

Title

Filaments and diffuse emission in a low-mass galaxy cluster

Abstract

Massive merging galaxy clusters are found to host Mpc-scale radio halos and relics. These giant diffuse synchrotron radio sources are formed as energy is deposited in the intra-cluster medium (ICM) during mergers, accelerating some population of particles in the cluster's micro-Gauss level magnetic field. Most clusters, merging and relaxed, also feature AGN and radio galaxies, as well as a host of other extended and diffuse radio sources. Simulations suggest it is possible for radio galaxies to diffuse into the surrounding ICM which may provide an underlying particle population for the generation of halos and relics. To link the particle populations it is important to understand the spectral energy distribution as both the re-acceleration mechanisms of halos and relics, and their underlying particle populations contribute to the observed spectra. This project focuses on a low-mass cluster Abell 194, not expected to host a halo or relics, but instead hosts active radio galaxies and myriad other radio emission features. The main feature of interest is a sheet of diffuse emission that may represent the slow diffusing of electrons from the active radio galaxies. Because of the cluster's location near the celestial equator, we have a number of datasets available, including MeerKAT (L-band), MWA, LOFAR, uGMRT, and ASKAP. We aim to combine deep UHF MeerKAT observations with this rich dataset to explore the spectra of the diffuse emission, as well as other radio features in the cluster.