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Magnetized plasma jets in experiment and simulation PETER SCHRAFEL, JOHN GREENLY, PIERRE GOURDAIN, CHARLES SEYLER, KATE BLESENER, BRUCE KUSSE, Cornell University — This research focuses on the initial ablation phase of a thing (20 micron) Al foil driven on the 1MA-in-100ns COBRA through a 5mm diameter cathode in a radial configuration. In these experiments, ablated surface plasma (ASP) on the top of the foil and a strongly collimated axial plasma jet can be observed developing midway through current-rise. Our goal is to establish the relationship between the ASP and the jet. These jets are of interest for their potential relevance to astrophysical phenomena. An independently pulsed 200μF capacitor bank with a Helmholtz coil pair allows for the imposition of a slow (150μs) and strong ($\sim$1T) axial magnetic field on the experiment. Application of this field eliminates significant azimuthal asymmetry in extreme ultraviolet emission of the ASP. This asymmetry is likely a current filamentation instability. Laser-backlit shadowgraphy and interferometry confirm that the jet-hollowing is correlated with the application of the axial magnetic field. Visible spectroscopic measurements show a doppler shift consistent with an azimuthal velocity in the ASP caused by the applied B-field. Computational simulations with the XMHD code PERSEUS qualitatively agree with the experimental results.

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