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Low convergence path to fusion II: An integrated NIF design. MARK J. SCHMITT, K. MOLVIG, G. H. MCCALL, Los Alamos Natl Lab, D. H. EDGEL, J. E. MYATT, R. BETTI, D.H. FROULA, E. M. CAMPBELL, Laboratory for Laser Energetics, Univ. of Rochester — We report on the Revolver design methodology for achieving ignition using large diameter (6mm) Be shells to efficiently (~10%) convert laser energy from a short, ~5 ns, 320TW laser pulse on the National Ignition Facility (NIF) into a dynamic pressure source for inertial confinement fusion. It is shown that this source can be used to kinetically drive two nested internal shells to achieve ignition conditions inside a central liquid DT core. Using principles recently elucidated [K. Molvig, et. al, Phys Rev Lett 116 255003, 2016], we formulate a robust optimization of a triple shell target that mitigates long-standing issues with conventional ignition schemes including drive non-uniformities, laser plasma instabilities (including the hot electrons they produce), non-local heat conduction and deceleration Rayleigh-Taylor (RT) mix. Rad-hydro simulations predict ignition initiating at 2.5keV with 90% of the maximum inner shell velocity remaining (before deceleration RT can cause significant mix in the compressed DT fuel). Simulations in 2D show that the short pulse design produces a spatially uniform kinetic drive that is tolerant to random 5% variations in laser cone power. Moreover, it will be shown that intra-shell parameters can be adjusted to mitigate convergence growth of capsule spatial non-uniformities. This research supported by the US DOE/NNSA, performed in part at LANL, operated by LANS LLC under contract DE-AC52-06NA25396.

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