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Understanding Laser-Imprint Effects on Plastic-Target Implosions on OMEGA with New Physics Models S.X. HU, D.T. MICHEL, A.K. DAVIS, R. BETTI, P.B. RADHA, E.M. CAMPBELL, D.H. FROULA, C. STOECKL, Laboratory for Laser Energetics, U. of Rochester — Using the state-of-the-art physics models (nonlocal thermal transport, cross-beam energy transfer, and first-principles equation of state) recently implemented in our two-dimensional hydrocode *DRACO*, we have performed a systematic study of laser-imprint effects on plastic-target implosions on OMEGA by both simulations and experiments. Through varying the laser picket intensity, the imploding shells were set at different adiabats ranging from $\alpha = 2$ to $\alpha = 6$. As the shell adiabat α decreases, we observed: (1) the measured shell thickness at the hot spot emission becomes larger than the uniform prediction; (2) the hot-spot core emits and neutron burn starts earlier than the corresponding 1-D prediction; and (3) the measured neutron yields are significantly reduced from their 1-D designs. Most of these experimental observations are well reproduced by our *DRACO* simulations with laser imprints. These studies clearly identify that laser imprint is the major cause for target performance degradation of OMEGA implosions of $\alpha \leq 3$. Mitigating laser imprints must be an essential effort to improve low-α target performance in direct-drive inertial confinement fusion ignition attempts. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944.

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