Abstract Submitted
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Magnetic reconnection in highly-extended current sheets at the National Ignition Facility[1] W. FOX, PPPL, D.B. SCHAEFFER, Princeton University, M. ROSENBERG, LLE, G. FIKSEL, University of Michigan, H.S. PARK, LLNL, J. MATTEUCCI, K. LEZHNIN, A. BHATTACHARJEE, Princeton University, D. UZDENSKY, University of Colorado, C.K. LI, F. SEGUIN, MIT, S.X. HU, A. SHVYDKY, LLE, D. KALANTAR, B.A. REMINGTON, LLNL — Magnetic reconnection enables the explosive conversion of magnetic field energy to plasma kinetic energy and energized particles in plasmas ranging from laboratory to astrophysical environments. A significant issue is understanding fast reconnection in systems much larger than intrinsic plasma scales. We present results from experiments at the National Ignition Facility to study reconnection in large and highly-extended current sheets. The magnetic fields are self-generated in two neighboring plasma plumes by the Biermann battery effect. By tiling a large number of NIF beams to create each plume, highly-elongated plasmas collide, producing well-controlled boundary conditions driven by 1-D flows. This allows detailed reconstruction of experimental magnetic fields from proton radiography data, obtained using monoenergetic protons from an imploded DHe3 capsule. We report observations from reconstructed magnetic fields, including the current sheet width, and the reconnection rate. Results are compared to particle-in-cell simulations which include the Biermann-battery generation self-consistently.

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