NLUF News

Six NLUF proposals for FY94 were submitted to DOE for the consideration of the Steering Committee (see Table 60.III). All of the principal investigators, representing four universities and two government laboratories, have had previous proposals approved for experiments at LLE. Three of the experiments involve x-ray or XUV spectroscopy, one is a plasma interaction experiment, one a diagnostics development, and one a target fabrication effort.

On 1 October 1993 these proposals were reviewed via conference call by the Steering Committee and **Dr. James Knauer** (NLUF Manager). Voting members included **Dr. Michael Boyle**, **Dr. Phillip Goldstone**, **Prof. Chandrasakar Joshi**, and **Dr. Robert Turner**. The Steering Committee evaluated the proposals for their technical merit and submitted their recommendation to the Oakland office of DOE.

DOE decided to fund all of the submitted proposals. The monies were allocated according to the technical ranking provided by the Steering Committee. These proposals were primarily directed to the development of diagnostics for the OMEGA Upgrade laser system. Two projects that were to use the GDL laser system were either conducted at other laser systems or are awaiting the availability of the GDL system.

A brief summary of each proposal funded for FY94 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 to use 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 its own attached target chamber. The optics used for Dr. Reader's previous experiments are not usable on the current GDL system because of the increased beam diameter and energy. We do have optics available but the focusing lens assembly must be adapted to his target chamber.

Table 60.III: The numerical listing of NLUF proposals.

Proposal Number	Investigator	Institution	Proposal Title
180	J. Reader	National Institute of Standards and Technology	Measurements of Quantum Electrodynamic Sensitive Transitions in Na-like and Cu-like Ions
181	J. F. Seely	Naval Research Laboratory	Normal-Incidence Multilayer Mirror X-Ray Microscope
182	A. Honig	Syracuse University	Temperature-Dependent Tensile Strength, Surface Roughness Diagnostics, and Magnetic Support and Positioning of Polymer ICF Shells at Temperatures between 4K and 300K
183	K. Mizuno	Plasma Physics Research Institute University of California, Davis	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
184	C. F. Hooper Jr.	University of Florida	Plasma Spectroscopy: Theoretical and Experimental Diagnostic Development / Tests
185	H. R. Griem	University of Maryland	Development of Density and Temperature Profile Diagnostics for ICF Targets

Proposal 181

"Normal-Incidence Multilayer Mirror X-Ray Microscope"

Principal Investigator:

J. F. Seely, Naval Research Laboratory (NRL)

Dr. Seeley's group at NRL is building a Cassegrain-type microscope for use at a wavelength of 33.7 Å. 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 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 is being done at NRL. The microscope fits into a LLNL SIM cart, allowing it to be tested on either GDL or NOVA.

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

There are three independent tasks to this proposal for work to be done at Syracuse University. The first task will study the material properties of CH shells at cryogenic temperatures; the second task will use 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. Ferrite-doped plastics have been delivered to LLE for shell fabrication.

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 is studying the critical surface using the ion-acoustic decay instability. The development of this diagnostic for the OMEGA Upgrade is being done at PPRI; subsequent testing of thermal-smoothing techniques is to be done on GDL. There is a second task that will use the GDL facility to test the second-harmonic diagnostic and 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. The GDL tasks have been delayed until the laser system is available for experiments.

Proposal 184

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

Principal Investigator:

C. F. Hooper Jr., University of Florida

The Principal Investigator continues to develop 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 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 done primarily at the University of Maryland is to extend the development of previous work in x-ray and XUV spectroscopy to OMEGA Upgrade target conditions. The diagnostics are being constructed and tested before the experiments can be done on the OMEGA Upgrade. The Trident laser system at the Los Alamos National Laboratory is being used to test the instrumentation.