Abstract Submitted
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Warm Dense Matter Experiments Driven by Ion Beams[1] F.M. BIENIOSEK, E. HENESTROZA, J.Y. JUNG, M.A. LEITNER, S. LIDIA, B.G. LOGAN, R.M. MORE, P.A. NI, P.K. ROY, P.A. SEIDL, W.L. WALDRON, LBNL, J.J. BARNARD, A. FRIEDMAN, LLNL — Intense beams of heavy ions are capable of heating volumetric samples of matter to high energy density. We present results from warm dense matter (WDM) experiments at NDCX-I. The 0.3 MeV, 30-mA K^+ beam from the NDCX-I accelerator heats foil targets by combined longitudinal and transverse neutralized drift compression of the ion beam to a spot size ~ 1 mm, and compressed pulse length ~ 2 ns. The uncompressed beam flux is $\geq$500 kW/cm^2, and the compressed pulse flux is > 5 MW/cm^2. Both the compressed and uncompressed parts of the NDCX-I beam heat targets. Future plans include construction of the NDCX-II accelerator, which is designed to heat targets at the Bragg peak using a 3-4 MeV lithium ion beam. We have developed a target chamber and target diagnostics including a fast multi-channel optical pyrometer, optical streak camera, and high-speed gated cameras. We compare measurements of temperature, droplet formation and other target parameters with model predictions. Continued improvements in beam tuning, bunch compression, and other upgrades are expected to yield higher flux on target.

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