

# Resolved HI study of ultradiffuse galaxies

Project Level: Masters

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## Project Description

Since their discovery in 2015, there is a renewed interest amongst astronomers in a special, fainter category of low surface brightness galaxies, called the ultradiffuse galaxies (UDGs) (van Dokkum et al 2015). These are galaxies with central surface brightness (in g band) similar to or fainter than 24 magnitude/ arcsec<sup>2</sup> and effective radii ( $r_e$ ) greater than 1.5 kpc. UDGs appear in all sizes (effective radii ranging from 1.5 kpc to >5 kpc), but the UDG literature is mainly dominated by dwarf galaxies. While majority of UDGs studied so far seem to reside in dwarf mass dark matter halos, the dark matter content of UDGs can ideally vary over a large range. There are studies suggesting some UDGs have little or no dark matter. In this project we image in HI, two UDGs, with an aim to understand the HI and dark matter properties of UDGs with large effective radii. The data will yield the HI content, morphology, velocity field and dark matter content of the galaxies and will help us understand the dark matter halo properties of the UDGs. GMRT HI observations of these galaxies have already been completed.

The project will give the student exposure to the full process of radio interferometric data reduction and analysis, starting with raw telescope data to producing HI spectral line cubes and extracting science information from the data. The project will involve training in data reduction software and analysis tools like AIPS, CASA and CARTA. Depending on the imaging results, we will also apply the modeling tool 3D-Barolo. Familiarity with python and linux environment is required. If completed successfully, the results would be published.