

Accelerated evolution in the densest groups of galaxies: MeerKAT imaging of the missing HI

Abstract

Hickson Compact Groups (HCGs) are located in low-density environments, and composed of ~ 4-10 tightly bound galaxies. Their high galactic density, similar to the centres of rich clusters, causes strong gravitational interactions between members, accelerating their evolution. This makes them ideal to study galaxy transformations, such as mass assembly pathways and star formation quenching modes.

HCGs can show extreme atomic gas (HI) deficiency. HI studies with the VLA have established an evolutionary sequence, where in Phase 1 the gas is mainly in galaxies, while in Phases 2 and 3 more and more HI gas is missing from these, either distributed in tidal tails, or missing altogether, yet (partly) detected in single-dish GBT observations (spread over up to 1000 km/s), suggesting the presence of diffuse gas in the intragroup medium (IGrM).

MeerKAT has the unique capabilities required to locate and analyse this elusive HI. Hence, we propose to observe a sample of HCGs in the most advanced evolutionary phases, in order to understand a) how do HCGs transition from a complex of HI tidal structures to the most extreme phase in which galaxies have completely lost their HI, b) how far from the core galaxies can the HI survive, and whether magnetic fields are aiding in this survival in the harsh IGrM, c) the effect of potential encounters with intruder galaxies located beyond the area studied with the VLA, and d) the unexplored role of intragroup gas in the accelerated transition of galaxies from active to quiescent.