

# 1972



## LLE Grows



LLE staff, 1972

By 1972, LLE had grown to 40 faculty and staff with a budget of \$1 million.

## The Laser Fusion Feasibility Project



One of the DELTA Laser beamlines

The Laser Fusion Feasibility Project (LFFP) was established at LLE. It was the first privately funded effort involving industry–university–government collaboration to investigate laser fusion as an energy source for the future. The LFFP consortium together invested \$35 million to the development of inertial fusion as an energy source. This represented the largest single contribution made to this field outside the federal government.

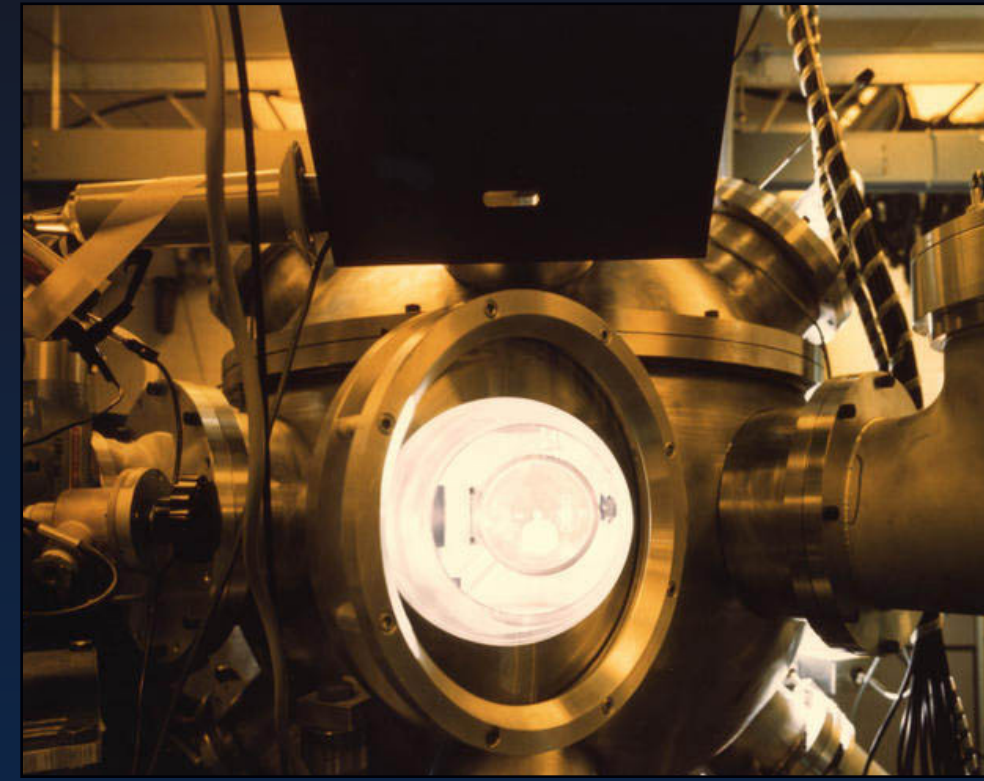
LFFP was among the nation’s first privately funded research efforts in laser fusion. Exxon and General Electric were the first two major industrial sponsors of LFFP and were joined later by Northeast Utilities, New York State Energy Research and Development Authority (NYSERDA), Empire State Electric Energy Research Corporation, Southern California Edison, Standard Oil of Ohio (SOHIO), and Ontario Hydro.

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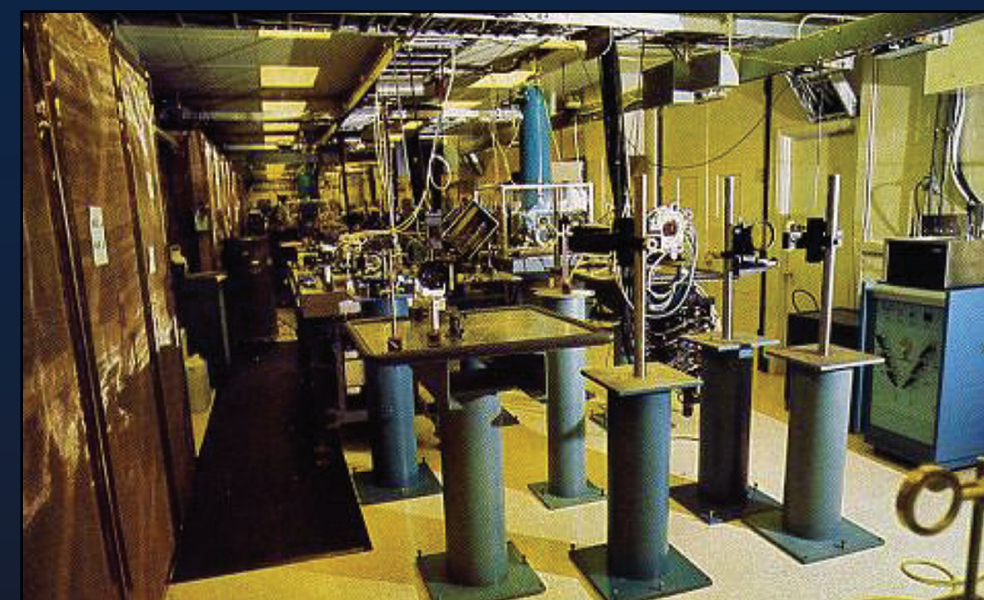
## DELTA Target Chamber



