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Cryogenic Implosion Performance Using High-Purity Deuterium–Tritium Fuel T.C. SANGSTER, V.N. GONCHAROV, P.B. RADHA, R. EARLEY, R. EPSTEIN, C.J. FORREST, D.H. FROULA, V.YU. GLEBOV, S.X. HU, I.V. IGUMENSHCHEV, F.J. MARSHALL, P.W. MCKENTY, W.T. SHMAYDA, M.J. SHOUP III, D.T. MICHEL, C. STOECKL, W. SEKA, Laboratory for Laser Energetics, U. of Rochester, J.A. FRENJE, M. GATU JOHNSON, PSFC, MIT — Demonstrating hydrodynamic equivalence between symmetric implosions on OMEGA and National Ignition Facility ignition designs will require a number of facility enhancements that include dynamic bandwidth reduction, a set of higher-order super-Gaussian phase plates, high-spatial-resolution gated-core imaging, high-bandwidth neutron burnwidth measurements, improved power balance, and contaminant-free deuterium–tritium (DT) fuel. The historic DT fuel supply was contaminated with $\sim 6\,\text{atm}\%$ of ^{1}H, leading to significant fractionation of the fuel during the layering process (the triple points of H:D and H:T are significantly colder than DD, DT, and TT). The fractionation leads to a drop in the potential yield because the D and T number densities are lower in the void than they would be with a pure-DT mixture). An isotope separation system has been developed to remove the ^{1}H from the DT fuel supply. This talk will discuss the first results with the purified fuel, conclusions from recent implosions to test cross-beam energy transfer mitigation, and the status of the remaining facility enhancements. 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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