

MeerKAT open time call 3 December - Proposal summary

MeerKAT View of AdvACT clusters - A MERGHERS Pilot Study	
Proposal number 13	Thu Jan 31 2019 04:34:06 GMT+0200 (SAST)
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Abstract:

To date approximately 80 galaxy clusters have been found that host Mpc-scale diffuse synchrotron emission. These steep spectrum, cluster-scale signals have been exclusively found in dynamically disturbed systems, indicating a strong link between their formation and the energetic processes disturbing the intracluster medium during cluster mergers. Observations of large X-ray and SZ-selected cluster samples have determined scaling relations between the radio emission and thermal properties of the host clusters. However, these samples have been restricted to high mass $M500 > 6 \times 10^{14} M_{\text{Sun}}$, low redshift ($z < 0.4$) systems where the emission is expected to be brightest. In order to better understand the formation of these diffuse structures and their link to cluster evolution and the hierarchical build-up of structures in the Universe, the discovery space must be expanded to higher redshift and lower mass. The MeerKAT Exploration of Relics, Giant Halos, and Extragalactic Radio Sources (MERGHERS) project is a proposed large-scale radio cluster follow-up to address this, by observing ~ 100 - 200 clusters over a wide range of mass and redshift. To investigate the feasibility of the MERGHERS programme, we propose a pilot study to observe 13 massive clusters which show evidence of optical merger signatures, using short MeerKAT exposure times. With this pilot study we will potentially detect new diffuse emission sources - the systems are new targets for diffuse emission studies - and derive resulting science such as constraining models of their formation mechanisms. We will also confront the challenges related to short exposures, such as poor uv-coverage and deconvolution artifacts. This pilot project will be crucial for confirming our technical strategy for MERGHERS, and serves as a pathfinder to show that MeerKAT can produce new diffuse emission science with short exposure times. Our total time request for this cycle, including overheads, is 16 hours.

Observation parameters:

Targets	J0013.3-4906 (03h19m34.24s, -49d06m44.67s); J0019.6+0336 (00h19m38.37s, 03d36m32.79s); J0034.4+0225 (00h34m26.41s, 02d25m25.45s); J0040.8-4407 (00h40m49.36s, -44d07m57.63s); J0046.4-3912 (00h46m24.66, -39d12m09.82s); J0106.1-0618 (01h06m09.42s, -06d18m55.30s); J0159.0-3413 (01h59m02.15s, -34d13m29.67s); J0240.0+0115 (02h40m03.02s, 01d15m55.47s); J0245.5-5302 (02h45m31.84s, -53d02m28.96s); J0248.1-0216 (02h48m11.68s, -02d16m29.85s); J0248.2+0238 (02h48m13.11s, 02d38m08.15s); J0528.8-3927 (05h28m52.56s, -39d27m46.51s); J0638.7-5358 (06h38m47.60s, -53d58m30.54s))		
Total time	16 in 3 epochs	Dump rate	4 s
Daytime	Nighttime preferred	Variable/Transient	No
Baselines	No more than two of the nine outer ring antennas may be excluded from the array.		