Abstract Submitted
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Turbulent Dynamo Amplification of Magnetic Fields in Laser-Produced Plasmas: Simulations and Experiments[1] P TZEFERACOS, U Chicago, A RIGBY, A BOTT, A BELL, U Oxford, R BINGHAM, RAL, A CASNER, CEA, F CATTANEO, U Chicago, E CHURAZOV, MPIA Garching, C FOREST, U Wisconsin-Madison, J KATZ, LLE, M KOENIG, LULI, C-K LI, MIT, J MEINECKE, U Oxford, R PETRASSO, MIT, H-S PARK, B REMINGTON, J ROSS, D RYUTOV, LLNL, D RYU, UNIST, B REVILLE, Queens U Belfast, F MINIATI, ETH Zurich, A SCHEKOCHIHIN, U Oxford, D FROULA, LLE, D LAMB, U Chicago, G GREGORI, U Oxford — The universe is permeated by magnetic fields, with strengths ranging from a femtogauss in the voids between the filaments of galaxy clusters to several teragauss in black holes and neutron stars. The standard model for cosmological magnetic fields is the nonlinear amplification of seed fields via turbulent dynamo. We have conceived experiments to demonstrate and study the turbulent dynamo mechanism in the laboratory. Here, we describe the design of these experiments through large-scale 3D FLASH simulations on the Mira supercomputer at ANL, and the laser-driven experiments we conducted with the OMEGA laser at LLE. Our results indicate that turbulence is capable of rapidly amplifying seed fields to near equipartition with the turbulent fluid motions.

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