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Fast and accurate AMS-02 antiproton likelihoods for global dark matter fits

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Cosmic-ray antiprotons from AMS-02 offer valuable information about the nature of dark matter, but their interpretation is complicated by large uncertainties in the modeling of cosmic ray propagation. In this talk, I intend to present a novel framework to efficiently marginalize over various uncertainties in order to obtain robust AMS-02 likelihoods for arbitrary dark matter models. The three central ingredients of this framework are the neural emulator DarkRayNet for predictions of the antiproton flux, the likelihood calculator pbarlike, and the global fitting framework GAMBIT. Systematic uncertainties from propagation, the secondary antiproton production cross section, solar modulation, and correlation in the AMS-02 data are taken into account. I plan to illustrate our approach and the limits on the annihilation cross section of WIMP dark matter in the context of a state-of-the-art global fit of the scalar singlet dark matter model, including also recent results from direct detection and the LHC.

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