Abstract Submitted
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On the importance of minimizing "coast-time" in x-ray driven inertial confinement fusion implosions[1] O.A. HURRICANE, D.A. CALLAHAN, D.T. CASEY, E.L. DEWALD, T.R. DITTRICH, T. DOEPPNER, D.E. HINKEL, L.F. BERZAK HOPKINS, A. KRITCHER, O. LANDEN, S. LE PAPE, T. MA, A. MACPHEE, A. PAK, H.-S. PARK, P.K. PATEL, J. RALPH, J.D. SALMONSON, P.T. SPRINGER, Lawrence Livermore National Laboratory — By the time an ICF implosion has converged a factor of 20, its surface area has shrunk 400x, making it an inefficient x-ray energy absorber. So traditionally, ICF implosions are designed to have the laser drive shut off at a time, t_{off}, well before bang-time, t_{BT}, for a coast-time of $t_{coast} = t_{BT} - t_{off}$. Contrary to expectations, high-foot implosions on NIF show a strong dependence of many key ICF quantities on reduced coast-time (by extending the duration of laser peak power at constant power), most notably stagnation pressure. Herein we show that the ablation pressure, p_{abl}, which drives high-foot implosions, is essentially triangular in temporal shape, and that reducing t_{coast} boosts p_{abl} by ˜2x. Analytic theory demonstrates that reducing coast-time can lead to a ˜15% higher implosion velocity, which together with the increased ablation pressure, can boost the stagnation pressure by ˜2x as compared to a coasting version of the same implosion. Four dimensionless parameters are identified. We find that reducing coast-time to as little as 500 ps still provides some benefit.

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