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Presentation Requested: poster

Category: Environment, Large Scale Structure and Galaxy Evolution

Question: How has (or how will) ALMA (with other telescopes) help us better understand the impact of the environment on galaxy evolution? Can ALMA or one of the other new facilities detect the gas in the large scale structure, outside of galaxies? What can we learn from dwarf galaxies or galaxies in clusters and groups in the nearby Universe using ALMA + other facilities & how has this helped us understand galaxy evolution at higher redshifts?

Halo Mass Effect on the HI Gas Content of Galaxies in Groups and Clusters

We combine the Sloan Digital Sky Survey (SDSS) and the Arecibo Legacy Fast ALFA (ALFALFA) Survey to perform a statistical study of the distribution of HI gas content of galaxies in groups and clusters in local Universe. Using carefully selected and matched samples to minimize the bias from the tidal gas stripping and the HI selection effect, we investigate the radial distributions of HI gas content for galaxies in groups and clusters relative to the control samples with similar stellar mass and redshift. Although the evidence of the HI gas content variation as a function of the group-centric distance is not significant owing to insufficient depth of ALFALFA to probe gas-poor galaxies, we note a marginal evidence of systematic decrease of the average HI properties toward the centers of groups, for galaxies in groups with halo mass greater than $\approx 10^{13.8} h^{-1} M_{\odot}$. We interpret this marginal observation of halo mass effect on HI gas content in context of a halo mass dependent ram pressure stripping scenario, which suggests that there is a threshold halo mass for efficient ram pressure stripping for given galaxy stellar mass. ALMA observation of ram pressure stripping galaxies will improve our understanding of the spatial and kinematic structure of multi-phase ISM interacting with group and cluster medium, and of its connection to galaxy star formation.