

Title

Confirming the first non-thermal radio filaments found in the Galactic Plane

Abstract

Nonthermal radio filament (NRF) structures are intriguing constituents of the ionised interstellar medium towards the Galactic Centre (GC). These NRFs are highly linear, are products of some injection mechanism of synchrotron particles, and are highly magnetised. With none so far observed elsewhere in the Galaxy, they have thus far been considered to reside exclusively towards the GC and to reflect the unique conditions found there. However, the SARAO MeerKAT 1.3 GHz Galactic Plane Survey (SMGPS) has revealed for the first time that NRFs do exist across the Galactic Plane. Here we propose to observe a sample of 40 of the brightest candidate nonthermal filaments from the SMGPS so that we can confirm their nonthermal nature by measuring their spectral indices. We will map the spectral index and polarisation variations across the brighter filaments, which will allow us to infer details of the illuminating cosmic ray population. Finally, high resolution imaging will resolve the filaments across their short axes and allow comparisons with the Galactic Centre population.