

Section 5

NATIONAL LASER USERS FACILITY NEWS

This report covers the activities of the National Laser Users Facility during the quarter October to December 1981. During this period most of our current users visited the Laboratory to either begin preparation for or to discuss the planning for their experiments. A total of 12 users' experiments have been approved: seven are scheduled for the OMEGA and Glass Development Laser (GDL) systems beginning in March 1982, one has been completed, one is ongoing, two are awaiting funding, and one was withdrawn.

The status of these experiments is as follows: Larry Knight (Brigham Young University) has completed his experiment, Jim Forsyth (University of Rochester) is continuing his experiment, Mark Sceats (University of Sydney, Australia) is awaiting funding for his two experiments, and Glen Dahlbacka (Physics International) has withdrawn his experiment. The remainder of our current users are in the process of fabricating the diagnostics for their respective experiments and are scheduled to begin taking data in March 1982. They include Francis Chen and Chan Joshi (UCLA) and Nizarali A. Ebrahim (Yale University), Hans Griem (University of Maryland), and Anthony Burek (National Bureau of Standards) on the GDL system; George Miley (University of Illinois), Uri Feldman and George Doschek (Naval Research Laboratory), Barukh Yaakobi (University of Rochester), and C. F. Hooper, Jr. (University of Florida) on the OMEGA system. A description of these experiments can be found in Volume 7 of the LLE Review. All of the above experiments are supported by contracts with the U.S. Department of Energy, except for Jim For-

syth's work, which is supported by the National Science Foundation, the National Institutes of Health, and the Air Force Office of Scientific Research.

In addition to supporting our current user experiments, we are beginning preparations for the next set of users who will be chosen by the Steering Committee during their annual meeting at LLE in late April or early May. Composed predominantly of scientists from outside the University of Rochester (see LLE Review Vol. 7 for a list of current members), the Steering Committee reviews and approves research proposals submitted to the NLUF by potential users. We have received two formal proposals and are expecting an additional sixteen. These proposals address problems in the following scientific areas: laser fusion, fundamental plasma physics, laboratory astrophysics, diagnostic development for fusion, and nuclear physics.

Opportunities for user experiments in a variety of scientific disciplines are available at the NLUF because of the unique high-energy density environment of high-power, focussed-laser radiation. This high-energy density is obtained by focusing pulsed terawatt laser beams to a spot 50 microns in diameter. Energy densities as high as 10^8J/cm^3 , field strengths of 10^{10}V/cm , and temperatures of over 50,000,000 °K are attainable at particle densities of 10^{23}/cm^3 . The dense, hot material so created can be an extremely intense emitter of x-rays, neutrons, and charged particles from a point source.

The NLUF offers to the user potential experiments in either laser-matter interaction or the use of x-rays or neutrons for probing the structure of matter. Laser-matter interaction experiments have yielded conditions similar to those in white dwarf stars with applications in fusion, laboratory astrophysics, and diagnostics development. X-rays or neutrons derived from these experiments permit structure analysis on the atomic and molecular scale. The x-rays emitted in this environment have been used to record biological changes in less than a billionth of a second.

Members of the Laboratory staff are available to help users in the design, construction and implementation of experiments on the OMEGA and GDL laser systems. Staff members also provide technical assistance in matching user equipment needs with in-house facility instrumentation systems. Operation of the laser is performed by Laboratory staff.

Further information on the NLUF is available from:

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