

Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Small-scale Dynamo in the Intra-cluster Medium of Galaxy Clusters¹ HAO XU, HUI LI, Los Alamos National Lab — Radio observations suggest that magnetic fields of a few micro Gauss permeating the Intra-cluster medium (ICM) of galaxy clusters. Some observations and numerical simulations also suggest that the magnetized ICM is in turbulent state. The origin and evolution of the ICM magnetic fields are still not well understood, as well as the properties of the ICM MHD turbulence. Using adaptive mesh refinement (AMR) cosmological ideal magnetohydrodynamic (MHD) simulations, we study the magnetic field evolution and the MHD turbulence during the formation of galaxy clusters. We show that the cluster magnetic fields can be amplified by the turbulence through the small-scale dynamo process to the observation level. The weakly compressible ICM MHD turbulence is excited and maintained by the continuous mergers and accretion during the course of cluster formation. We will discuss the properties of magnetic fields and the MHD turbulence, as well as their relations to the operation of small-scale dynamo. The comparisons of simulated results with radio observations will also be presented.

¹This work is supported by the LDRD and IGPP programs at LANL and by DOE/Office of Fusion Energy Science.

Hao Xu
Los Alamos National Lab

Date submitted: 22 Jul 2011

Electronic form version 1.4