Abstract Submitted
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Studies of ion kinetic effects in OMEGA shock-driven implosions using fusion burn imaging M.J. ROSENBERG, F.H. SEGUIN, H.G. RINDERKNECHT, H. SIO, A.B. ZYLSTRA, M. GATU JOHNSON, J.A. FRENJE, C.K. LI, R.D. PETRASSO, MIT, P.A. AMENDT, S.C. WILKS, G. ZIMMERMAN, LLNL, N.M. HOFFMAN, G. KAGAN, K. MOLVIG, LANL, V. YU. GLEBOV, C. STOECKL, F.J. MARSHALL, W. SEKA, J.A. DELETTREZ, T.C. SANGSTER, R. BETTI, D.D. MEYERHOFER, LLE, S. ATZENI, Universita Di Roma "La Sapienza", A. NIKROO, GA — Ion kinetic effects have been inferred in a series of shock-driven implosions at OMEGA from an increasing yield discrepancy between observations and hydrodynamic simulations as the ion-ion mean free path increases.[1] To more precisely identify the nature and impact of ion kinetic effects, spatial burn profile measurements of DD and D3He reactions in these D3He-filled shock-driven implosions are presented and contrasted to both purely hydrodynamic models and models that include ion kinetic effects. It is shown that in implosions where the ion mean free path is equal to or greater than the size of the fuel region, purely hydrodynamic models fail to capture the observed burn profiles, while a model that includes ion diffusion is able to recover the observed burn profile shape. These results further elucidate the ion kinetic mechanisms that are present under long mean-free-path conditions after shock convergence in both shock-driven and ablatively-driven implosions. This work was supported in part by the U.S. DOE, NLUF, LLE, and LLNL.

[1]Rosenberg et al. Phys. Rev. Lett. 112, 185001 (2014)

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