

Title

A Survey of Low Surface Brightness Radio Emission in Fermi Unassociated Gamma-ray Sources

Abstract

A peculiar subset of unassociated gamma-ray sources (UAS) found in the Galactic plane have no cataloged radio point source within their localization, also referred to as 'empty fields'. This population of gamma-ray sources has been largely resisting traditional association methods that were applied over the past decade. Here we propose to map and classify low surface brightness radio emission in a large sample of empty fields, with the primary goal to better understand the emerging new class of Galactic unassociated soft gamma-ray sources, first discussed in the 3rd data release of the 4th Fermi Large Area Telescope point source catalog. The aim is to better understand dense regions in the Galactic plane, their significance to cosmic ray acceleration, and to investigate the presence of an overlooked class of Galactic gamma-ray emitter. The results of this work will also benefit to optimize e.g. radio and gamma-ray pulsar searches. MeerKAT is an ideal instrument to probe low surface brightness emission around the Galactic plane and this proposal would add observations of up to 136 additional Fermi sources to this study, not covered by previous MeerKAT observations.