Identification of Cosmic Filaments using the `Simba-C` Simulation and `DisPerSE` Filament Finder

Mr. Renier T. Hough*†

Prof. Amare Abebe

Prof. Yin-Zhe Ma

This project aims to use the large-scale cosmological `Simba-C` simulation and `DisPerSE`, a cosmic filament finder to identify persistent topological features, including the "Cosmic Web", within simulated galaxy distributions. By analysing filament properties and their correlation with galaxy characteristics, such as star formation activity and morphology, the study aims to deepen our understanding of large-scale structure formation in the Universe, as well as give us insights into the cosmic web's intricate network.

1 Objectives

- Learning how to analyse the `Simba-C` simulation.

- Identify and analyse topological features in cosmological dataset using the `DisPerse` filament finder

- Possible features to analyse:

    - Peaks, voids, walls, and filaments within simulated galaxy distributions.
    - Analysing the properties and characteristics of cosmic filaments, including length, width, density, and connectivity.
    - Investigating the correlation between filamentary structures and galaxy properties, such as star formation activity and morphology.

2 Special requirements

The student should have experience in programming in Python and C, as well as Linux terminal usage.

This can become a Master's level project.

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*renierht@gmail.com

†North-West University