LABORATORY Spotlight
The National High Magnetic Field Laboratory
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LANL UPDATE

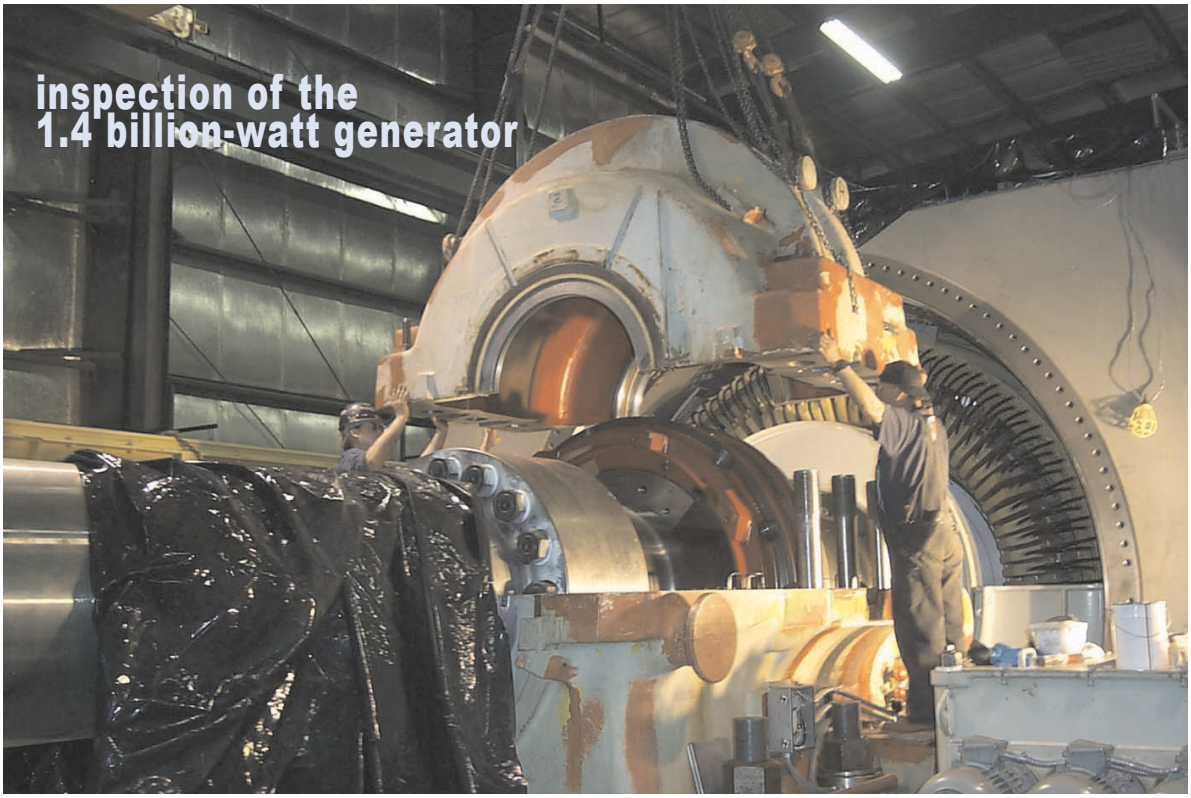
It is springtime in New Mexico. Birds are chirping, the sun is warming the earth and everyone is hoping for rain…

Although seemingly peaceful outdoors, the NHMFL Pulsed Field Facility has been anything but quiet this season as the lab has been bustling with activity.

Spring kicked off with the completion of the general inspection of the 1.4 billion-watt generator used to power the facility's largest magnets. Since the failure of the 60 T Long Pulse in the summer of 2000, the generator has been somewhat idle, providing a perfect opportunity to inspect the machine before the completion of the 60 T Rebuild and the new 100 T magnet. This inspection took about five months and no major problems were found.

"Going in we were unsure what we would find. If we had found anything major we might have had to pull out the rotor," said Joe Schillig, electrical engineer at NHMFL/LANL.

