

Title

Pearls on a string: Dark and bright galaxies on a strikingly narrow filament

Abstract

Simulations suggest that the streaming of gas into galaxies happens along the filamentary strings in the cosmic web. The low density of matter in the filaments makes their detection quite challenging even though they contain the largest fraction of baryonic mass in the Universe. We have identified an unusually narrow filament of galaxies in the nearby Universe. The HI 21 cm observations of this filament with JVLA have revealed the presence several HI-rich systems, mostly with no identified optical counterparts. These gas-rich systems likely mark the peaks of the dark matter distribution. We propose here to use MeerKAT, the sole telescope with the required sensitivity and resolution simultaneously, to study the distribution of HI, in both cloud and circumgalactic scales, in a section of the filament. This is (i) to construct the HI mass function in a filament for the very first time, (ii) to characterise the properties of HI sources in this unique laboratory, and (iii) to study the low column density HI between the gas-rich systems. Complementing MeerKAT observations with our proposed FAST observations for detecting the diffuse HI gas will result in a major achievement in understanding the distribution of cold gas in filaments. The proposed observations not only have the potential of leading to a high impact discovery, they are to be the base for planning further MeerKAT observations over the full length of the filament through a large proposal.