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Modeling magnetic fields and synthetic radiographs for high energy density plasma flows in shock-shear targets YINGCHAO LU, SHENTAI LI, DANIEL BARNAK, HUI LI, KIRK FLIPPO, Los Alamos National Laboratory, EDISON LIANG, Rice University, KWYNTERO KELSO, ANDY LIAO, Los Alamos National Laboratory, CHIKANG LI, ANDREW BIRKEL, BRANDON LAHMANN, Massachusetts Institute of Technology, PETROS TZEFERACOS, DON LAMB, The University of Chicago — In HEDB experiments on the OMEGA laser, we use a shock-shear derived platform to maximize the magnetic field generation to determine the types of fields that are able to develop in such experiments. Radiation-magnetohydrodynamics simulations using FLASH code indicate that fields of tens of Tesla can be generated via Biermann battery effect due to vortices and mixing in the counter-propagating shock-induced shear layer. Monte Carlo simulations using the newly developed MPRAD code are carried out to study the interplay between the proton deflection by magnetic fields and the diffusive transport by Coulomb scattering. The synthetic proton radiography and X-ray framing camera images are in good agreement with experiment data. The magnetic fields are found to be of sufficient strength such that they may be able to change the dynamics of the small-scale evolution of vortices like those in a turbulent cascade, and affect our understanding of turbulence.

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