

# Stuck in the trap: finding synchrotron pair halos around pulsars

## Abstract

Gamma-ray observations of our Galaxy have revealed that electron-positron pairs produced by pulsars can be confined around them over durations and distances far exceeding the limits of typical pulsar wind nebulae. This is a new phenomenon, and the physics at work behind it is poorly understood. The present proposal is part of an effort to provide a more solid observational basis to pair halos around pulsars and better understand their dynamics. We aim at achieving the first detections of pair halos around pulsars from their radio synchrotron emission. With its large field of view and superior imaging capabilities, MeerKAT is expected to provide a rich morphological information on the halo emission angular distribution, which should ultimately inform us about the mechanics of pair confinement in the vicinity of pulsars. Based on a halo population model, we selected two targets with sizes  $\sim 0.2$ deg and intensities at the  $\sim 1$ Jy level: pulsars J1928+1746 and J1101-6101. For each target, we request a 10h on-source single pointing observation, which should allow us to image the halo emission from its central peak up to beyond its 68% containment radius. Both objects have promising gamma-ray counterparts, which guarantees a favorable framework for the physical interpretation of the MeerKAT observations.