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Sensitivity of CTA to dark matter annihilations in the galactic centre

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We analyse the sensitivity of the future Cherenkov Telescope Array (CTA) experiment to dark matter annihilations in the galactic centre using the most up to date instrument response functions and background simulation model provided by the CTA Collaboration. We systematically examine the different statistical methods for setting limits using CTA and provide a realistic assessment of the sensitivity of CTA to photon fluxes from dark matter annihilation by means of a binned likelihood analysis for the Einasto and Navarro-Frenk-White halo profiles.

Applying these projections to the phenomenological minimal supersymmetric standard model (pMSSM) we show that CTA is bound to exclude at the 95% C.L. almost all of the phenomenologically favoured ~ 1 TeV higgsino region of the pMSSM, effectively closing the window for heavy supersymmetric dark matter in many realistic models. CTA will be able to probe the vast majority of cases corresponding to a spin-independent scattering cross section below the reach of 1-tonne underground detector searches for dark matter. Altogether, CTA will provide a highly sensitive way of searching for dark matter that will be partially overlapping and partially complementary with 1-tonne detector and collider searches, thus being instrumental to effectively explore the nearly full parameter space of the pMSSM.

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