

Abstract Submitted
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Magnetic Fields and Turbulence in the Intra-cluster Medium of Galaxy Clusters HUI LI, HAO XU, WEI LIU, Los Alamos National Lab — Recent observations have revealed that the intra-cluster medium (ICM) of galaxy clusters could be significantly magnetized. Observations further revealed that magnetic fields in the ICM have large amount of fluxes, yet appearing to have a power-law spectrum. It is often suggested that such magnetic fields could be generated via a turbulent dynamo. Here, we study a different scenario where significant magnetic fields are produced by supermassive black holes (SMBHs) in the centers of massive galaxies, then these magnetic fields are transported to the wider ICM via jets/lobes during the lifetime of active galaxies (~ 100 Myr). Subsequent cluster mergers during the cluster evolution (up to 10 Gyr) will stir, shear, and shock the ICM as well as the magnetic fields provided by SMBHs. We present numerical simulations of the evolution of clusters with magnetic fields using the newly developed cosmological MHD code with adaptive mesh refinement. The evolution of magnetic field energy and flux, along with the ICM dynamics, will be discussed in detail. By comparing our simulations with the observations, we will explore the implications for MHD turbulence and dynamo mechanisms in the ICM.

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