

Mapping the 3D Structure of Virgo Cluster Filaments with Tully-Fisher Distances

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Abstract

Galaxies gravitate towards galaxy clusters along filamentary structure. It has been suggested that environmental effects, such as ram pressure stripping, tidal interactions, etc., may pre-process the filament galaxies as they move towards the galaxy cluster. An upcoming study by Yoon et al. will investigate the pre-processing of galaxies in filaments around the Virgo cluster. An important step of their study is to determine whether the sample galaxies, selected based on location and line-of-sight velocity, are physically associated with the filaments. The goal of our project is to 3D map the Virgo cluster filament structure and to probe the 3D location of Yoon et al.'s sample. To achieve this goal, we estimate distances to Virgo filament galaxies by an I-band Tully-Fisher relation. We measure HI spectra of well-defined spirals from the ALFALFA database and use photometric properties from the Extragalactic Distance Database(EDD). We have discovered that the NE filament can be classified into two filaments, one stretching radially behind the Virgo cluster (from 20-60Mpc) and the other extending from 30Mpc to 80Mpc, covering a range from 20 to 30 degrees in declination.