RESULTS FROM MAGNETIZED PLASMA-JET EXPERIMENTS EXECUTED AT THE TRIDENT LASER FACILITY

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The interaction of high-velocity plasma flows in a background magnetic field has applications in pulsed-power and fusion schemes, as well as astrophysical environments, such as accretion systems and stellar mass ejections into the magnetosphere. Experiments recently executed at the Trident Laser Facility at the Los Alamos National Laboratory investigated the effects of an expanding aluminum plasma flow into a uniform 4.5-Tesla magnetic field created using a solenoid designed and manufactured at the University of Michigan [1,2]. In these experiments, simultaneous interferometry (IF) and Faraday rotation (FR) images are used to diagnose both the plasma and magnetic field distributions, respectively. IF measures the path-integrated electron distribution in the plasma, whereas Faraday rotation is sensitive to both the electron density and the local magnetic field. Using these simultaneous measurements allows one to estimate an average magnetic field value along the path of the probe beam, and provides spatial resolution in the transverse direction. Preliminary results from these experiments will be shown and discussed.

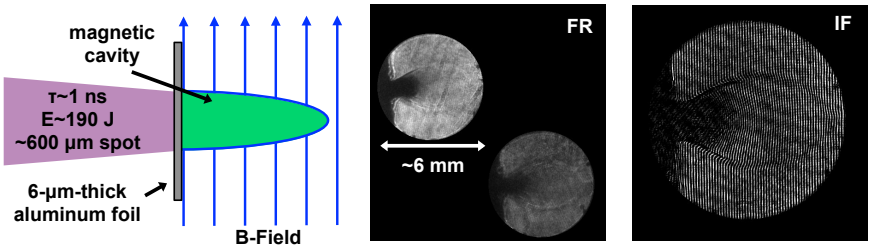

Figure 1 illustrates the experimental setup and sample data taken 30 ns after the onset of the laser drive. The two FR images are orthogonal polarizations of a single beam created using a Wollaston prism. Magnetic cavity formation is apparent in both FR and IF data.

[1] M. J.-E. Manuel et al. High Energy Density Physics, in press (2014)
[2] S. R. Klein et al. Review of Scientific Instruments, 85 (2014)

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