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Hot electron generation and energy coupling in planar experiments with shock ignition high intensity lasers[1] M.S. WEI, C. KRAULAND, N. ALEXANDER, General Atomics, S. ZHANG, J. PEEBLES, F.N. BEG, UCSD, W. THEOBALD, E. BORWICK, C. REN, R. YAN, D. HABERBERGER, R. BETTI, E.M. CAMPBELL, LLE, Univ. Rochester — Hot electrons produced in nonlinear laser plasma interactions are critical issues for shock ignition (SI) laser fusion. We conducted planar target experiments to characterize hot electron and energy coupling using the high energy OMEGA EP laser system at SI high intensities. Targets were multilayered foils consisting of an ablator (either plastic or lithium) and a Cu layer to facilitate hot electron detection via fluorescence and bremsstrahlung measurements. The target was first irradiated by multi-kJ, low-intensity UV beams to produce a SI-relevant mm-scale hot ($\sim$1 keV) preformed plasma. The main interaction pulse, either a kJ 1-ns UV pulse with intensity $\sim$1.6x10^{16} Wcm^{-2} or a kJ 0.1-ns IR pulse with intensity up to $\sim$2x10^{17} Wcm^{-2}was injected at varied timing delays. The high intensity IR beam was found to strongly interact with underdense plasmas breaking into many filaments near the quarter critical density region followed by propagation of those filaments to critical density, producing hot electrons with T_{hot} $\sim$70 keV in a well-contained beam. While the high intensity UV beam showed poor energy coupling. Details of the experiments and the complementary PIC modeling results will be presented.

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