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Magnetic fields and relativistic electrons in the nearby galaxy cluster Abell 754

Abstract

Giant (Mpc-scale), diffuse synchrotron sources associated with turbulence and shocks in the intra-cluster medium (ICM) have been observed in a number of merging galaxy clusters. Nonetheless, the origin, distribution, and properties of the relativistic electrons and magnetic fields that generate the emission are still poorly constrained. With the requested MeerKAT observations, we will study the non-thermal components in the ICM of the prototypical nearby merging galaxy cluster Abell 754. Due to its low-redshift of z=0.053, this system is an ideal target to perform a deep and highly resolved spatial analysis. The new data will allow us to investigate the spectral properties of the radio emission, constrain the magnetic field amplification and particle acceleration at the X-ray detected shock front, and determine the magnetic field distribution in the ICM from the cluster center up to the cluster outskirts.