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Publication Date

2010-01-08

SIMULATIONS OF TARGETS FOR WARM DENSE MATTER AND INERTIAL FUSION ENERGY APPLICATIONS ON NDCX II*

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The Neutralized Drift Compression Experiment II (NDCX II) is an induction accelerator now being constructed at Lawrence Berkeley National Laboratory. The baseline design calls for a 3 MeV, 30 A Li^+ ion beam, delivered in a bunch with characteristic pulse duration of 1 ns, and transverse dimension of order 1 mm. The purpose of NDCX II is to carry out experimental studies of material in the warm dense matter regime, and ion beam/hydrodynamic coupling experiments relevant to heavy ion based inertial fusion energy. In preparation for this new machine, we have carried out hydrodynamic simulations of ion-beam-heated, metallic targets, connecting observable quantities with the simulated density, temperature, and velocity, and have shown the sensitivity to these observables on EOS. Simulated target geometries include spherical and cylindrical bubbles (to create enhanced regions of higher pressure and temperature), in addition to planar solid and planar foam targets. Pulse formats include single pulses of fixed ion energy, and double pulses with varied energy (or single pulses with ion energy that changes over the pulse) to investigate ion coupling efficiency. Planar coupling efficiencies are compared with simulations of ion driven direct drive capsules that have shown high coupling efficiencies at low total pulse energy (< 1 MJ).

*Work performed under the auspices of the U.S. Department of Energy under contract DE-AC52-07NA27344 at LLNL, and University of California contract DE-AC02-05CH11231 at LBNL.