

Abstract Submitted
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Simulations of Cluster Magnetic Fields from AGNs HAO XU, HUI LI, Los Alamos National Laboratory — We will report our research on magnetic fields and MHD turbulence in galaxy clusters using Cosmological Adaptive Mesh Refinement (AMR) MHD simulations of cluster formation with seed magnetic fields from Active Galactic Nuclei (AGNs). In our simulations, magnetic fields with energy between $\sim 10^{58}$ to 10^{60} erg are put into the center of forming clusters at $z=3$ to mimic the magnetic feedbacks from AGNs. The injected local magnetic fields then spread throughout the whole cluster by the processes of cluster mergers and turbulent mixing. The magnetic fields are amplified and maintained by the bulk motions of the Intra-cluster medium (ICM) at large scales and by the ICM turbulence, which is driven by the continuous mergers and merger shocks, at small scales. The magnetic energy increases to $\sim 10^{61}$ erg and the strength of the final fields is at micro Gauss level extended to 1 Mpc from the cluster center. We will show the distributions of the simulated magnetic fields and the Faraday rotation measures of the clusters related to the ICM MHD turbulence. We will further discuss properties of the MHD turbulence and small-scale dynamo on the amplification and saturation of the magnetic fields.

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