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A fussy revisitation of antiprotons as a tool for Dark Matter searches

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Antiprotons are regarded as a powerful probe for Dark Matter (DM) indirect detection and indeed current data from PAMELA have been shown to lead to stringent constraints. However, in order to exploit their constraining/discovery power properly and especially in anticipation of the exquisite accuracy of upcoming data from AMS, great attention must be put into effects (linked to their propagation in the Galaxy) which may be perceived as subleasing but actually prove to be quite relevant. We revisit the computation of the astrophysical background and of the DM antiproton fluxes fully including the effects of: diffusive reacceleration, energy losses including tertiary component and solar modulation (in a force field approximation). We show that their inclusion can somewhat modify the current bounds, even at large DM masses, and that a wrong interpretation of the data may arise if they are not taken into account. The numerical results for the astrophysical background are provided in terms of fit functions; the results for Dark Matter are incorporated in the new release of the PPPC4DMID.

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