

Abstract general public

This project aims to increase our knowledge about the cosmic environment and how it affects the formation of galaxies. For this project we aim to investigate galaxy formation in cosmic voids, the large, nearly empty regions that dominate the volume of our Universe. These regions grow over time, pushing matter to their edges making them even more empty. Galaxies, which only can evolve in an overdensity, a large accumulation of matter, should have difficulties to form in the environment of a cosmic void. Moreover, the history of a galaxy is heavily influenced by merger events, the collision of two or more galaxies. Void galaxies will have fewer mergers in their life-span which should have a measurable influence on their characteristics.

With the increase of observational data scientists started to investigate void galaxies in more detail. Yet, the surveys are still rather small and observations yield different results. Our project aims to provide a prediction of what we expect to measure based on a fully numerical approach. We will make use of well tested state-of-the-art cosmological software to simulate a realistic galaxy population and identify the void-galaxies in this population. We then will estimate the characteristics of these galaxies and probe how the observations match to each other. We will analyse the dependence on the mass of the galaxies as void galaxies are found to be, statistically, less massive. For this analysis we will consider the size, the spin and the formation epoch of galaxies. We will study the colour of galaxies to make an estimate if there is a measurable difference between galaxies that we'll identify as void galaxies and all other galaxies identified in our simulation. For this purpose we will make use of the simulated data to statistically model the stellar evolution and thus the luminosity and colour of the galaxies in our simulation. Our analysis aims to help clarify if the population of void galaxies does differ compared to galaxies found in the more dense regions of the Universe.