Two-Dimensional Investigation of Neutron-Yield Performance in Direct-Drive, Low-Adiabat D₂ Implosions on OMEGA


Neutron yields of direct-drive, low-adiabat ($\alpha \approx 2$ to $3$) cryogenic D₂ target implosions on OMEGA have been systematically investigated using 2-D, radiation hydrodynamics DRACO simulations. We have focused on the neutron-yield degradation caused by initial target offset, ice-layer roughness, and low-mode laser-irradiation nonuniformities. Simulations provide a reasonably good guide to understanding experimental neutron-yield degradation for thin-shell (5 $\mu$m) cryogenic implosions. The neutron yields are found to be sensitive to the phase between the target offset and the ice-layer roughness. For 10-$\mu$m-thick-shell implosions, the experimental yield is generally lower than what low-mode DRACO simulations predict, for which high-mode studies will also be presented. This work was supported by U.S. Department of Energy Office of Inertial Confinement Fusion under Cooperative Agreement No. DE-FC52-08NA28302.

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