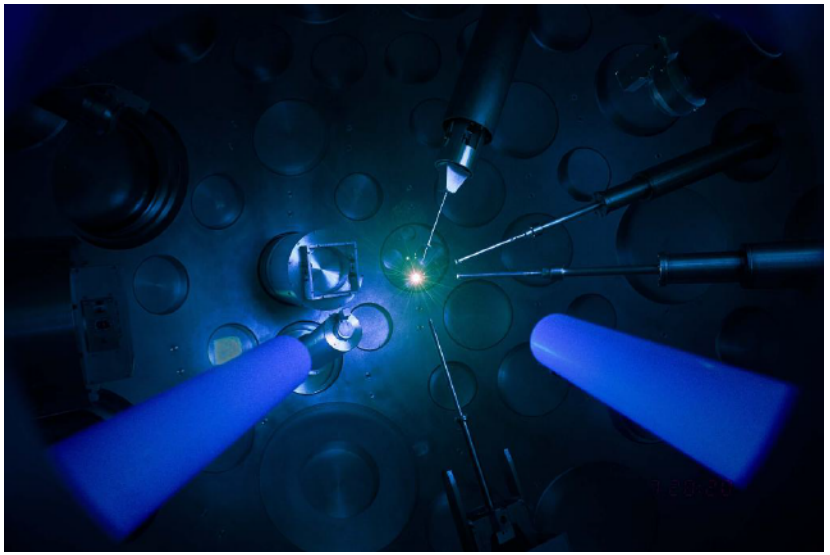
The Institute of OPTICS

Colloquium

UNIVERSITY OF ROCHESTER

The Optics of Inertial Confinement Fusion



Dr. John H. Kelly
Laboratory for Laser Energetics
University of Rochester
PhD in Optics, Rochester, 1980
Laboratory for Laser Energetics, 1980-

3:00 pm Monday, Oct 31, 2011
Sloan Auditorium, Goergen 101
Refreshments served

Optics that are unique to high-peak-power fusion lasers: liquid crystal optics, and large optics (~40cm aperture) deformable mirrors, gratings, plasma-electrode-Pöckels cells, off-axis parabolas, gain media, etc., will be described, and the evolution of the NIF and Omega laser systems will be reviewed.

HAJIM
SCHOOL OF ENGINEERING
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The Optics of Inertial Confinement Fusion

Dr. John H. Kelly
and the entire staff of the Laboratory for Laser Energetics
University of Rochester

Abstract: *Optics* are all-pervasive in inertial-confinement fusion. From the very concept itself of illuminating a small deuterium-tritium capsule, through the high-energy lasers to accomplish that, to the target-interaction diagnostics used to measure what is happening on micron and nanosecond scales, Optics plays a central role.

This talk introduces the basic concept of inertial-confinement fusion. The National Ignition Facility (NIF), its FY 2012 goal and that goal's importance to the entire inertial confinement fusion program is examined. The role of the Laboratory for Laser Energetics (LLE) in furthering the National program's objectives is then described. Particular attention is paid to the manufacture and coating of optics for the NIF and for the two laser systems at LLE, Omega and Omega EP. The evolution in laser system architecture over the last 25 years will be examined. Optics that are unique to high-peak-power fusion lasers, e.g. liquid crystal optics, and large optics (~40cm aperture) deformable mirrors, gratings, plasma-electrode-Pöckels cells, off-axis parabolas, gain media, etc., will be described. Finally, time permitting, some of the more speculative lasers being proposed for fusion-power plants will be presented.

Biography: John H. Kelly received his Ph.D. from the Institute of Optics in 1980 under the supervision of Dr. K. J. Teegarden and joined the staff of the Laboratory for Laser Energetics the same year. He subsequently worked on solid-state laser amplifier development for high-peak-power and high-average-power lasers for many years. More recently he led the teams that designed, built, and activated the South Bay Beamline prototype of the Omega 60 Upgrade, the team that activated the Omega 60-beam laser, and the team that activated the Omega EP PW-class laser. Dr. Kelly is now a line scientist for operation of the Omega Laser.