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Forging anti-helium in a dark matter crucible

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The cosmic-ray experiment AMS-02 has reported the possible detection of ~ 10 anti-helium events. Conventional production mechanisms struggle to explain the similar fluxes observed for both isotopes ${}^4\overline{\text{He}}$ and ${}^3\overline{\text{He}}$. In this talk, I discuss how these species could be created through “anti-nucleosynthesis” occurring in fireballs of standard model antiquarks, leptons, and photons expanding with a relativistic bulk velocity. Such fireballs may be initiated by collisions between heavy composite states in the dark sector that carry negative baryon number. Since the fireballs are thermalized, our explanation has the distinction of being agnostic to the particular dark matter model employed. It has the additional advantage of naturally producing nuclei travelling relativistically with $\gamma \sim 10$, as observed.

Submitted on behalf of a Collaboration?

No

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