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Sensitivity to kev-MeV dark matter from cosmic-ray scattering

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A wealth of astrophysical and cosmological observational evidence shows that the matter content of the universe is made of about 85% of non-baryonic dark matter. Huge experimental efforts have been deployed to look for the direct detection of dark matter via their scattering on target nucleons, their production in colliders, and their indirect detection via their annihilation products. (1) Inelastic scattering of high-energy cosmic rays off dark matter particles populating the Milky Way halo would produce secondary gamma rays in the final state from the decay of the neutral pions produced in such interactions, providing a new avenue to probe dark matter properties. (2) We compute here the sensitivity for H.E.S.S.-like observatory, a current-generation ground-based Cherenkov telescopes, to the expected gamma-ray flux from collisions of Galactic cosmic rays and dark matter in the center of the Milky Way. We also derive sensitivity prospects for the upcoming Cherenkov Telescope Array (CTA) and Southern Wide-field Gamma-ray Observatory (SWGO). The expected sensitivity allows us to probe a poorly-constrained range of dark matter masses so far, ranging from keV to sub-GeV, and provide complementary constraints on the dark matter-proton scattering cross section traditionally probed by deep underground direct dark matter experiments.

Palavras-chave: Dark matter. Cosmic rays. Galactic center.

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