Vacuum chamber

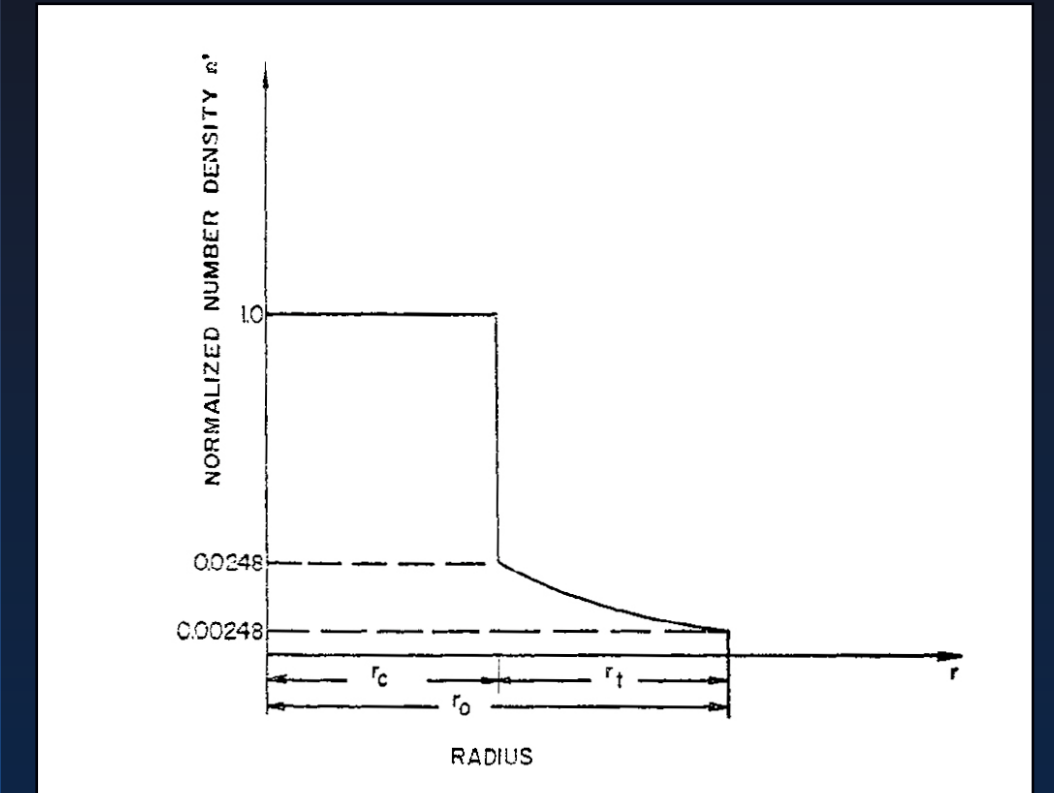
Between 1971 and 1975, the first four-beam LLE system, DELTA, was built and operated. DELTA was an ~1-kJ Nd:glass laser used to investigate the interaction of high-power laser radiation and plasma with particular emphasis on laser fusion.

The vacuum chamber pictured above was used for a variety of early laser–matter interaction and implosion experiments at LLE in the early to mid-70s. Some of the pioneering experiments conducted on DELTA included: cryogenic deuterium targets, early measurements of stimulated scattering in laser-produced plasmas, and compressed plasma density measurements using Stark broadening of x-ray lines.



Photograph of the DELTA laser from the 1972 LFFP brochure

## Numerical Modeling of Laser-Produced Plasmas



Initial normalized density profile as a function of radius

In an article titled “Numerical Modeling of Laser Produced Plasmas,” Edward Goldman, who headed the LLE theory effort at that time, published results on numerical modeling in *Plasma Physics*. Theoretical calculations showed the benefits of short-wavelength laser irradiation for laser-fusion targets. There was also an interest in the use of laser fusion for the production of fissile materials by one of LLE’s major sponsors, General Electric.

A paper based on DELTA experiments by Goldman, Soures, and Lubin on the “Saturation of Stimulated Backscattered Radiation in Laser Plasmas” was published in *Physical Review Letters* (PRL) in 1973.

E. B. Goldman “Numerical Modeling of Laser Produced Plasmas: The Dynamics and Neutron Production in Dense Spherically Symmetric Plasmas,” *Plasma Phys.* **15**, 289–310 (1973).

L. M. Goldman, J. Soures, and M. J. Lubin “Saturation of Stimulated Backscattered Radiation in Laser Plasmas,” *Phys. Rev. Lett.* **31** (19), 1184–1187 (1973).

