

2022 MSc Project

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Student may register at any South African university

Exploiting MeerKAT's discovery of vast numbers of radio point sources

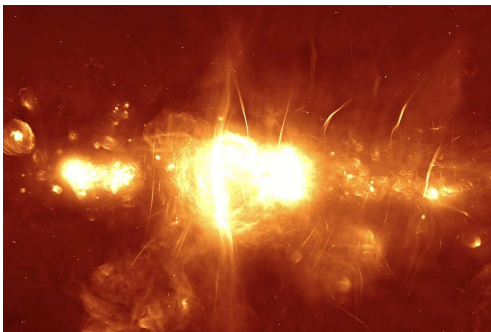
The MeerKAT radio telescope is discovering huge numbers of previously unknown radio sources. These sources appear in every field observed as part of the various different Large Survey Projects and open time proposals. MeerKAT also observed a large part of the Galactic plane, as an observatory project, and a point source catalogue based on these data will soon be available.

The majority of radio point sources are background quasi-stellar objects (QSOs), but the Galactic plane survey will also have detected many sources in our Galaxy, including accreting compact binaries, young stellar objects, and flare stars. This rich dataset can be used to understand the contributions that different binary and stellar objects make to the Galactic radio source population.

An obvious first step in understanding the new radio sources will involve cross matching the radio data to existing catalogues at other frequencies (optical, near- and mid-IR, X-ray, and γ -ray). Properties such as various flux ratios can then be used for a rough classification. However, it is likely that optical spectroscopic follow-up of a large number of new MeerKAT sources will be needed to guide classifications based on imaging data. There are also sure to be individually interesting objects worthy of additional detailed follow-up at radio and optical wavelengths.

Project goals You will use a MeerKAT point source catalogue that has been cross matched to optical, near- and mid-IR, X-ray, and γ -ray source catalogues. Based on these multi-wavelength data, you will explore strategies for classifying the radio sources, in particular to distinguish between Galactic and extra-galactic objects. You will also define and conduct a program of optical spectroscopic follow-up, to reveal the nature of a subset of radio sources, and to refine your classification method. The outcome of this project will be a better understanding of the Galactic radio source population, and possibly detailed studies of particularly interesting objects.

Skills Basic programming skills and good knowledge of undergraduate physics or astrophysics are required. Observations with the SAO telescopes and SALT will form an important part of this project, but prior experience in observational techniques is not required.



A MeerKAT image of the Galactic Center, covering about 2 square degrees. Although the extended emission is the most eye-catching in this image, it also contains thousands of point sources.