CONTENTS

Page

IN BRIEF iii

CONTENTS v

Section 1 ADVANCED TECHNOLOGY DEVELOPMENTS 1
- 1.A High-Speed, Gated X-Ray Imaging for ICF Target Experiments 1
- 1.B Characterization of Microchannel-Plate Detectors for High-Speed, Gated X-Ray Imaging by Electro-Optic Sampling 11
- 1.C Neutron Streak- and Framing-Camera Diagnostics for ICF Implosions 14
- 1.D Nuclear Diagnostics for the OMEGA Upgrade 22
- 1.E Temporal Pulse-Width Control of the OMEGA and GDL Laser Oscillators 27
- 1.F Shaping of Nanosecond Linearly Chirped Pulses 38

Section 2 NATIONAL LASER USERS FACILITY NEWS 56

Section 3 LASER SYSTEM REPORT 58
- 3.A GDL Facility Report 58
- 3.B OMEGA Facility Report 58

PUBLICATIONS AND CONFERENCE PRESENTATIONS

IN BRIEF

This volume of the LLE Review covers the three-month period October–December 1992. On 18 December, the OMEGA Laser Facility fired its last shot. It will be decommissioned during the next quarter to make room for the OMEGA Upgrade Laser Facility. This volume deals with two areas of interest for the OMEGA Upgrade, the development of advanced x-ray and neutron diagnostics and the development of long-pulse (>1-ns) laser sources. The first three articles discuss the development of time-dependent diagnostics. The development of an x-ray framing camera is described and measurements of the high-voltage pulse propagation in the camera are presented. Time-resolved and time-integrated neutron diagnostics for the OMEGA Upgrade are then discussed. Two schemes for the generation of >1-ns laser pulses are presented. Finally, the activities of the National Laser Users Facility and the GDL and OMEGA laser facilities are summarized.

Highlights of the research reported in this issue include

- The use of gated microchannel-plate detectors as high-speed framing cameras in laser-driven inertial-confinement fusion (ICF) experiments is described. Using an array of pinholes to image the target, detectors capable of generating up to 16 individual frames with ~90-ps resolution on a single laser shot are now in routine use.
- The picosecond propagation characteristics of a voltage pulse in a microchannel plate, used in x-ray framing cameras, were measured electro-optically.

The signal propagation velocity and dispersion, the line characteristic impedance, and the substrate dielectric constant were measured.

- A new streak-camera diagnostic for directly time-resolving the neutron burnwidth for ICF implosions is presented. The technique uses the *(n, p)* reaction in CH_2 to convert the neutron signal to a proton signal, which is proximity coupled to a CsI secondary electron emitter and subsequently recorded with a standard LLE large-format, x-ray streak camera. This technique can also be extended to high-speed, microchannel-plate framing cameras.
- The planned time-integrated nuclear diagnostics for the OMEGA Upgrade include "line-of-sight," single-hit detectors to measure the ion temperature and activation diagnostics coupled with rapid-extraction mechanisms. The longest-path ion-temperature diagnostic will be housed in a separate building outside the OMEGA Upgrade target chamber.
- Pulse-width control of laser oscillators through the use of intracavity, Fabry-Perot etalons is described. Pulses of 7-ns duration with no temporal modulation have been generated. The experimental measurements are in good agreement with the simple theory presented.
- The generation of long laser pulses (>1 ns) with arbitrary temporal shapes using spatial masking is described. An initially chirped pulse is spectrally dispersed within a grating pair and a binary mask is used to generate long pulses with short rise times.