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Laboratory Simulations of Collisionless Shocks in Low-Density, Laser-Driven Magnetized Plasmas D.B. SCHAEFFER, C.G. CONSTANTIN, E.T. EVERSON, A.S. BONDARENKO, L.A. MORTON[1], UCLA, D. WINSKE, D.S. MONTGOMERY, K.A. FLIPPO, Los Alamos National Laboratory, S.A. GAILLARD, FZD, R.P. JOHNSON, T. SHIMADA, S.A. LETZRING, Los Alamos National Laboratory, C. NIEMANN, UCLA — We present magnetic field and electron temperature and density data from collisionless shock experiments on the Trident laser at Los Alamos National Laboratory. Experiments were performed with a graphite or CH target placed inside a static magnetic field (~ 1 kG) created by a 50 cm-diameter Helmholtz coil and ablated by two sequential laser pulses at 1053 nm. The first pulse created an ambient low-density, magnetized plasma while the second pulse created a super-Alfvénic ($M_A \sim 10$) plasma to shock the ambient plasma. A separate laser beam at 527 nm was used for Thomson scattering to characterize the ambient plasma $3 - 19$ cm radially from the target and $0.5 - 9.7$ μs after the first ablation. An array of single-axis, 1 mm b-dot probes was used to measure magnetic field compression, expulsion, and fast diffusion inside and around the diamagnetic cavity formed by the laser-plasma expansion. Complimentary magnetic field data was obtained using proton deflectrometry.

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