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Effects of Hohlraum Plasma Filling on Implosion Symmetry¹ N.B. MEEZAN, D.A. CALLAHAN, O.S. JONES, R.A. LON, H.F. ROBEY, D.S. CLARK, J.L. MILOVICH, R.P.J. TOWN, S.N. DIXIT, T. DOEPPNER, J.E. RALPH, M.B. SCHNEIDER, R.H.H. SCOTT, P.A. MICHEL, J.D. MOODY, A.J. MACKINNON, D.H. KALANTAR, S.H. GLENZER, L.J. SUTER, B.J. MAC-GOWAN, Lawrence Livermore National Laboratory, J.L. KLINE, G.A. KYRALA, Los Alamos National Laboratory — We describe a study with the design code HY-DRA to understand how hohlraum plasma filling impacts symmetry control. The 2010 National Ignition Facility (NIF) symmetry campaign demonstrated symmetry tuning via cross-beam transfer in ignition-scale hohlraums driven by 1.3 MJ of laser energy. Following the subsequent NIF shock-tuning campaign, the implosion symmetry changed from prolate to oblate $(a_2/a_0 \approx -50\%)$. Optical and x-ray data suggested higher hohlraum plasma density than in previous experiments, impairing the inner laser beam propagation. Design calculations with HYDRA were consistent with this finding; however, they also predicted an increase in cross-beam transfer that would counteract the impaired propagation, resulting in round implosions. We can empirically restore symmetry control by changing the hohlraum geometry, fielding conditions, or laser pulse.

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Nathan Meezan Lawrence Livermore National Laboratory

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