



NIKE KrF LASER - Target Facility

PLASMA PHYSICS DIVISION

FACILITIES

- High energy Krypton-Fluorine laser (3 kJ)
- Deep ultraviolet operation (248 nm)
- High spatial uniformity in focal profile (0.2%)
- Temporal pulse shaping (0.4-12 ns)
- Focal zoom capabilities (0.3-1.3 mm spots)
- Laser bandwidth up to 3 THz
- High resolution x-ray imaging systems
- X-ray and optical streak cameras
- 1D and 2D VISAR
- Probe lasers for optical diagnostics
- Spectrometry for wide range of photon energies (1 eV-100 keV)
- Neutron detectors

ABOUT

World's highest energy krypton fluoride laser, the Nike laser provides up to 3 kJ of deep ultraviolet laser energy on targets at intensities up to 2×10^{15} W/cm². It has the shortest wavelength ($\lambda = 248$ nm) and is capable of producing the most uniform target illumination ($\delta I/I < 0.2\%$) of all high-energy laser facilities. These features create highly uniform ablation pressures on target that allow well-controlled experiments at pressures up to 20 million atmospheres.

The facility studies physics and technology issues of inertial confinement fusion. Primary areas of research include hydrodynamic instabilities of laser-accelerated targets, characterization of the response of materials to extreme pressures, generation of laser-plasma instabilities, and emission of x-rays from laser-heated targets.

The facility's high flexibility accommodates a wide variety of experiment configurations. Twelve of the facility's 56 laser beams are used to generate diagnostic x-rays that radiograph the primary laser-illuminated targets. These data serve to record the spatio-temporal evolution of the target throughout each laser shot and have been extensively used to test simulation codes developed at NRL.

Although this work is supported by the Department of Energy's program for science-based stockpile stewardship, the facility has been used for a variety of research topics including modeling plasma phenomena in the atmosphere, hydrodynamics of instabilities relevant to astrophysics, and detection of underground nuclear testing.

