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## ViCTORIA project: the MeerKAT Virgo Cluster Survey

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The ViCTORIA (Virgo Cluster multi-Telescope Observations in Radio of Interacting galaxies and AGN) project is a unique multi-frequency radio survey of the Virgo cluster, combining LOFAR-LBA, LOFAR-HBA, and MeerKAT data to achieve unprecedented depth, resolution, and spectral coverage. The Virgo cluster, the closest rich cluster in the Universe, is a key target for understanding galaxy evolution, AGN feedback, and the role of the environment in shaping galaxy properties.

In this talk I will present the MeerKAT Virgo Cluster Survey, carried out in L band (856–1712 MHz). This dataset offers a full-polarisation, wide-band coverage over  $112 \text{ deg}^2$ , with 64 observations and a total number of pointings of 320. With a sensitivity of  $7 \mu\text{Jy beam}^{-1}$  at the nominal resolution of  $7.6''$ , and complemented by a dedicated peeling strategy to mitigate the dynamic range limitations introduced by Virgo A (M87), the MeerKAT Virgo Cluster Survey enables high-fidelity imaging of diffuse and compact radio sources, including hundreds of cluster galaxies and low-surface-brightness features such as ram-pressure stripped tails and intra-cluster filaments.

To process such a large and complex dataset, we developed a dedicated data reduction pipeline, optimised for full-polarisation, wide-band imaging and tailored to the specific challenges posed by the Virgo Cluster. This pipeline is designed to ensure uniformity, scalability, and reproducibility, which are key requirements in the SKA era, and integrates advanced strategies for direction-dependent calibration and dynamic range enhancement.

This contribution will present the initial scientific results from the MeerKAT Virgo Cluster Survey, which aims to derive polarised images, including RM synthesis of cluster galaxies and AGN, spectral index mapping between HBA and MeerKAT frequencies, and perspectives for probing spectral curvature across the entire 42–1712 MHz frequency range. By bridging the LOFAR and MeerKAT regimes, ViCTORIA exemplifies the synergistic science enabled by SKA precursors, paving the way for SKA-MID surveys of galaxy clusters and diffuse emission. This project contributes directly to the preparation of SKA science by testing data analysis strategies, building collaborations, and offering a high-legacy, multi-frequency dataset of strong relevance to the SKA science case.

### Topics

Galaxy Clusters & LSS (relativistic particles and magnetic fields)

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