

Abstract Submitted
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Highly Compressed Ion Beams for Warm Dense Matter Science¹

ALEX FRIEDMAN, LLNL, for the HIF-VNL — The Heavy Ion Fusion Virtual National Laboratory is developing the intense ion beams needed to drive matter to the High Energy Density regimes required for Inertial Fusion Energy and other applications. An interim goal is a facility for Warm Dense Matter studies, wherein a target is heated volumetrically without being shocked, so that well-defined states of matter at 1 to 10 eV are generated within a diagnosable region. In the approach we are pursuing, low to medium mass ions with energies just above the Bragg peak are directed onto thin target “foils,” which may in fact be foams with mean densities 1 to 10 percent of solid. This approach complements that being pursued at GSI Darmstadt, wherein high-energy ion beams deposit a small fraction of their energy in a cylindrical target. We present the beam requirements for Warm Dense Matter experiments. We discuss neutralized drift compression and final focus experiments and modeling. We describe suitable accelerator architectures based on Drift-Tube Linac, RF, single-gap, Ionization-Front Accelerator, and Pulse-Line Ion Accelerator concepts. The last of these is being pursued experimentally. Finally, we discuss plans toward a user facility for target experiments.

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