

Title

The nature of the radio edges and magnetic fields in the Bullet Cluster

Abstract

Radio halos are giant (Mpc-scale) diffuse synchrotron sources thought to be powered by turbulent-driven mechanisms during galaxy cluster mergers. Historically, radio halos have been described as smooth and regular in morphology, with the radio emission broadly following the distribution of the X-ray emitting thermal intra-cluster medium (ICM). However, recent MeerKAT observations indicate that the emission of radio halos is not smooth, but rich in substructure. In particular, sharp surface brightness discontinuities in radio halos, co-located with edges in the thermal gas emission, have been observed in a number of merging clusters. With the requested MeerKAT observations, we will perform the first multi-radio-frequency study of such radio edges by targeting the famous Bullet Cluster, with the aim of investigating the nature of the newly discovered discontinuities and their relation with the underlying shock and cold fronts. The new data will also allow us to constrain the magnetic field properties at shock fronts and determine its radial profile in the ICM.