



June 6th 2013 – 11:00 am

CFEL Seminar Room IV, 01.111 (Bldg. 99)

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Laboratory simulation of generation and amplification of interstellar magnetic fields

X-ray observations of young and middle-aged supernova remnants reveal the presence of magnetic fields far larger than those expected from the standard theory of strong shock waves. Similarly, Faraday rotation measurements of magnetic fields in galaxies and cluster of galaxies has revealed large magnetic fields. It is thought that this behavior is the result of shocks propagating in an inhomogeneous (clumpy) interstellar medium.

Here we report on experiments investigating the generation and amplification of magnetic fields in either a homogenous or a perturbed ambient medium. We will show that the magnetic field behavior follows the vorticity in the flow, consistent with theoretical and numerical investigations using magneto- hydrodynamics simulations. Since the synchrotron emissivity in highly turbulent astrophysical environments depends on the volume averaged magnetic energy density, a full understanding of such shock induced turbulence is required for accurate modeling of non-thermal astrophysical sources.

