the result of seamlessly combining more than 1100 cloud-free satellite images of Antarctica. LIMA, which is among the first products of the current International Polar Year, is a joint effort by NSF, the US Geological Survey, NASA, and the British Antarctic Survey.

http://www.geo.uib.no/jordskjelv

To celebrate its centenary in 2005, the Seismological Observatory in Bergen, Norway, put on an exhibition entitled **When the Earth Quakes!** The exhibition's website, currently available in Norwegian and English, offers a detailed yet accessible introduction to seismology and its applications to understanding earthquakes and finding offshore oil.

http://www.cap.ca/cap/art.html

The Canadian Association of Physicists has been running its **Art of Physics** competition since 1992. Entrants have to photograph an eye-catching or unusual physics phenomenon and explain it to the general public in fewer than 200 words. The gallery of past winners is available at the competition's website.