SUPRATHERMAL ELECTRON GENERATION IN FAST IGNITION RELEVANT SHORT-PULSE LASER PLASMA INTERACTIONS

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The characteristics of relativistic electrons generated in short-pulse laser plasma interactions are important for evaluating the success of the fast ignition concept. The important parameters include the spectrum, laser to electron conversion efficiency, and divergence angle of the electrons at the interface. Simulation results using 3-D particle-in-cell (PIC) techniques in fast ignition geometries show coupling >60% into hot electrons with a characteristic slope temperature slightly greater than the ponderomotive potential of the laser. Electrons were divergent into a wide 3-4 sr cone angle.

A recently developed hybrid code[1] that couples the 3-D PIC with a hybrid-MHD model for high density transport has allowed for integrated simulations of realistic experimental conditions. These simulations are compared to recent experiments on the Titan laser at Lawrence Livermore (150 J, 0.7 ps, $I=10^{20}$ W/cm2) that use Bremsstrahlung measurements and fluorescence imaging techniques to infer the spectrum and conversion efficiency. Planar multilayer foils and cone-wires were used as surrogates for fast ignition targets. Results from these experiments will be shown and compared to simulation models.

[1] A.J. Kemp, B.I. Cohen and L. Divol. Accepted for publication in Physics of Plasmas.

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