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Comment on Calculation of Positron Flux from Galactic Dark Matter

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Energetic positrons produced in annihilation or decay of dark matter particles in the Milky Way can serve as an important indirect signature of dark matter. Computing the positron flux expected in a given dark matter model involves solving transport equations, which account for interaction of positrons with matter and galactic magnetic fields. Existing calculations solve the equations inside the diffusion zone, where galactic magnetic fields confine positrons, and assume vanishing positron density on the boundaries of this zone. However, in many models, a substantial fraction of the dark matter halo lies outside the diffusion zone. Positrons produced there can then
enter the diffusion zone and get trapped, potentially reaching the Earth and increasing the expected flux. We calculate this enhancement for a variety of models. We also evaluate the expected enhancement of the flux of energetic photons produced by the inverse Compton scattering of the extra positrons on starlight and cosmic microwave background. We find maximal flux enhancements of order 20% in both cases.

Auteurs principaux: SHAKYA, Bibhushan (Cornell University); Prof. PERELSTEIN, Maxim (Cornell University)

Orateur: SHAKYA, Bibhushan (Cornell University)

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