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**Heating the Intra-Cluster Medium by Magnetic AGN Feedbacks**

HAO XU, UC, San Diego / Los Alamos National Lab, HUI LI, Los Alamos National Lab, MICHAEL NORMAN, UC, San Diego — It is believed that AGN feedback from the SMBH at the central elliptical galaxy in galaxy clusters is a major source to heat the Intra-Cluster Medium (ICM) to avoid the catastrophic collapse of the cluster core. The morphologies of the jet/lobes of the radio galaxies and the sizes of the large X-ray cavities indicate that the energy of magnetic fields from AGNs may be a big fraction of the total AGN energy. We performed Cosmological MHD simulations of AGN feedbacks in Poynting flux-dominated limit at different stages of the cluster formation. We show that about 80% of the injected magnetic energy ( $\sim 10^{61}$  erg) from the AGN is converted to the thermal and kinetic energy of the ICM. This energy is distributed through the ICM by driving shocks and forming bubbles by magnetic fields. While shocks heat the inner part of cluster core rapidly, the raising bubbles bring the injected energy to the outer region in longer time. The properties of cluster core are dramatically changed by the injection. The impact on cluster formation by the AGN feedbacks at different redshifts is discussed.

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