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Magnetically accelerated foils for shock wave experiments[1]
STEPHAN NEFF, JESSICA FORD, DAVID MARTINEZ, CHRISTOPHER PLECHATY, SANDRA WRIGHT, RADU PRESURA, Nevada Terawatt Facility, University of Nevada, Reno — The interaction of shock waves with inhomogeneous media is important in many astrophysical problems, e.g. the role of shock compression in star formation. Using scaled experiments with inhomogeneous foam targets makes it possible to study relevant physics in the laboratory, to better understand the mechanisms of shock compression and to benchmark astrophysical simulation codes. Experiments with flyer-generated shock waves have been performed on the Z machine in Sandia. The Zebra accelerator at the Nevada Terawatt Facility (NTF) allows for complementary experiments with high repetition rate. First experiments on Zebra demonstrated flyer acceleration to sufficiently high velocities (around 2 km/s) and that laser shadowgraphy can image sound fronts in transparent targets. Based on this, we designed an optimized setup to improve the flyer parameters (higher speed and mass) to create shock waves in transparent media. Once x-ray backlighting with the Leopard laser at NTF is operational, we will switch to foam targets with parameters relevant for laboratory astrophysics.

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