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Hot-Electron and Strong-Shock Generation at Shock-Ignition–Relevant Laser Intensities W. THEOBALD, R. BETTI, R. NORA, W. SEKA, M. LAFON, D.T. MICHEL, C. STOECKL, Fusion Science Center and Laboratory for Laser Energetics, U. of Rochester, A. CASNER, CEA, J. PEEBLES, F.N. BEG, U. of California, San Diego, X. RIBEYRE, A. VALLET, CELIA, M.S. WEI, General Atomics — The effect of hot electrons on the formation of spherical shocks in solid targets was studied in direct-illumination experiments on OMEGA at incident laser intensities of up to 6×10^{15} W/cm^2. The experiments investigated the interaction physics in various ablator materials (Be, C, CH, and SiO_2) and under various beam-focusing conditions, which are relevant to developing a shock-ignition target design for the National Ignition Facility. The hot-electron production and the temperature of the distribution varied with the focal spot and beam overlap with values between 40 to 90 keV and instantaneous conversion efficiencies of laser power into hot-electron power of up to $\sim 15\%$. A significant increase in hot-electron population was observed with CH ablators that was correlated with higher shock strength, exceeding 400 Mbar in the ablation layer and reaching Gbars upon convergence in the center of the spherical target. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944 and DE-FC02-04ER54789 (Fusion Science Center).

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