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The Impact of antiproton and antimatter nuclei measurements on dark matter searches

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We study the AMS-02 antiproton/proton ratio spectral-measurement in light of the recent advances done in parametrizing the impact of solar modulation of cosmic-rays, the antiproton production uncertainties from inelastic proton-proton collisions in the Galaxy as well as the interstellar medium uncertainties that pertain to the propagation of cosmic-rays in the Milky Way. We confirm previous claims on a GeV bump in antiprotons. Including all the relevant astrophysical uncertainties there is a ˜3 sigma significance of a feature in the antiproton/proton ratio that if interpreted as a signal of dark matter annihilation, it would be suggestive of a 50-100 GeV dark matter particle with a partial annihilation cross-section to hadrons that is in the range of $\sigma v : 1 - 10 \times 10^{-26}$ cm^3/s. We also discuss the impact that the recent discovery of anti-helium 3 and 4 nuclei by AMS-02 has on the dark matter searches in antimatter cosmic-rays.

Author: CHOLIS, ILIAS (Johns Hopkins University)

Co-authors: LINDEN, Tim (U); HOOPER, dan

Presenter: CHOLIS, ILIAS (Johns Hopkins University)

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