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Searches for dark matter signals in the gamma-ray sky with photon count statistics

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The dissection of the gamma-ray sky into point sources and diffuse components is a valuable tool to search for new physics, such as dark matter signals. In the recent past, it has been shown that statistical analysis methods can excel the sensitivity of classic source detection approaches. In this contribution we discuss the application of photon count statistics to dark matter searches in Fermi-LAT data at different Galactic latitudes. We analyze eight years of Fermi-LAT data by considering the 1-point photon counts statistics. We aim at resolving the population of point sources and decomposing the diffuse component into Galactic foreground emission and isotropic diffuse background emission. The analysis is employed to incorporate a potential contribution from annihilating dark matter (DM), investigating the sensitivity reach of 1-point photon counts statistics for the DM thermally-averaged self-annihilation cross section. We find that the sensitivity of 1-point statistics at high Galactic latitudes is highly competitive to upper limits recently obtained with other indirect detection methods. Moreover, we illustrate the results of this method applied to low Galactic latitudes.

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