The self-similarity of cluster magnetic fields: A MeerKAT Study of nearby massive clusters

Abstract

Many open questions remain regarding the properties and origin of magnetic fields in clusters, yet they play a crucial role in cluster physics. Due to the scarcity of polarised radio sources, stacking of clusters has been required to determine average magnetic field profiles and correlation scales accurately.
However, stacking relies heavily on the assumption that cluster magnetic fields follow a uniform profile. In this proposal, we will determine the magnetic field profile of 10 carefully selected individual clusters at various merger stages. We will answer the question of whether clusters have a uniform magnetic field profile or show significant dispersion between different merger states. The results will provide crucial input for virtually all models of cosmic ray acceleration and magnetic field evolution and aid in ultimately constraining the mechanism for the creation of large-scale magnetic fields in clusters.