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Search for dark matter using sub-PeV gamma-rays observed by Tibet AS γ

Recently, Tibet AS γ has discovered the long-awaited detection of diffuse gamma-rays with energies between 100 TeV and 1 PeV from the Galactic disk region, thus proving the existence of Galactic PeVatrons. It has been shown that these data broadly agree with prior theoretical expectations. We study the possible implication of these gamma-rays within the well-motivated scenario of Heavy DM decay into a wide range of Standard model final states in the presence of various astrophysical background models of sub-PeV gamma-rays. For almost all the final states, we have obtained the strongest constraints on the lifetime of decaying PeV-scale DM. Our constraints are robust for various DM density profiles. Near future data from Tibet AS γ and various other detectors may help us discover DM particle identity using this technique.

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