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Strongly Driven Magnetic Reconnection in a Magnetized High-Energy-Density Plasma G. FIKSEL, D.H. BARNAK, P.-Y. CHANG, D. HABERBERGER, S.X. HU, S. IVANCIC, P.M. NILSON, Laboratory for Laser Energetics, U. of Rochester, W. FOX, W. DENG, A. BHATTACHARJEE, PPPL, Princeton University, K. GERMASCHEWSKI, U. of New Hampshire — Magnetic reconnection in a magnetized high-energy-density plasma is characterized by measuring the dynamics of the plasma density and magnetic field between two counter-propagating and colliding plasma flows. The density and magnetic field were profiled using the 4ω angular filter refractometry and fast proton deflectometry diagnostics, respectively. The plasma flows are created by irradiating oppositely placed plastic targets with 1.8-kJ, 2-ns laser beams on the OMEGA EP Laser System. The two plumes are magnetized by an externally controlled magnetic field with an x-type null point geometry with B = 0 at the midplane and B = 8 T at the targets. The interaction region is pre-filled with a low-density background plasma. The counterflowing super-Alfvénic plasma plumes sweep up and compress the magnetic field and the background plasma into a pair of magnetized ribbons, which collide, stagnate, and reconnect at the midplane, allowing for the first detailed observation of a stretched current sheet in laser-driven reconnection experiments. The measurements are in good agreement with first-principles particle-in-cell simulations. This material is based upon work supported by the Department of Energy National Nuclear Security Administration under Award Number DE-NA0001944 and NLUF Grant DE-SC0008655.

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