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Search for DM signal features in the Galactic gamma-ray spectra with the Fermi LAT

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Indirect dark matter searches with gamma rays involve looking for spectral signatures that could be associated to either annihilation or decay of dark matter particles in space. In this work we present the results of a search for line-like and box-like features in the gamma-ray spectra in five sky regions centered on the Galactic Center, optimized for different DM density profiles and annihilation or decay channels, using a 15-year dataset collected by the Fermi Large Area Telescope in the energy range from 1 GeV to 1 TeV. Line-like features may arise from the annihilation of dark matter particles, resulting in the direct production of gamma-ray pairs. Box-like features could arise from the annihilation of pairs of dark matter particles into pairs of light mediators which in turn decay into pairs of gamma rays. In both scenarios, the intensity of the feature is related to the velocity-averaged dark matter annihilation cross section. No statistically significant evidence of such features has been found and we use the upper limits on their intensities to constrain the velocity-averaged cross sections.

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