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A Pathway to Ignition-Hydrodynamic-Equivalent Implosions in OMEGA Direct Drive Through the Reduction of Cross-Beam Energy Transfer D.H. FROULA, G. FIKSEL, V.N. GONCHAROV, S.X. HU, H. HUANG, I.V. IGUMENSHCHEV, T.J. KESSLER, D.D. MEYERHOFER, D.T. MICHEL, T.C. SANGSTER, A. SHVYDKY, J.D. ZUEGEL, Laboratory for Laser Energetics, U. of Rochester — Cross-beam energy transfer (CBET) in OMEGA cryogenic ignition-hydrodynamic-equivalent designs reduces the ablation pressure from 230 Mbar to 140 Mbar. To maintain an ignition-relevant velocity of 3.7×10^7 cm/s, areal density of 300 mg/cm^2, and hot-spot pressure greater than 100 Gbar on OMEGA, this reduction in ablation pressure requires that the mass of the shell and the adiabat be reduced by 75% and 50%, respectively. Measurements indicate these implosions are hydrodynamically unstable. To improve the stability, the thickness of the shell (target mass) and the adiabat can be increased while maintaining relevant conditions when reducing CBET. To mitigate CBET, several methods to reduce the diameter of the laser beams while maintaining acceptable drive uniformity are being investigated for OMEGA: (1) direct reduction of the laser spots over the entire laser pulse and (2) reduction of the diameter of the laser spots after a sufficient conduction zone has been generated. This two-state zooming is predicted to maintain low-mode uniformity while mitigating CBET. 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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