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Formation and Evolution of Laser-Driven, High-Mach-Number Magnetized Collisionless Shocks DEREK SCHAEFFER, Princeton University, WILL FOX, Princeton Plasma Physics Laboratory, GENNADY FIKSEL, University of Michigan, Ann Arbor, AMITAVA BHATTACHARJEE, Princeton University, Princeton Plasma Physics Laboratory, DUSTIN FROULA, DAN HABERBERGER, DAN BARNAK, SUXING HU, Laboratory for Laser Energetics, University of Rochester, KAI GERMASCHEWSKI, University of New Hampshire, Durham — Recent experiments[1] demonstrated the laboratory generation of high-Mach-number, magnetized collisionless shocks through the interaction of a laser-driven piston plasma with a pre-formed magnetized ambient plasma. We present additional results on collisionless shock formation, structure, and evolution from new experiments and numerical simulations. These include angular filter refractometry and Thomson scattering measurements of the density and temperature of the piston and ambient plasmas and their interaction, and proton radiography measurements of the dynamics of the magnetic field. Related studies on the role of collisionless coupling, magnetic field overshoots, particle heating, and the MHD jump conditions in piston-driven shocks were undertaken with the 2D particle-in-cell code PSC. The results provide improved understanding of laboratory-generated magnetized collisionless shocks and their relationship to shocks in astrophysical systems.

[1]Schaeffer *et al.*, Phys. Rev. Lett. **119**, 025001 (2017)

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