Abstract Submitted
for the DPP12 Meeting of
The American Physical Society

Grid-induced turbulence in laser driven shock wave experiments and magnetic field generation HUGO DOYLE, JENA MEINECKE, ALEXANDER SCHEKOCHIHIN, NICHOLAS HARTLEY, BRIAN REVILLE, ANTHONY BELL, GIANLUCA GREGORI, University of Oxford, ACSEL TEAM, COSMOLAB TEAM — Although magnetic fields exist throughout the Universe, their origin is still uncertain. They are seen in galaxy clusters, filaments and voids, with intensities ranging from a few μG to a fraction of a fG. Thanks to the development of high power laser facilities it is now possible to study such astrophysical systems in the laboratory using simple scaling laws. We have developed a new experimental platform where we investigate the generation and amplification of tiny seed magnetic fields through induced turbulence. This was achieved by focusing the Vulcan laser ($\sim$300 J, 527 nm, 1 ns) onto a graphite rod, with the resultant blast wave propagating through ambient argon gas at 1 mbar pressure. A broad range of diagnostics including interferometric, schlieren and spectroscopic self-emission imaging along with temporally resolved induction coils were used to characterise the magnetic field and shock evolution. Homogeneous turbulence was generated by placing a wire mesh array in the path of the shock. Comparison with current models of turbulent amplification of magnetic fields are discussed.

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Date submitted: 23 Jul 2012 Electronic form version 1.4