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MeerKAT observations of the ridge connecting the galaxy clusters pair A399-A401

Abstract

Galaxy clusters and filaments are unique laboratories to investigate the evolution of relativistic particles and magnetic fields components during the formation of the large-scale structures of the Universe. The goal of this proposal is to image, in unprecedented detail, the distribution of the diffuse large-scale radio emission in the exceptional pair of galaxy clusters A399-A4011, separated in projection by 3 Mpc. Using the LOFAR at 140 MHz, Govoni et al. (2019), recently found that the two clusters are connected by a vast magnetic ridge illuminated by fossil electrons in a filament of the cosmic web. With this proposal we aim at obtaining the detection of the radio ridge connecting A399-A401, with MeerKAT in the L-band (900-1670 MHz), at a resolution of about 35''. This will permit to analyze the structure of the radio ridge on linear scales of about 50 kpc. The combination of MeerKAT and SRT data obtained in the L-band will permits us to map the entire diffuse radio emission of the A399-A401 ridge by keeping the resolution of the MeerKAT with the advantage of recovering any previous missing large-scale structure. Detecting the ridge in the L-band is of fundamental importance to obtain the first crucial constraint on the radio spectrum of the radio ridge and to understand its nature.