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Simulations of Magnetic Field Generation in Laser-Produced Blast Waves[1] D. LAMB, M. FATENEJAD, U. Chicago, G. GREGORI, U. Oxford, F. MINIATI, ETH, H.-S. PARK, B. REMINGTON, LLNL, A. RAVASIO, M. KOENIG, LULI, C.D. MURPHY, U. Oxford — Magnetic fields are ubiquitous in the Universe. The origin of these fields and process by which they are amplified are not fully understood, although amplification is thought to involve turbulence. Experiments being conducted at medium-scale laser facilities (such as the LULI laser the Janus laser) can investigate the self-generation of magnetic fields under conditions that resemble astrophysical shocks. In these experiments, two 527 nm, 1.5 ns long laser beams are focused onto a 500 μm diameter graphite rod producing an explosion and asymmetric blast wave into a Helium filled chamber. A variety of diagnostics measure the velocity, electron density, and show that a large scale magnetic field is produced. We report preliminary hydrodynamic and MHD simulations using FLASH of a simplified version of the experiment. The results provide insights into the origin and generation of the magnetic field.

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