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Antihelium from Dark Matter Annihilation

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Observations by AMS-02 on the International Space Station have tentatively detected approximately 10 events that are consistent with antihelium nuclei. This observation is of significant interest due to the difficulty in producing any detectable antihelium flux through standard model interactions. In this talk, I will discuss the state of these observations, focusing on detailed theoretical models that may be able to significantly enhance the antihelium flux from dark matter annihilation, including: (1) a previously-missed standard model mechanism where $\overline{\Lambda_b}$ particles produced by dark matter can efficiently decay into antihelium nuclei, (2) the possibility that the dark sector includes dark-QCD interactions which can efficiently produce multi-baryon final states that efficiently coalesce into antihelium (and even more exotic) particles. I will discuss the possibility that rare decays into antihelium may beat the more popular gamma-ray, antiproton, and positron channels to produce the first evidence of particle dark matter.

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