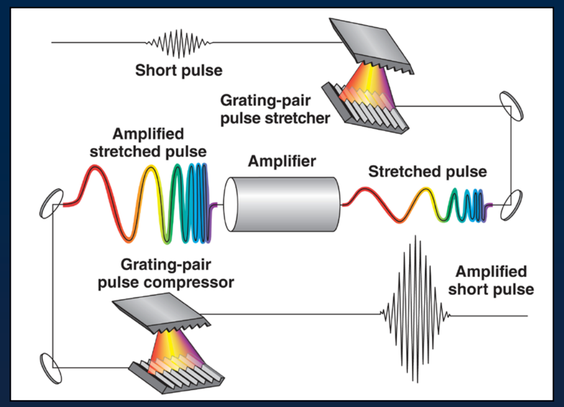
1985

OMEGA Frequency Conversion Completed

24-beam OMEGA firing, showing UV beams

Full conversion of the 24-beam OMEGA laser to 351-nm operation was completed on time and within budget in 1985.

Chirped-Pulse Amplification



A paper published in Optics Communications by Donna Strickland and Gerard Mourou of LLE describes the chirped-pulse amplification (CPA), a technique used to amplify ultrashort laser pulses to the petawatt level. This approach, developed and demonstrated at LLE, is the basis of modern ultrahigh-power lasers.

D. Strickland and G. Mourou, "Compression of Amplified Chirped Optical Pulses," Opt. Commun. ***56*** *(3), 219–221 (1985).*

Spherical-Target Compression

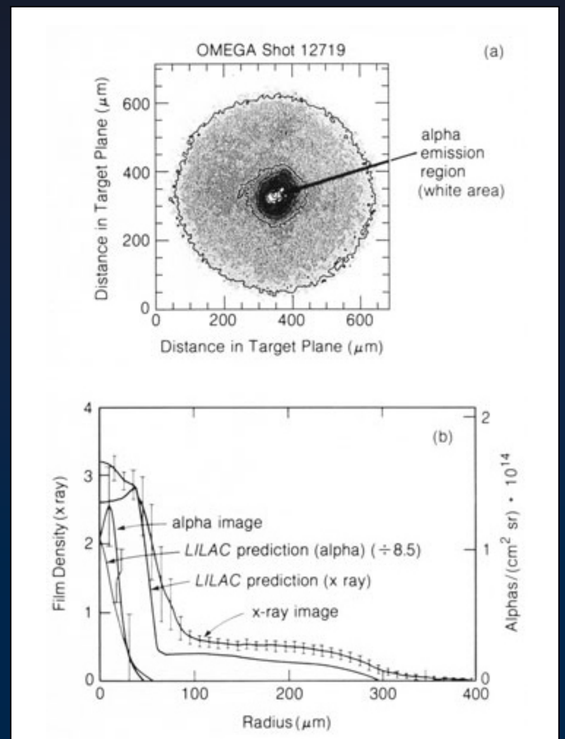


Fig. 14, LLE Review 28

Spherical-target compression experiments demonstrated high neutron yield and high fuel density with 351-nm irradiation between 1985 and 1988.

(a) Composite of an x-ray micrograph (around $E \sim 4$ keV) of a high-yield target implosion and an alpha zone-plate image indicating the spatial distribution of the alpha particle products of thermonuclear burning. (b) Averaged radial profiles of the images in (a), together with *LILAC* postprocessor predictions of the same.

"Laser-Fusion-Target Implosion Studies with OMEGA," LLE Review Quarterly Report **28**, *155-163, Laboratory for Laser Energetics, University of Rochester, Rochester, NY, LLE Document No. DOE/DP/40200-26, NTIS Order No. DE87005867 (1986).*
(Copies may be obtained from the National Technical Information Service, Springfield, VA 22161).

1986

Progress in Laser Fusion

August 1986 cover of Scientific American showing the diagnostics inside the OMEGA target chamber

In August 1986, the cover of Scientific American showed the diagnostics inside the OMEGA target chamber. The featured article was titled "Progress in Laser Fusion" by R. Stephen Craxton, Robert L. McCrory, and John M. Soures. The article discussed the considerable progress made in laser fusion since the ability to convert infrared lasers to the ultraviolet was demonstrated at LLE in 1979. The authors concluded that electric power generation using short-wavelength lasers would be feasible with lasers generating between 1.6 and 10 MJ per pulse with a fusion energy release 100× larger than the input laser energy.

R. S. Craxton, R. L. McCrory, and J. M. Soures, "Progress in Laser Fusion," Sci. Am. ***255,*** *268–279 (1986).*

Review Recognizes LLE Research

Horseshoe mount for 24-beam OMEGA cryogenic target

In March, 1986 the National Academy of Sciences Review of the Department of Energy's Inertial Confinement Fusion (ICF) Program recognized the important work being done by LLE in addressing the key aspects of ICF research. They set a goal of compressing a cryogenic direct-drive target to 100 to 200× liquid-DT density as a demonstration to justify the upgrade of the OMEGA laser to 30 kJ.

W. Happer, ed., in Review of the DOE's Inertial Confinement Fusion Program *(National Academy of Sciences Washington, DC 1986).*