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Hunting for dark matter subhalos among the Fermi-LAT sources with VERITAS

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The distribution of dark matter in the Galaxy, according to state-of-the-art simulations, shows not only a smooth halo component but also a rich substructure where a hierarchy of dark matter subhalos of different masses is found. We present a search for potential dark matter subhalos in our Galaxy exploiting the high (HE, 100 MeV – 100 GeV) and very-high-energy (VHE, >100 GeV) gamma-ray bands. We assume a scenario where the dark matter is composed of weakly interacting massive particles of mass over 100 GeV, and is capable of self-annihilation into standard model products. Under such a hypothesis, most of the photons created by the annihilation of dark matter particles are predicted to lay in the HE gamma-ray band, where the Fermi-Large Area Telescope is the most sensitive instrument to date. However, the distinctive spectral cut-off located at the dark matter particle mass is expected in the VHE gamma-ray band, thus making imaging atmospheric Cherenkov telescopes like VERITAS the best suited instruments for follow-up observations and the characterization of a potential dark matter signature. We report on the ongoing VERITAS program to hunt for these dark matter subhalos, particularly focusing on two promising dark matter subhalo candidates selected among the Fermi-LAT Second Source Catalog unassociated high-energy gamma-ray sources.

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