

Title

Probing the Diffuse Radio Halo in the Massive Galaxy Cluster ACT-CL J1142.7+1527 at $z = 1.19$

Abstract

We propose MeerKAT UHF-band observations of the galaxy cluster ACT-CL J1142.7+1527 at redshift $z = 1.19$, previously observed at L-band, revealing central diffuse radio emission with a power of $P_{1.4} = 9.43 \times 10^{24}$ W/Hz. The key science goals include measuring flux density and radio power of the halo to understand magnetic fields and particle populations, analysing spectral indices to reveal properties of relativistic electrons and magnetic fields, and correlating thermal X-ray with non-thermal radio emission of the intracluster medium (ICM) to study particle acceleration mechanisms. We request 7.3 hours of MeerKAT UHF-band observation to trace fainter extended emission, produce a detailed spectral index map, and constrain magnetic field properties. This study of the high-redshift radio halo will advance our understanding of the formation and evolution of these diffuse radio sources in the early universe.