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High-Areal-Density Cryogenic D_2 Implosions on OMEGA T.C. SANGSTER, V.N. GONCHAROV, P.B. RADHA, V.A. SMALYUK, R. BETTI, R.S. CRAXTON, J.A. DELETTREZ, D.H. EDGELL, V.YU. GLEBOV, D.R. HARDING, J.P. KNAUER, F.J. MARSHALL, R.L. MCCRORY, P.W. MCKENTY, D.D. MEYERHOFER, S.P. REGAN, W. SEKA, S. SKUPSKY, J.M. SOURES, C. STOECKL, B. YAAKOBI, Laboratory for Laser Energetics, U. of Rochester, J.A. FRENJE, R.D. PETRASSO, PSFC, MIT, D. SHVARTS, NRCN — The validation of direct-drive ignition target designs on OMEGA requires the demonstration of both 1-D burn and 1-D areal density (ρR) up to the point of mix truncation with cryogenic fuel on an adiabat of $\leq$4 and a peak implosion velocity of $\sim$3.5 $\times$ 10^7 cm/s. We report here on the demonstration of 1-D ρR in a series of cryogenic D_2 implosions with a fuel adiabat of $\sim$2. The targets consisted of a thick CD ablator (10-μm wall) and a fuel layer of $\sim$95 μm of D_2. The inner-surface roughness of the ice was $\sim$2-μm rms. With an 18-kJ decaying shock drive pulse with a peak intensity of 5 $\times$ 10^{14} W/cm^2, the $\langle \rho R \rangle$ was 202 mg/cm^2 (95% of 1-D). The thick CD ablator mitigates hot electron preheat from the two-plasmon-decay instability in hydrogen—by design, no hydrogen reaches the quarter-critical density surface. Future experiments will focus on areal density performance at higher implosion velocities. This work was supported by the U.S. DOE Office of ICF under Cooperative Agreement DE-FC52-92SF19460.

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