

Broad-band radio observations in the SKA era: the case of the galaxy group Nest200047

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In recent years, the remarkable capabilities offered by precursors and pathfinders of the Square Kilometre Array (SKA) have started revolutionizing our view even of previously well-known objects such as jetted Active Galactic Nuclei (AGN). Particularly in the MHz-frequency regime, observations are now able to uncover the oldest plasma injected by AGN jets into their surrounding environment, shedding light on the jet duty-cycle and their interaction with the external medium over very long timescales. The crucial advancement towards comprehending the physics of these sources lies now in the exploitation of broad-band spectro-polarimetric radio observations. Although the combination of multiple telescopes at different frequencies currently enables this approach, it remains computationally intensive and time-consuming.

In this context, I will present our recent study on the galaxy group Nest200047, which serves as an exemplary instance of recurring AGN jet activity in a low-mass system. Our investigation reveals unprecedented evidence of the evolution of the old AGN plasma into intricate filamentary structures over hundreds of Myr. By conducting a dedicated multi-frequency campaign spanning from 53 to 1500 MHz, using LOFAR, uGMRT, MeerKAT, and VLA telescopes, we have performed a unique, resolved spectro-polarimetric analysis of the system. I will discuss the computational and storage resources required to achieve these results, as well as the used algorithms and the overall processing time. This type of analysis is crucial in preparing for the full utilization of the SKA's potential once it becomes operational.

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