Section 3
NATIONAL LASER USERS FACILITY NEWS

The NLUF Steering Committee has received six proposals to evaluate for FY94. The proposals include experiments on GDL plus diagnostic-development projects for the OMEGA Upgrade. A brief summary of each proposal follows:

Proposal 180

"Measurements of Quantum Electrodynamic-Sensitive Transitions in Na-like and Cu-like Ions"

Principal Investigator: **J. Reader**, National Institute of Standards and Technology (NIST)

The principal investigator proposes using GDL to measure QED effects in high-Z ions. There are 11 proposed targets ranging in Z from 47 to 92. The GDL laser system will be used to study Na-like and Cu-like ions of these elements. The primary diagnostic is a 2.2-m Rowland Spectrograph (owned by NIST) with an attached target chamber. The optical system that is intrinsic to the spectrograph is incompatible with the beam geometry of the GDL system. Optics available from the LLE inventory can overcome this incompatibility with the focus lens requiring adaption to the spectrograph's target chamber.

Proposal 181

"Normal-Incidence Multilayer Mirror X-Ray Microscope"

Principal Investigator: **J. F. Seely**, Naval Research Laboratory (NRL)

This NRL group plans to build a Cassegrain-type microscope for use at a 33.7-Å wavelength. The work builds upon the successful fielding of a similar instrument on the OMEGA laser system in 1992 and development work supported by NASA. The proposed microscope will have a 1.8-μm resolution at the target and a magnification of 10 and will use a 1024 × 1024 CCD as the detector. Most of the work will be done at NRL, and the microscope could be tested on either GDL or NOVA. The main concern about this proposal is whether the 33.7-Å wavelength is too long to give useful information about the target's

status during the implosion. The answer is not obvious when shaped laser pulses are used for the implosion.

Proposal 182

"Temperature-Dependent Tensile Strength, Surface Roughness Diagnostics, and Magnetic Support and Positioning of Polymer ICF Shells at Temperatures between 4 K and 300 K"

Principal Investigator: **A. Honig**, Syracuse University

This proposal includes three independent tasks to be done at Syracuse University. The first task is to study the material properties of CH shells at cryogenic temperatures; the second task uses the measured shell properties with precharacterized shells to determine if there is a correlation between accommodation coefficients and surface roughness; and the third task will develop the use of ferrite-doped plastic shells for magnetic levitation and positioning. This work uses much of the technology for handling cryogenic targets developed by the principal investigator over the last four years.

Proposal 183

"The Ion-Acoustic Decay Instability in a Large-Scale, Hot Plasma Relevant to Direct-Drive Laser Fusion—Applications to a Critical Surface Diagnostic and Thermal Smoothing"

Principal Investigator: **K. Mizuno**, Plasma Physics Research Institute (UCD)

This group has proposed a study of the critical surface using the ion-acoustic decay instability. The development of this diagnostic for the OMEGA Upgrade is to be undertaken first with subsequent testing of thermal-smoothing techniques on GDL. A second task will use the GDL facility to test the second-harmonic diagnostic and will use x rays emitted from flat targets to study thermal smoothing and lateral heat transport. This second task requires that GDL have full pulse-shaping and smoothing-by-spectral-dispersion capability. In addition, there is the need for a large-aperture polarizer to modify the high-intensity portion of the laser pulse.

Proposal 184

"Plasma Spectroscopy: Theoretical and Experimental Diagnostic Development/ Tests"

Principal Investigator: **C. F. Hooper, Jr.**, University of Florida

The principal investigator proposes to continue the development of atomic physics computer codes to calculate the effects of high temperature and density on x-ray line emission and transport. There are three tasks associated with this work: The analysis of *L*-shell spectra is considered (by the principal investigator) the next step in the extension of the atomic models with ion dynamics formalism. It is also proposed to extend the "multielectron-line-broadening theory" to conditions expected for OMEGA Upgrade target implosions. The third task is unrelated to the above efforts and proposes to develop micro-dot spectroscopy to study laser-plasma interactions.

Proposal 185

"Development of Density and Temperature Profile Diagnostics for ICF Targets"

Principal Investigator: **H. R. Griem**, University of Maryland

The work proposed is to extend the development of previous work in x-ray and XUV spectroscopy to the OMEGA Upgrade. The diagnostics must be constructed and tested before the experiments can be done on the OMEGA Upgrade; in the meantime GDL will be used to continue this development.