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3-D simulations of magnetic reconnection in high-energy-density laser-produced plasmas W. FOX, A. BHATTACHARJEE, K. GERMASCHEWSKI, University of New Hampshire — Magnetic reconnection has recently been observed and studied in high-energy-density, laser-produced plasmas, in a regime characterized by extremely high magnetic fields, high plasma beta and strong, supersonic plasma inflow. These experiments are interesting both for obtaining fundamental data on reconnection, and may also be relevant for inertial fusion, as this magnetic reconnection geometry, with multiple, colliding, magnetized plasma bubbles occurs naturally inside ICF hohlraums. Previous 2-d particle-in-cell reconnection simulations, with parameters and geometry relevant to the experiments, identified key ingredients for obtaining the very fast reconnection rates, namely two-fluid reconnection mediated by collisionless effects (the Hall current and electron pressure tensor), and strong flux pile-up of the inflowing magnetic field [1]. We present results from extending the previous simulations to 3-d, and discuss 3-d effects in the experiments, including instabilities in the reconnection layer, the topological skeleton of null-null lines, and field-generation from the Biermann battery effect.

[1] W. Fox, A. Bhattacharjee, and K. Germaschewski, **PRL** 106, 215003 (2011).

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