

Characterizing Ionized Gas and HI properties of Nearby Galaxies

Level: NASSP Honours

Supervisor: Dr Moses Mogotsi

Institution: SALT/SAAO, UCT

Supervisor Contact: moses@sao.ac.za

Project Description:

Optical emission lines can be used to determine the kinematics and properties of the ionized gas in galaxies. These can be used to study the star formation in the galaxy, motion of gas in the galaxy, the presence or absence of shocks and AGN, to detect the presence of different gas components and to understand the nature of the gas among other things. This is useful because we can use it to better study the kinematics and interstellar medium of galaxies. And to understand how galaxies evolve and how this evolution is affected by different processes such as galaxy interactions, environments and internal processes. Atomic hydrogen (HI) traces the neutral gas in these galaxies, which is the fuel from which stars can eventually form from.

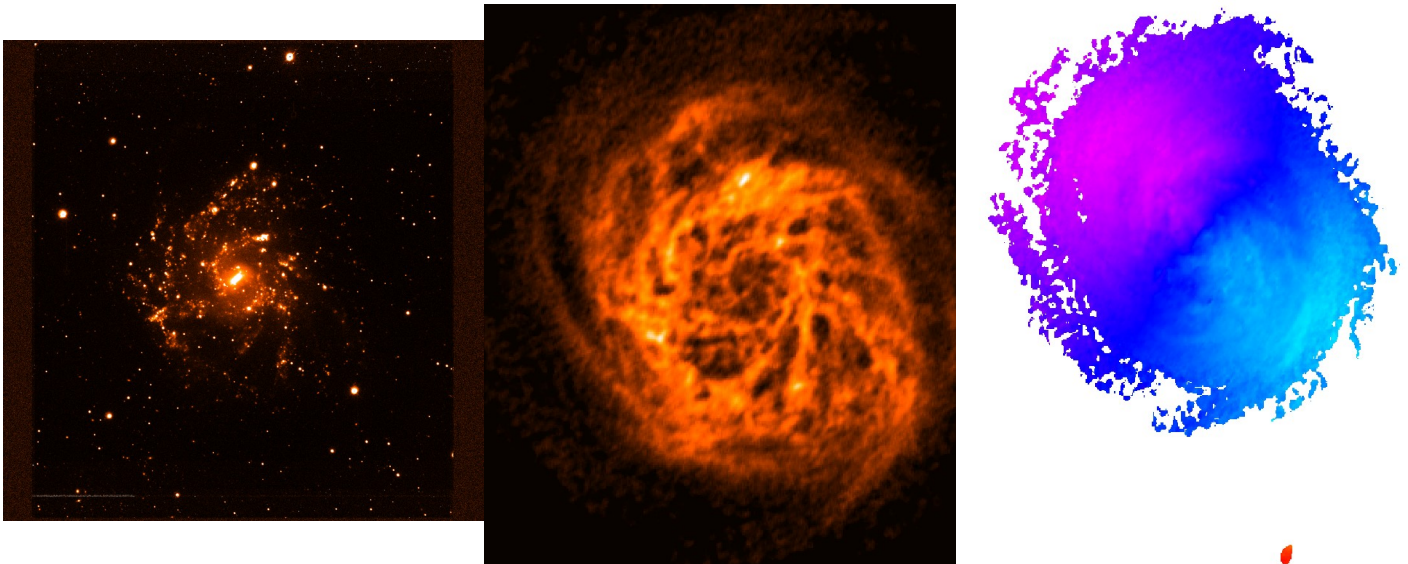


Figure 1: A composite images of MHONGOOSE galaxy: J2257-41. Left: H α image, Middle: HI flux and Right: HI velocity.

This project will involve using optical spectroscopic data from SALT to study the resolved properties of nearby galaxies that are being observed with MeerKAT, with the potential future aim of combining the optical and radio HI data to better characterize these galaxies. The project will mainly focus on the H-alpha and [NII] emission lines to study the kinematics of the gas and star formation, but it can be expanded to other emission or absorption lines. The optical data will either be from optical longslit observations of new integral field (IFU) data from SALT's new slitmask IFU (SMI). The galaxy or galaxies analyzed in this project are from the MHONGOOSE HI survey of nearby galaxies being done on MeerKAT, which is a deep survey of the HI in 30 nearby galaxies. There is also potential to work with optical IFU data from other telescopes or with galaxies from the MIGHTEE-HI or MeerChoirs. The project can be extended into further work using SALT, MeerKAT and other data.

The project is quite flexible and I would be happy to discuss adjust the project to match the aspects that the student is interested in. The

Requirements: The student needs to be comfortable using Python, interested in learning more of it and expanding their spectral analysis skillset.