MKT-22149

Searching for dark matter with MeerKAT observations of dwarf spheroidal galaxies

Abstract

Attempts to understand the nature of dark matter have long been at the forefront of both modern particle physics and astronomy. Numerous dark matter candidates have been proposed based on various theoretical and observational motivations. Their mass range spans many orders of magnitude, and so different detection methods are both useful and necessary. We propose to use L-band MeerKAT observations of two dwarf spheroidal galaxies (dSphs), Reticulum II and Tucana III, to search for two well-motivated dark matter candidates, axions and weakly interacting massive particles (WIMPs). The MeerKAT observations are expected to fill a gap in the axion parameter space for a mass-equivalent frequency of $1051\sim1090$ MHz between MeerKAT UHF observations and results from laboratory experiments, and to critically test the WIMP-annihilation-origin of the tentative γ ray excesses revealed by Fermi-LAT observations of these two dSphs.