1. **Level of the project:** Master's
2. **Name of primary supervisor:** Dr Nadeem Oozeer
3. **Institution of supervisor:** South African Radio Astronomy Observatory (SARAO), Rhodes University
4. **Name of co-supervisor (if appropriate)**
5. **Institution of co-supervisor (if appropriate)**
6. **Contact details of supervisor and co-supervisor:** nadeem@sarao.ac.za
7. **Project title:** Multi-wavelength Analysis of a Giant Radio Galaxy observed with MeerKAT.
8. **Description of project:**

Radio galaxies exhibit a diverse range of morphologies, with some extending to exceptionally large linear sizes as their jets evolve into the intergalactic medium (IGM). A distinct class of such extended radio sources is the Giant Radio Galaxy (GRG), characterized by a projected linear size exceeding 700 kpc. Investigating the large-scale structures of GRGs is essential for understanding the evolution of galaxies, their interactions, and their influence on the surrounding IGM.

One of the key tools for studying the evolution of radio galaxies is the spectral index, which serves as a proxy for estimating their age. However, spectral age estimates are subject to significant uncertainties, including variations in the magnetic field and the lack of precise injection index values. Additionally, a discrepancy often arises between the spectral age and the dynamical age of a source, which is primarily determined by its morphology and luminosity distribution (e.g., Machalski et al., 2009).

This project focuses on the analysis of a GRG with an angular extent of approximately 0.8 degrees, observed using MeerKAT in a mosaicking mode. The primary objective is to conduct a multi-wavelength investigation to characterize the spectral properties of the source, estimate its age, and examine the environment in which it is evolving. Through this analysis, the study aims to contribute to a deeper understanding of the physical processes governing the formation and evolution of this GRG.

Skill needed:

- Computing experience - Unix/Linux environment
- Good programming skill in Python
- Astronomical data analysis tools - a plus (e.g. virtual observatory, ds9, CARTA, Casa,…)

Data availability and resources:

- Data is already available for processing and analysis will be carried out using MeerKAT pipeline tools.
- Student is expected to mine other wavelength data to supplement available data
- IDIA & RARG servers with sufficient compute resources are available