
Level of the project: MSc

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Institution: South African Radio Astronomy Observatory (SARAO)

Title: *Investigating the spectral structure and energetics of giant radio galaxies from the MeerKAT Massive Distant Clusters Survey (MMDCS)*

Project Description:

The recent discovery of a giant radio galaxy (GRG) in the scale of the cosmic web (7 Mpc in size) has demonstrated that jets can travel cosmological distances without being disturbed or destroyed by magnetohydrodynamical (MHD) instabilities (Oei et al., 2022). This discovery further indicates that there might be more GRGs that exceed the suggested growth limit of about 5 Mpc. The question as to what causes these objects to grow to be this large remains unanswered. Many attempts have been made to find a correlation between the size of GRGs and their physical properties but to no avail. These properties rarely include investigations of the age of the emitting electrons in GRGs. This project therefore will first continue the search for GRGs in the MeerKAT Massive Distant Clusters Survey (MMDCS) fields, and investigate the relationship between the ages of the detected GRGs, their sizes and other physical properties.

One of the hypotheses for explaining the exceptionally large projected linear sizes of GRGs is that these objects could be very old RGs which have had sufficient time to expand over large distances (Subrahmanyam et al. 1996). This hypothesis may be tested by constraining the GRG ages compared to those of smaller radio galaxies (RGs).

The student who takes up this project will conduct detailed multiwavelength study of the MMDCS GRGs. The study will focus on the spectral analysis of the GRGs using MeerKAT L-band observations as well as on the optical and infrared properties of the respective host galaxies.

Required Skills:

- Good Python programming skill
- Computing experience in the Unix/Linux environment
- Some exposure to software and analysis tools (e.g. ds9, CASA etc.) would be an added advantage.