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Prospects for Indirect Dark Matter Searches with the Cherenkov Telescope Array (CTA)

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The existence of dark matter (DM) as the dominant contribution to the gravitational mass of the Universe is by now well established but the corpuscular nature of DM is at present unknown. Multiple hypotheses endure as to the character of DM and for the most popular DM models the CTA has a unique chance of discovery.

The principal target for DM searches with CTA is the Galactic Centre (GC) halo. The best strategy is to perform CTA observations within a few degrees of the GC, with the Galactic Centre itself and the most intense diffuse emission regions removed from the analysis. Assuming a cuspy DM density profile for the Milky Way, 500 hours of observations in this region provide sensitivities to and below the thermal cross-section of DM annihilations, for masses between a few hundred GeV and a few tens of TeV, and give a significant chance of discovery in some models for Weakly Interacting Massive Particles (WIMPs). Since the DM density in the Milky Way is far from certain, other targets are also proposed for observation, like ultra-faint dwarf galaxies such as Segue 1 with 100 hours per year proposed. Beyond these two observational targets, further alternatives, such as galactic dark clumps, will be considered closer to the actual date of CTA operations.

The presentation will give the sensitivity predictions for DM searches on the various targets taking into account the latest instrument response functions expected for CTA together with estimations on the systematic uncertainties from the backgrounds.

Collaboration

CTA

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