

## Section 4

# NATIONAL LASER USERS FACILITY NEWS

This report covers the activities of the National Laser Users Facility (NLUF) during the quarter 1 October to 31 December 1983. During this period, three users conducted experiments on LLE facilities. Visiting scientists representing the University of Connecticut and the University of Pennsylvania conducted experiments on the Glass Development Laser (GDL), compiling a total of 39 shots. An additional group representing the University of Maryland, the Naval Research Laboratory, and the Goddard Space Flight Center conducted experiments on the OMEGA facility, compiling a total of 25 shots. A specific listing of shots can be found in Section 1 (LASER SYSTEM REPORT) of this issue.

The two user experiments on the GDL system used 351-nm laser light focused onto flat targets for x-ray diffraction experiments. The participating individuals of these experiments are:

- **J. Kent Blaise, D. Pierce, Donatella Pascolini, and A. Scarpa** (University of Pennsylvania): "Time-Resolved Structural Studies of the  $\text{Ca}^{2+}$ -ATPase of Sarcoplasmic Reticulum Membranes Utilizing a Laser Plasma as a Source."
- **Leo Herbette and Robert McDaniel** (University of Connecticut): "Time-Resolved X-Ray Diffraction of Acetylcholine Receptor Membranes."

The one user experiment on the OMEGA system used six beams of 351-nm laser light focused onto spherical targets. The participating individuals of this experiment are:

- **Hans Griem** and **Samuel Goldsmith** (University of Maryland), **Uri Feldman** and **George Doschek** (Naval Research Laboratory), and **W. E. Behring** (Goddard Space Flight Center).

During the last fiscal year (1 October 1982 to 30 September 1983), the user program accumulated a total of 368 shots on both the GDL and the OMEGA facilities. These user experiments represented a broad range of scientific investigations. Table 17.2 shows the shot distribution for users during this period.

We are now in the process of soliciting proposals for the next NLUF Steering Committee meeting. This year, our committee will require submission of proposals by 1 April 1984. A revised description of the user facility and funding opportunities is included below.

### User Experiments

User experiments are accessible at the University of Rochester for applications in high-energy-density physics. High-energy-density physics experiments use an intense pulse of laser light focused to a diameter of approximately  $10^{-3}$  cm. Intensities of  $10^{17}$  W/cm<sup>2</sup> can be created, equivalent to an electric field intensity of  $10^9$  V/cm. A solid material, irradiated by such an intense laser pulse rapidly becomes a plasma with temperatures of  $10^7$ - $10^8$  K at densities of 1-10 g/cm<sup>3</sup>. This point-source plasma thus provides the necessary conditions for studies of thermonuclear fusion, spectroscopy of highly ionized atoms, shockwaves, laboratory astrophysics, and the fundamental physics of matter under high intensities. Additional research opportunities are available for pulsed x-ray-diffraction experiments by using x-rays emitted from a laser-produced plasma. This x-ray point source emits  $10^{15}$  photons in  $10^{-9}$  s at 4.4 Å (for a chlorine target). An x-ray collector can be used to deliver  $10^{10}$  photons to a sample. The university facility has accommodated 30 user experiments since 1979.

### Funds Available

The U.S. Department of Energy (DOE) has designated the Laboratory for Laser Energetics at the University of Rochester as a national facility, available to qualified researchers nationwide. DOE supports facility operation and provides research contracts for user experiments in laser fusion, plasma physics, and associated applications. Approximately \$720,000 of user research funds will be available for the next period. User proposals in other areas can be accepted; however, funding support will have to be obtained separately through other agencies (e.g., the NSF). Proposals requesting allocation of facility time should be submitted to the NLUF Manager by 1 April 1984. Proposal review is provided by the NLUF Steering Committee.

### Facility

The 24-beam, 12-trillion-watt OMEGA laser system (at 1054 nm) provides the main high-power irradiation capability of the Laboratory. The OMEGA system now has six beams converted to the ultraviolet

User System Shot Distribution  
for Fiscal Year 1983  
(1 October 1982 - 30 September 1983)

<u>USER</u> (Affiliation)	<u>EXPERIMENT</u>	<u>NUMBER OF SHOTS</u>
Frank Chen and Chan Joshi (UCLA), Nizar Ebrhaim (Yale University)	Plasma Instabilities	105
J. Kent Blasie and Leo Herbette (U. of Pennsylvania and U. of Connecticut)	Biophysics	77
Ray Elton and T. N. Lee (Naval Research Laboratory)	X-Ray Laser	25
Jim Forsyth and Robert Frankel (U. of Rochester)	Biophysics	107
Uri Feldman and George Doschek (Naval Research Laboratory)	VUV Spectroscopy	32
Hans Griem and Samuel Goldsmith (U. of Maryland)	Line Shifts	15
George Miley (U. of Illinois)	Particle Energy Loss	5
Barukh Yaakobi (U. of Rochester)	X-Ray Diagnostics	2*
	TOTAL	368

\*Plus other shots shared with other users.

SCHEDULED USER SHOTS

Burton Henke (U. of Hawaii)	X-Ray Diagnostics (1984)
Tom Blue (U. of Illinois)	Particle Measurements (1984)
C. F. Hooper, Jr. (U. of Florida)	Implosion Dynamics (1984)

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Table 17.2  
User system shot distribution for fiscal  
year 1983 (1 October 1982-30 September  
1983).

(351 nm). The six UV beams have a total energy of 300 J for 1-ns pulse widths. User experiments are possible with either UV or IR laser radiation. A single-beam replica of OMEGA, the Glass Development Laser (GDL, at 351 nm), is also available. The target areas at the NLUF allow users access to three separate chambers—one for OMEGA and two for GDL.

For more information about proposal guidelines and the resources available at the NLUF, please contact:

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