

Title

MeerKAT observations of the most massive CHEX-MATE clusters

Abstract

This proposal aims to extend the MeerKAT coverage of the Southern CHEX-MATE sample, pushing the limit of radio detection from perturbed galaxy clusters to massive, almost-relaxed systems. We propose L-band observations for a total of 93 hrs on 13 clusters. This is a natural extension of our previous MeerKAT expeditions, where we achieved excellent results by discovering new radio sources and gaining critical expertise about the instrument's capabilities. Therefore, we are confident that these data will uncover new radio halos and relics in the targeted clusters. More importantly, when combined with MGCLS results and dedicated X-ray XMM data, the proposed observations will provide us with all the necessary data to conduct the first systematic study of the interaction between the non-thermal and thermal components in clusters. We will investigate point-to-point and radial correlations between radio (brightness and spectral index) and X-ray (brightness and thermodynamic quantities, e.g. entropy) and the results will put novel constraints on particle re-acceleration models and on the formation and evolution of galaxy clusters.