

Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Magnetic Mirror for Exploding Wire Plasma Confinement¹ CHI-ATAI CHEN, ERIC LAVINE, JOHN GREENLY, WILLIAM POTTER, BRUCE KUSSE, Cornell University — An auto-magnetizing liner producing a mirror magnetic configuration has the potential to increase fuel density in MAGLIF experiments by reducing end losses [1]. To demonstrate the feasibility of forming a mirror trap on a pulsed power platform, we have fabricated and fired wire arrays that produce magnetic mirror fields on COBRA, a pulsed power machine with 1 MA peak current and 100 ns rise time. In initial experiments, we exploded 127 μ m diameter Al wires that are connected in parallel with twisted copper wire arrays in either mirror or cusp configuration. Generation of a mirror configuration by the copper wire array was observed with micro probe probes placed at multiple axial positions; a mirror ratio of 3.8 was measured at 0.5 MA load current. Up to twelve visible light images were obtained with a high-speed camera at 40 ns intervals and plasma was observed to follow magnetic field line in the cusp configuration. We are planning a series of experiments to measure the flow of particles that have escaped from the mirror using a retarding potential analyzer. [1] Shipley et al., *Physics of Plasmas* 25(5) (2018).

¹We would like to thank Harry Wilhelm and Todd Blanchard for their support to the experiments. Research supported by the NNSA Stewardship Sciences Academic Programs under DOE Cooperative Agreement No. DE-NA0003764.

Chiatai Chen
Cornell University

Date submitted: 29 Jun 2020

Electronic form version 1.4