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### Investigating merger histories using global HI profile asymmetries

This project will focus on developing, testing and implementing new, more sophisticated methods of quantifying asymmetries in the HI spectra of the ALFALFA galaxies. Methods will be developed that better trace asymmetries as a function of radial velocity (relative to the galaxy's systemic velocity). The approaches will be based on using the lopsidedness (Nathan Deg et al 2017) and (Bok et 2015) to model a given galaxy's HI spectrum, and then use that model to accurately measure the asymmetries. After that, we are going to compare two different approaches to properly validate the asymmetries. Once the asymmetries of the ALFALFA galaxies have been measured, the properties of the environments in which the galaxies reside will be measured. This will be done by utilising the optical counterparts to which the ALFALFA galaxies have been reliably cross-matched. Every optical counterpart will come with a slew of observational information from Data Release 10 of the DeCaLS. As such, the environmental densities - in addition to other properties - will be determined for the ALFALFA galaxies. Doing so will allow for the MSc project's main science question to be: What evidence does the full ALFALFA sample offer for the presence of merger-induced asymmetries in the HI spectra of galaxies in the nearby Universe? What is the best approach to calculate the asymmetry?

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