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Kinetic Simulation of Magnetized Collisionless Shock Formation for OMEGA EP Experiments YU ZHANG, Dept. of Mechanical Engineering, U. of Rochester, CHUANG REN, JONATHAN DAVIES, Laboratory for Laser Energetics, U. of Rochester — Magnetized collisionless shocks are ubiquitous in astrophysics, and are believed to be the source of nonthermal spectra inferred from numerous observations. Experimental platforms are capable of studying relevant physics in laboratories. Within the accessible parameter space of OMEGA EP, perpendicular shocks in hydrogen and neon gas are studied by 2-D particle-in-cell simulations with real ion-electron mass ratios. A modified two-stream instability was proposed to be the main dissipation mechanism for the shock formation by previous research [J. Park et al., Phys. Plasmas 19, 062904 (2012)], and is used to estimate the optimal parameter settings for the simulations and upcoming experiments. Simulation results show that the magnetized collisionless shocks can be readily formed within a few tenths of a nanosecond, or a few hundreds of microns in both hydrogen and neon gas, with a background magnetic field of 50 T, which is achievable on OMEGA EP. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0003856, Department of Energy Award Number DE-SC0020431, and the resources of NERSC. The authors thank the OSIRIS consortium for the use of OSIRIS code.

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