

## THE ELECTRA LASER PROGRAM

The objective of the Electra Program at the Naval Research Laboratory (NRL) is to develop a repetitively pulsed, high energy, Krypton Fluoride (KrF) Laser for Inertial Fusion Energy (IFE). The rationale for doing this is that recent advances show direct drive with a KrF laser is a promising approach for fusion energy: The Nike laser at NRL has demonstrated that an electron beam pumped KrF laser can produce a multi-kilojoule, spatially uniform, laser beam [1]; advanced target designs suggest target gains in excess of 100 using a laser with the established beam uniformity of KrF [2,3]; and the Sombrero Power Plant study showed a KrF based system would lead to an attractive power plant [4]. The Electra laser, shown in the photo below, uses the same architecture as Nike, i.e. double sided electron beam pumping of the laser gas, but will run at 5 Hz, and will develop technologies that can meet the IFE requirements for efficiency, durability and cost. The laser will have an output of 700 J. This size is small enough to be manageable, but large enough to be scalable to a 50-150 kJ laser beam line needed for a laser fusion power plant. Electra is being built by integrating each component as it is developed. These include the electron beam emitter, the pressure foil structure to isolate the laser gas from the electron beam diode, a recirculator to cool and quiet the laser gas, and long life optical windows. Developing these will require research in generation and propagation of large area electron beams, gas kinetics, laser transport, solid state pulsed power, materials chemistry, laser physics and advanced optics. This work will be discussed in papers VO1.002, VO1.003, VO1.004 and VO1.005.



The Electra Laser Main Amplifier. The two pulsed power systems, shown on either side of the black magnet coils, will produce two opposing 500 keV, 100 kA, 100 nsec, 30 cm x 100 cm electron beams. The pulsed power can operated continuously for 100,000 shots at 5 Hz. This five hour run is more than adequate to start developing the laser components.

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For further information, contact John Sethian (202) 767-2705; [sethian@this.nrl.navy.mil](mailto:sethian@this.nrl.navy.mil)

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