Abstract Submitted
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Measurement of hot electron preheat during capsule implosions on the NIF with hard x-ray imaging[1] TILO DOEPPNER, E.L. DEWALD, L. DIVOL, S.H. GLENZER, N. IZUMI, C.A. THOMAS, G. LACAILLE, O.L. LANDEN, J.M. MCNANEY, N.B. MEEZAN, J.D. SALMONSON, Lawrence Livermore National Laboratory, J.L. KLINE, Los Alamos National Laboratory — Hot electrons of energies between 170 and 250 keV can penetrate the capsule ablator and preheat the DT fuel in indirect-drive ICF implosions, reducing the final compressed fuel area density and ignition margin. We have fielded a high aspect ratio pinhole imager with 400 μm resolution, 0.9x magnification viewing through a Laser Entrance Hole to measure the $50-125$ keV hard x-ray Bremsstrahlung emission from hot electrons slowing in the capsule. The absolutely calibrated, time-integrating image plate detector allows inferring an upper limit of 150 J in hot electrons with $E > 170$ keV impinging on the fusion capsule in a 1.3 MJ experiment with a 20 ns laser drive. Time-resolved, spatially integrated hard x-ray measurements confirm that these hot electrons are generated close to the end of the laser pulse. Based on measured hot-electron energy and time history, simulations predict a degradation of implosion performance by $< 10\%$ due to hot electron preheat.

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Tilo Doeppner
Lawrence Livermore National Laboratory

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