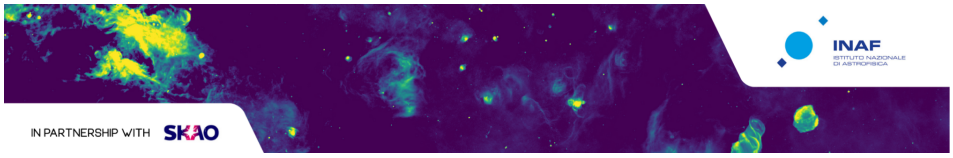

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Particle Acceleration and Magnetic Fields in Abell 3667: A Multi-Band Polarimetric Study

Thursday 27 November 2025 16:30 (3 minutes)

As a precursor to SKA-Mid, MeerKAT provides an unprecedented opportunity to study the synchrotron emission and magnetic field properties of galaxy clusters through high-sensitivity, wide-band polarimetric observations. Radio relics, elongated and polarized sources found at the outskirts of merging clusters, trace shocks in the intracluster medium (ICM) and provide key insights into particle acceleration mechanisms. In this talk, I will present a new MeerKAT's UHF band (544–1087 MHz) observation of Abell 3667, a cluster showing a spectacular pair of radio relics. These data complement an existing L-band observation (856–1711 MHz; de Gasperin et al. 2022), enabling a detailed multi-band rotation measure (RM) analysis.

By combining the UHF and L-band datasets, we derive high-resolution spectral index and RM maps, which are essential for studying the magnetic field structure and evolution in the shocked ICM with unprecedented detail. This study highlights the importance of resolved RM synthesis across a broad frequency range, a capability that will be dramatically enhanced with SKA.

Moreover, the cluster's radio halo is clearly detected for the first time, revealing its full extent and morphology. We present the first spectral analysis of the halo emission, which supports a scenario of turbulence-driven particle reacceleration.

This study demonstrates the power of SKA pathfinder observations to probe cosmic magnetism and non-thermal phenomena in the ICM. The techniques and results presented here pave the way for the next-generation studies of cosmic magnetism and non-thermal processes in galaxy clusters with SKA.

Topics

Galaxy Clusters & LSS (relativistic particles and magnetic fields)

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