Study of the Change of the Halomass in Galaxies Depending on Their Proximity to Filaments in the Universe

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Purpose The ordinary matter in the universe is not distributed in a homogeneous way. The action of gravity forms different structures. Galaxy filaments are the largest known structures. The aim of this project is to demonstrate that the halomass (mass of the dark matter halo) changes depending on the distance of galaxies to filaments. Methods The cosmic web was analyzed with the Euclidean Minimum Spanning Tree, using Python language. This code searched filaments. To prove that this was a good method, another code was used: the KDTree, which measures the average distance between filament networks. The results of a data set from the Sloan Digital Sky Survey were compared with the ones that other scientists using other methods got. Then a simulation of the future data sets from the PAU camera was used. The distance of each galaxy to the nearest filament and its halomass was obtained. Results It was discovered that the Euclidean Minimum Spanning Tree had found the real filaments. And the smaller the distance from the galaxy to the nearest filament, the bigger was the halomass. Conclusions The Euclidean Minimum Spanning Tree is a good method to find filaments. The halomass of the galaxy changes depending on its distance to the nearest filament.

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