IN BRIEF

This volume of LLE Review features articles on the infrared-toultraviolet conversion of six beams of OMEGA and on the first series of experiments conducted with the reconfigured, up-converted system: developments in the LLE advanced technology program; and activity in the National Laser Users Facility.

The OMEGA conversion and the initial six-beam experiments have been conducted to meet the system performance criteria established by the Department of Energy as the basis for a decision for the continued up-conversion of the system. The specific criteria and the experimental data to be obtained are listed below.

Laser System Performance Criteria: (a) energy in the six converted (351-nm) beams greater than 250 J in a pulse greater than 0.5 ns: (b) ultraviolet conversion efficiency in reasonable agreement with theoretical predictions; (c) measurement and successful evaluation of the beam-intensity distribution in the equivalent target plane in the ultraviolet (351 nm) and in the infrared (1054 nm); (d) alignment accuracy (pointing, focusing, and stability) of the six ultraviolet beams comparable to the infrared beam capability.

Target Interaction Experiments with Six-Beam Ultraviolet Illumination: (a) measurement of absorption on spherical targets consistent with theoretical predictions; (b) measurement of preheat as indicated by the x-ray spectrum from an illuminated spherical target, these measurements should be in reasonable agreement with data from one-beam planar target experiments and should show lower preheat levels than similar infrared experiments; (c) measurement of the massablation rate for spherical targets and demonstration that this rate is comparable to or greater than the rate observed in similar infrared experiments.

The Laboratory for Laser Energetics completed the six-beam OMEGA conversion (LLE Review, Volume 16) and has performed the experiments specified in the decision criteria. This volume describes how the required criteria were met or surpassed.

In particular, in the OMEGA Facility Report: (a) System 351-nm performance at the level of 388 J was demonstrated. A series of 103 shots was taken: 30 of these shots produced energy in excess of 250 J. (b) The frequency-conversion performance was in reasonable agreement with the *MIXER* code (LLE Review, Volume 16). (c) Both the 351-nm and 1054-nm equivalent-target-plane distributions were measured and evaluated. (d) Pointing stability of $\pm 10\,\mu$ m and focus resolution of $\pm 50\,\mu$ m at 351 nm, comparable to 1054-nm performance, was demonstrated.

The Progress in Laser Fusion section describes the experimental work that demonstrated: (a) Absorption at 10^{15} W/cm² in excess of 50% was measured, exceeding initial expectations. (b) Preheat levels deduced from x-ray spectra are much less than in comparable 1054-nm experiments. (c) Ablation rates are higher than those measured in comparable 1054-nm experiments.

Following a review, the Department of Energy has granted approval for the conversion of the remaining beams. With the resources currently in hand, a minimum of six additional beams will be converted in FY84. The full conversion of the system is well within our present technical capability.

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Laboratory Engineer Larry Forsley, leader of the Computer Systems Group, is shown digitizing an x-ray photograph of a target plasma with the recently installed image processing system. Digital image processing is applied extensively in the experimental and engineering programs of the laboratory.