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Development of a durable KrF laser for Inertial Fusion Energy¹ FRANK HEGELER, MOSHE FRIEDMAN, Commonwealth Technologies, Inc., MATTHEW WOLFORD, MATTHEW MYERS, JOHN SETHIAN, JOHN GIU-LIANI, Naval Research Laboratory, Plasma Physics Division, PATRICK BURNS, Research Support Instruments, REGINALD JAYNES, Science Applications International Corp., DENNIS SADOWSKI, KEVIN SCHOONOVER, SAID ABDEL-KHALIK, Georgia Institute of Technology — The krypton fluoride (KrF) laser facility, Electra, is a repetitively pulsed, electron beam pumped laser system at the Naval Research Laboratory, which is focused on the physics and requirements of a durable driver for Inertial Fusion Energy (IFE). The main laser amplifier has achieved repetitive operation of 1 to 5 Hz, continuous runs of 20,000 shots at 2.5 Hz as an oscillator, and a laser output of 300 to 700 J depending on the electron diode configuration. This presentation will provide an overview of the Electra Laser Facility and discuss recent and future modifications that should significantly improve the robustness of the laser. These include: (i) scalloped hibachi that will lower the mechanical stress of the diode vacuum/laser gas interface foil; (ii) testing of an all solid state pulsed power system; (iii) improvement of the 500 kV, 110 kA, 100 ns cathodes; and (iv) forced convective jet cooling of the foil that does not degrade the laser focal profile. Based on Electra advances with the above key components a wall plug efficiency of 6 to 7% is projected for IFE systems.

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