

NEWSLINE

Published weekly for employees of Lawrence Livermore National Laboratory

Friday, June 17, 2005

Vol. 30, No. 24

ReNOVAted laser enables new research

By Anne M. Stark

NEWSLINE STAFF WRITER

The ground-breaking capabilities of the former Nova petawatt laser are alive in Bldg. 174.

Using parts from Nova and other now-dismantled Laboratory lasers, physicists have developed a new intense-short-pulse laser that will open up a whole new world of research.

The product of a two-year

See **TITAN**, page 7



JACQUELINE MCBRIDE/NEWSLINE

Engineering's Jim Bonlie checks diagnostics on Titan.

Friday, June 17, 2005

Newsline 7

TITAN

Continued from page 1

collaboration between the Physics and Advanced Technologies, National Ignition Facility, Chemistry and Materials Science and Engineering directorates, the Titan laser achieved first light at 50 terawatts last week. With institutional funding from the Laboratory Science and Technology Office, Titan is currently being commissioned and will be ready for experimenters in October.

Andrew Ng, who serves as Titan's scientific director, said the new laser is the perfect environment for multi-disciplinary experiments serving clients from PAT, NIF, DNT and the CMS directorates.

When complete, Titan will be the Laboratory's first combined long-pulse (nanosecond) and ultra-short-pulse (sub-picosecond) laser operating at hundreds of joules in each of its two beams. It is one of only three petawatt-class lasers in the world (the others are in the United Kingdom and Japan).

NIF's Brent Stuart, who designed the large

vacuum pulse compressor that is the core of Titan, said: "This design takes advantage of novel multi-layer-dielectric-coated grating technology and maximizes the intensity on target given the geometric constraints." This grating technology, from the group led by Jerry Britten of CMS and NIF, will support future systems at the Lab and elsewhere.

Research scientists see Titan as an experimental platform that complements the Omega laser and supports future experiments to be carried out at the NIF.

"There's a broad range of experimental users," said Ng, who works in V Division. "With Titan, you can open up a whole new world of research."

Titan is housed in the Jupiter Facility, formerly known as the Bldg. 174 Laser Facility. The facility, which was originally built in the 1970s, has served as the home of several upgrades of the Janus laser, as well as several lower energy ultra-short-pulse lasers, all currently operated as user facilities. Part of the building that originally served as a capacitor bank area and then a storage room has been completely renovated to house the new Titan target area.

"Titan will be one of the premier user facilities in the world," said Hector Lorenzana of

the Defense and Nuclear Technologies Directorate, who will use the new laser to study extreme materials properties. "Traditionally, we used the gas gun but you can only conduct one experiment per day. But here, we can do up to 10 experiments per day. And with the sub-picosecond capability of Titan, we can start probing unprecedented physics."

For Prav Patel of V Division, the construction of the Titan Laser is a great opportunity for LLNL. "Titan's unique long-pulse/short-pulse capability will enable Livermore scientists to conduct truly world-class pioneering research in high energy density physics," he said.

Andy Mackinnon of NIF will use Titan to help investigate the science base required to achieve fast ignition on NIF. "Titan promises to be a very exciting facility, where we will be able to test much of the physics of fast ignition," he said.

When commissioning is complete, scientists will be able to conduct many experiments on Titan in any given day, according to Ng. And Titan will operate along with the other user lasers in the Jupiter Facility: Janus, COMET, Callisto and Europa.