Abstract Submitted
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Shock-Augmented Ignition[1] ROBBIE SCOTT, CLF, STFC Rutherford Appleton Laboratory, UK, DUNCAN BARLOW, University of Warwick, UK, LUCA ANTONELLI, MATTHEW KHAN, ARUN NUTTER, University of York, UK, KEVIN GLIZE, CLF, STFC Rutherford Appleton Laboratory, UK, TONY ARBER, University of Warwick, UK, NIGEL WOOLSEY, University of York, UK —
This work describes a new pulse-shaping methodology which, according to radiation hydrodynamic simulations, enables the benefits of Shock Ignition but without the requirement for high peak laser intensity and/or power. If this can be realized, this work indicates that Laser Direct Drive implosions could be fielded on existing facilities which would achieve gains of ˜85 with a peak implosion velocity of $<$330km/s. Shock Ignition appears an attractive route to achieving ignition and high gain via laser fusion. The strong shock enables ignition at implosion velocities below the self-ignition threshold, limiting growth of the ablative Rayleigh-Taylor instability. However, it does have potential disadvantages, caused by the need for high peak intensity to drive the strong shock. This work details a novel pulse shape which enables the creation of a very strong shock ($>$1 Gbar), thereby enabling the benefits of Shock Ignition, but with a peak intensity of ˜1.3×10^{15}W/cm^2. The reduced intensity may reduce deleterious parametric instabilities, while the reduced peak power requirements, would enable a large capsule (radius 1720m) to be fielded on NIF while remaining within the current 1.8MJ, 500TW limitations.

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