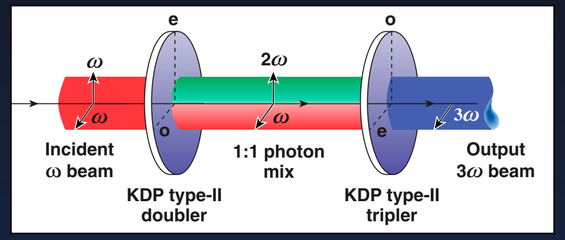
1980

OMEGA 24-Beam Laser System Complete

Rosemary Leary and Bob Hutchison in front of the OMEGA 24-beam OMEGA Laser System

In January 1980, the construction of the 24-beam OMEGA uniform-irradiation facility was completed and a series of 24-beam performance tests were conducted and validated by a Department of Energy review. The system demonstrated a short-pulse power of 12.2 TW at a pulse width of 53 ps (minimum specified 7.5 TW) and a long-pulse energy of 1.76 kJ at a pulse width of 273 ps (minimum specified was 1.2 kJ).

Patent For Frequency-Tripling Technique



Frequency-tripling technique

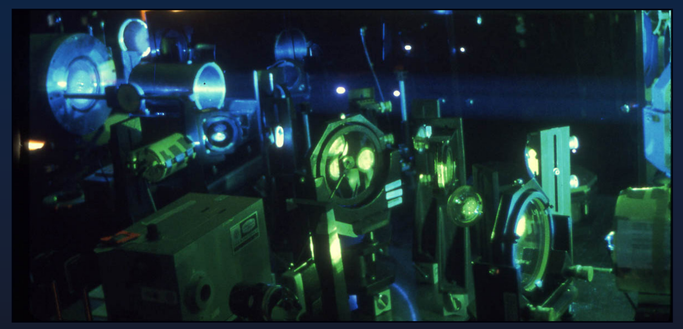
On 1 May 1980, a patent application was filed for a frequency-tripling technique invented by LLE scientist R. S. Craxton (U.S. Patent 4,346,314, issued 24 August 1982). The technique was first demonstrated experimentally on the Glass Development Laser (GDL) system at LLE; two papers on the subject were published in Optics Communications in September 1980. This frequency-tripling technique rapidly became a means of choice to significantly enhance the effectiveness of existing and soon-to-be-built high-power Nd:glass laser systems including OMEGA, Nova, OMEGA Upgrade, GEKKO of Japan, Ligne d'Integration Laser (LIL), Laser Mégajoule (LMJ) of France, and the National Ignition Facility (NIF).

R. S. Craxton, "High Power Efficient Frequency Conversion of Coherent Radiation with Nonlinear Optical Elements," U. S. Patent No. 4, 346, 314 (1 May 1980).

R. S. Craxton, "Theory of High Efficiency Third Harmonic Generation of High Power Nd-Glass Laser Radiation," Opt. Commun. ***34*** *(3), 474–478 (1980).*

W. Seka, S. D. Jacobs, J. E. Rizzo, R. Boni, and R. S. Craxton, "Demonstration of High Efficiency Third Harmonic Conversion of High Power Nd:Glass Laser Radiation," Opt. Commun. ***34****, 3469–473 (1980).*

Third-Harmonic Generation

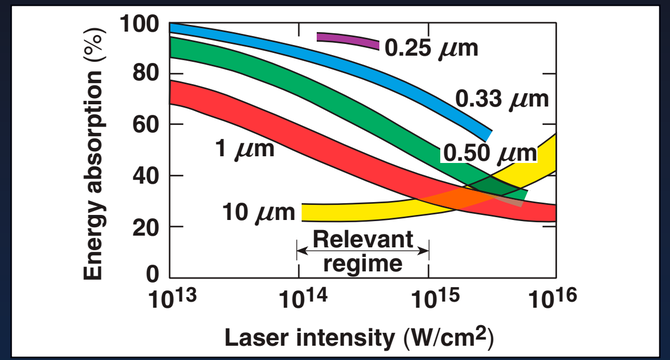


◀ *Glass Development Laser*

Efficient third-harmonic generation was demonstrated at LLE on the Glass Development Laser.

1981

Freqency Tripling in Use

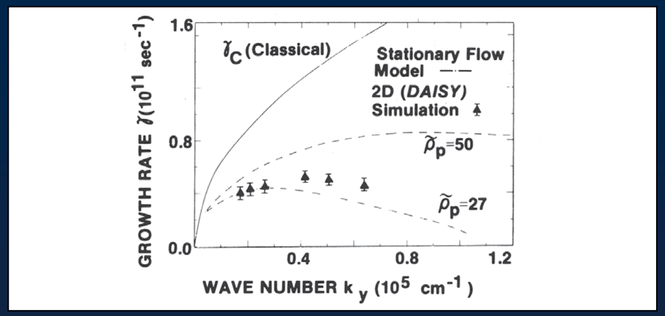


UV laser–matter interaction experiments demonstrate benefits of short-wavelength irradiation

In 1981, initial papers were published on LLE's use of frequency tripling. LLE's third-harmonic-generation schemes for high-power glass lasers allowed for highly efficient absorption of the incident laser. By tripling the frequency of the beams, more power was delivered to the target.

R. S. Craxton, "High Efficiency Frequency Tripling Schemes for High Power Nd:Glass Lasers," IEEE J. Quantum Electron. ***QE-17*** *(9), 1771–1782 (1981).*

Ablation-Driven Rayleigh–Taylor Instability



Comparison of the 2-D simulations of Rayleigh–Taylor linear instability growth rates with the stationary-flow model

The paper "Nonlinear Evolution of Ablation-Driven Rayleigh–Taylor Instability" by R. L. McCrory *et al.* appeared in *Physical Review Letters*. This work examined nonlinear aspects of Rayleigh–Taylor instability and showed that it was plausible to design successful moderate-aspect-ratio capsules.

R. L. McCrory, L. Montierth, R. L. Morse, and C. P. Verdon, "Nonlinear Evolution of Ablation-Driven Rayleigh–Taylor Instability," Phys. Rev. Lett. ***46*** *(5), 336–339 (1981).*

1982

LLE-Developed Technology Transferred to Private Sector

Jay Eastman

Jay M. Eastman, the chief engineer in charge of building the 24-beam laser system and the LLE director from 1981 to 1982, left the Laboratory to start Optel, a private company specializing in barcode scanners. Optel was one of many successful examples of LLE-developed technology being used by a private sector company.