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Minimal Dark Matter in the sky: updated Indirect Detection probes

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Minimal Dark Matter is among the simplest and most predictive Dark Matter frameworks, with the Majorana SU(2) 5-plet as its smallest accidentally stable real representation. We present a comprehensive reassessment of its indirect-detection signals. The γ-ray flux from both Sommerfeld-enhanced annihilations and bound-state formation is calculated, incorporating next-to-leading-order corrections and next-to-leading-log resummation of the relevant electroweak effects. In the Milky Way halo, bound-state formation dominates the flux near 100 GeV. The corresponding low-energy spectrum is used to place constraints based on Fermi-LAT observations of Galactic diffuse emission, while the high-energy part of the spectrum is employed to forecast the required observation time for several of the Milky Way's dwarf spheroidal galaxies using the Cherenkov Telescope Array Observatory (CTAO). Fermi-LAT data strongly disfavor the lower edge of the thermal mass window, even under conservative assumptions about the inner Galaxy density profile. Furthermore, several hundred hours of forthcoming CTAO observations of northern dwarfs should be sufficient to probe the central mass value.

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