MeerChoirs: Using SALT & MeerKAT to study Galaxy Evolution in Groups

Level: MSc

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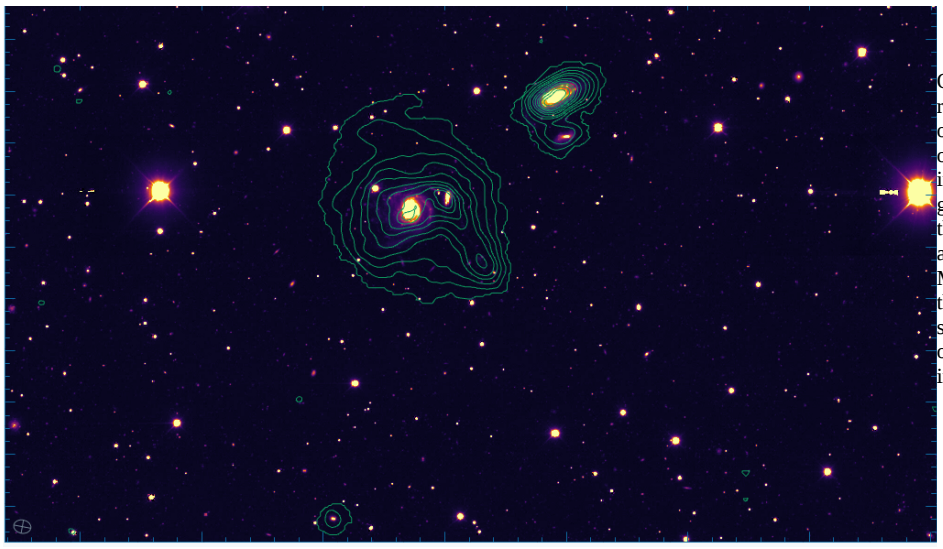
Project Description:
Galaxies can be found in different environments, from low density voids to galaxy groups and clusters, which are much more dense than voids. The morphology, gas content and star formation rates of galaxies varies across different environments; which suggests that the environment is an important factor to consider when studying how galaxies evolve. Groups can be thought of as a nice transition between low density field environments and high density cluster environments, therefore we can use them to study how things change between these environment extremes. MeerChoirs aims to study groups by using HI data from MeerKAT and optical data from telescopes such as SALT and WIYN. HI is an ideal tracer to look for the presence of galaxy interactions in groups, and MeerKAT provides us with high sensitivity data over a large field of view, which makes it ideal to study nearby groups and their environment. And optical data from SALT can help us to characterize the ionized gas and stellar kinematics and properties of such galaxies. With the arrival and installation of the new NIR IFU on SALT later this year (2022), we will be able to also probe the resolved near-infrared spectra of these MeerChoirs galaxies, providing sensitivity to shocks and very young stars which can occur due to bursts of star formation caused by galaxy interactions.

In this project the student will perform a census of the HI content of the galaxies in the group and determine their kinematics and look for signatures of galaxy interaction or changes to them due to the environment. They will then compare the HI properties to optically determined ionized gas and star formation properties from the SALT longslit observations, and compare these to NIR data from the new NIR IFU. The MeerKAT data has already been taken, and the student might take part in imaging the HI for the particular group they are working on. Some of the SALT data has been observed, but further observations still need to be taken for the particular group the student will work on.

Requirements: The student needs to be very comfortable with Python coding, and be familiar with handling fits files.



On the Left is an image showing recently imaged HI data for one of the MeerChoirs groups overlayed on a deep optical image of the central region of the group. This is only from half of the total exposure time and it is also worth noting that the MeerKAT field of view is larger than the shown region, and new sources have been detected outside of this region in the latest imaged data.