

Formation of Inhomogeneous Density Structures in Laser Produced Plasmas

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Density inhomogeneity for a test bed of magnetic field amplification in supernova remnants [1, 2] was investigated in laser produced plasmas. In order to model the density variations more than an order of magnitude, we performed two types of experiments using a high-power laser system: spatial separation of laser focal spots and target fabrication to produce inhomogeneous density field. Irradiating a CH-plane target with four laser beams with off-sets of the focal spots, we produced bumpy structure of electron density. On the other hand, making thin slits on a CH-plane target, density and velocity inhomogeneities were produced by irradiating the slit target with the laser beams. In both methods the density variations were very large, more than orders of magnitude, and can be used for the magnetic field amplification by inducing shock waves and an external magnetic field.

References

- [1] Y. Uchiyama et al., Extremely fast acceleration of cosmic rays in a supernova remnant, *Nature*, 449, 576-578, 2007
- [2] T. Inoue, R. Yamazaki, S. I., Inutsuka, Turbulence and Magnetic Field Amplification in Supernova Remnants: Interactions Between a Strong Shock Wave and Multiphase Interstellar Medium, *Astrophysical Journal*, 695, 825-833, 2009