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# Detecting and characterising pulsar halos with the Cherenkov Telescope Array

The recently identified source class of pulsar halos may be populated and bright enough at TeV energies to constitute a large fraction of the sources that will be observed with the Cherenkov Telescope Array (CTA), especially in the context of the planned Galactic Plane Survey (GPS). In this study, we examine the prospects offered by CTA for the detection and characterization of such objects. CTA will cover energies from 20 GeV to 300 TeV, bridging the ranges already probed with the Fermi Large Area Telescope and High Altitude Water Cherenkov Observatory, and will also have a better angular resolution than the latter instruments, thus providing a complementray look at the phenomenon. From simple models for individual pulsar halos and their population in the Milky Way, we examine under which conditions such sources can be detected and studied from the GPS observations. In the framework of a full spatial-spectral likelihood analysis, using the most recent estimates for the instrument response function and prototypes for the science tools, we derive the spectral and morphological sensitivity of the CTA GPS, to extended sources in general and then to the specific intensity distribution of halos. From these, we quantify the physical parameters for which pulsar halos can be detected, identified, and characterized, and what fraction of the Galactic population could be accessible. We also discuss the effect of interstellar emission and data analysis systematics on these prospects.

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