

Exploring optimal sub-arraying strategies for MeerKAT-VLBI

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MeerKAT is a South African radio interferometer that will be the most sensitive in its class until the operation of the Square Kilometre Array mid-frequency array. Like SKA1-mid, MeerKAT's receptors are configured in a dense core as well as more extended spiral arms to provide higher angular resolution. The inclusion of the MeerKAT array into global VLBI networks will add significant sensitivity to existing VLBI networks, especially in the longest baselines of >7000 km and strengthen the role of the Hartebeeshoek Radio Astronomy Observatory (HartRAO) through better sampling and higher sensitivity in this part of the uv-plane. MeerKAT-VLBI will also extend VLBI coverage in the southern hemisphere which will be expanded even further by the African VLBI Network (AVN). MeerKAT's ability to be split into sub-arrays and simultaneously generate interferometric and tied-array output provides the opportunity to further increase its high expected scientific output. This flexibility will be important for many science programmes, including VLBI experiments where a subset of antennas may potentially participate with the AVN, EVN and LBA. Through a suite of simulations of VLBI arrays including MeerKAT, as well as the stand-alone interferometric and phased up performance of MeerKAT, this project explores optimal solutions for a range of potential MeerKAT-VLBI and MeerKAT projects. We aim to systematically explore the scientific, technical, and financial trade-offs of MeerKAT sub-arrays and commensal observations, which is ultimately aimed at maximising the scientific utility of both MeerKAT and the VLBI networks it forms part of.