

Double-dipping for dark matter with gamma-rays

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Gamma-ray probes have historically been a gold-standard in indirect dark matter detection due to their smaller set of complicating factors and generally lower backgrounds. However, they are most optimally sensitive to the traditional supersymmetric WIMP annihilation channels and leptophilic channels (particularly for larger masses) are much harder to probe effectively in this manner. However, these channels do produce strong neutrino emissions but this has been complicated by lack of neutrino telescope sensitivity. In this work we display a method for inferring neutrino fluxes from gamma-ray data and using this to achieve superior constraints on the leptophilic channels of WIMP annihilation. This allows us to ‘double-dip’ re-using the same gamma-ray data sets to get a wider range of robust WIMP and stringent annihilation constraints. We demonstrate this approach with data from HESS and Fermi-LAT and use it to probe dark matter models suggested to explain recently reported cosmic-ray excesses.

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