

Hunting minimal dark matter quintuplet

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This study investigates the sensitivity of the Cherenkov Telescope Array (CTA) and Fermi Large Area Telescope (Fermi-LAT) to dark matter (DM) annihilation in γ -ray lines. We focus on observations of the Galactic Center (GC), dwarf Spheroidal galaxies (dSphs), and galaxy clusters (GClS). Specifically, we compare the reach of the GC with that of dSphs, considering the poorly known putative core radius of the DM distribution. Surprisingly, we find that the currently best dSph candidates present a more promising target than the GC, especially for core radii ranging from one to a few kiloparsecs.

In addition to CTA prospects, we extend our analysis to incorporate Fermi-LAT data. Recent advancements in computations have highlighted the impact of Sommerfeld enhancement and bound-state formation on the annihilation cross section of Minimal Dark Matter (MDM) multiplets. Exploring this new paradigm, we examine Fermi-LAT data to assess its capability to detect or rule out a potential line arising from bound-state formation processes. Our findings reveal that the Fermi-LAT data effectively rules out the MDM 5plet at a significance level of 2σ , demonstrating the importance of considering enhanced cross sections and new annihilation signatures in the quest to unravel the mysteries of dark matter.

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