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Three-Dimensional Hydrodynamic Modeling of OMEGA Direct-Drive Cryogenic Implosions with the Highest Fusion Yield I. V. IGUMENSHCHEV, R. BETTI, E. M. CAMPBELL, D. CAO, C. J. FORREST, V. N. GONCHAROV, V. GOPALASWAMY, J. P. KNAUER, O. M. MANNION, D. PATEL, S. P. REGAN, R. SHAH, A. SHVYDKY, Laboratory for Laser Energetics — A recent optimization experimental campaign on the OMEGA laser resulted in the highest fusion yield (~$1.6 10^{14}$ neutrons) so far while achieving an areal density of ~160 mg/cm^2 in cryogenic DT direct-drive implosions. One-dimensional hydrodynamic simulations overpredict the measured performance of these implosions, suggesting that various low- and high-mode asymmetries in imploding targets can be important. The effects of these asymmetries were studied using 3-D hydrodynamic simulations with the code *ASTER*. Simulations assumed the following sources of asymmetries with measured or estimated magnitudes: laser-power imbalance, laser beam mispointing and mistiming, laser imprint, target offset, and target defects. Simulations suggest that an integral effect of these sources can explain the difference between the measured and predicted in 1-D performances of OMEGA implosions. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0003856.

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