

Antlia Cluster in High def: A study of early galaxy cluster assembly

Abstract

We propose 49.2 hours of HI 21 cm spectral line observations to study cluster evolution and galaxy demographics in the Antlia Cluster. Antlia is the best example of a cluster at an early stage of assembly in the nearby universe. Specifically, we will resolve the HI and radio continuum in galaxies located at the outskirts, infall region, and core of the cluster. We will correlate the HI and radio continuum morphology of galaxies as a function of their cluster-centric distance (which is anti-correlated with their age since accretion) and with substructure in the cluster to estimate (1) what are the dominant physical processes transforming galaxies early in galaxy cluster assembly, and (2) what fraction of galaxies were pre-processed in the group environment before they were accreted onto Antlia. MeerKAT is the only instrument with the field-of-view, sensitivity, resolution and view of the southern hemisphere with which we can undertake this study. Even more than previous HI observations with KAT-7 which revolutionized our understanding of the Antlia Cluster and its history, this MeerKAT study has the potential to address fundamental questions in our understanding of early galaxy cluster assembly.