Workers from Western Power, Mannings USA, ABB/Alstom (France) and NHMFL/LANL were all involved in the inspection that included visual inspection, high voltage tests, and ultrasound tests. The generator was originally brought to Los Alamos in 1988 for a fusion experiment. It was inspected before purchase but had never actually been used. The generator had been built in Switzerland and shipped to a nuclear power plant in Tennessee that was never completed. The next inspection will depend on the usage of the generator—which will



be much more than in the past once the 60 T and 100 T magnets are up and running.

In research news, M.H. Jung and A.H. Lacerda, in collaboration with researchers from the University of Nevada at Las Vegas (A.L. Cornelius), the University of California at Irvine (J.L. Lawrence), LANL-MST-10, and Japan, have demonstrated that a magnetic field above 40 T can reveal, in addition to the Kondo temperature (TK~670 K), another low temperature T_c ~ 30 K to 40 K attributed to the onset of the Fermi Liquid coherence in $YbAl_3$. These results were recently published in *Physical Review Letters*: PRL **88** 1172001 (2002).

An ongoing collaboration between the NHMFL/LANL (A. Migliori, J. Betts, and G.S. Boebinger) and the University of Chicago (T.F. Rosenbaum's group) found that resistance displays a large (thousands of a percent), nearly linear increase, with applied field without saturation to 60 T. These results make silver chalcogenides attractive candidates as magnetic field sensors accurate to <0.005 T, which might be further applicable in >100 T pulsed magnets, where large fields have been produced but calibration better than 10% has proved elusive. These results appear in *Nature*: **417**, 421-424 (2002).

Throughout the month of April, NHMFL/LANL Center Leader Greg Boebinger participated in a Los Alamos National Laboratory-sponsored public lecture series in Northern New Mexico. The lecture series, entitled "Frontiers in Science" is an effort by the national lab to "inform neighboring communities about the broad range of scientific and engineering research that is being done at the lab." Boebinger's talk, "Levitation, Superconductivity and the World's Largest Magnets" was presented four times—in Santa Fe, Taos, Espanola, and Los Alamos.

"Greg did a great job," said Joe Ginocchio, chairman of the Frontiers in Science Lecture Series Committee. "At the one in Santa Fe, many young people showed up who were fascinated about it, and stayed around for the demos after [the talk]." Ginocchio also mentioned that a high school science teacher in the audience commented that Boebinger's talk was the "best one yet."

The consistent successes coming out of the magnet lab have prompted Los Alamos National Laboratory Director John Browne to include the NHMFL in his recent talks about current research in Los Alamos. Browne highlighted the NHMFL in his Annual State of the Lab address and in his presentation of "LANL Today" at the APS April Meeting.

In other efforts to publicize the importance of research at the NHMFL, the Pulsed Field Facility continues to host tours of the lab whenever possible. In February, the NHMFL/LANL welcomed U.S. DOE Under Secretary Robert G. Card, and in April for LANL Science Day, the NHMFL gave a tour to numerous state officials including tribal and county leaders and representatives from the offices of Senator Bingaman and Domenici and Representative Udall. On April 23, 2002, the lab hosted Professor J. Peterson, Interim Vice Chancellor for Research at the University of Colorado at Boulder.

Visits to the lab are not, however, reserved for users and politicians. On April 13, 2002, the NHMFL welcomed family members from all areas of the Los Alamos Lab to visit for the lab-wide Family Day. Staff members manned tables with magnet/conductor manipulatives and examples of some of the materials used in the lab's magnets, as well as the launcher and levitation train (thanks to Tallahassee!) and gave tours of the laboratory nearly every 20 minutes.

It was estimated that nearly 200 people showed up for the Family Day event, which was a great success since it was the first NHMFL Family Day to be publicized to the entire lab community. Next year, the Pulsed Field group hopes to continue the tradition and expand the audience as much as possible.

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