

CR antinuclei predictions and their detectability in the next years

Wednesday 31 May 2023 16:50 (5 minutes)

The creation of anti-nuclei in the Galaxy has been discussed as a possible signal of exotic production mechanisms such as primordial black hole evaporation or dark matter decay/annihilation in addition to the more conventional production from cosmic-ray (CR) interactions. Tentative observations of cosmic-ray antihelium by the AMS-02 collaboration have re-energized the quest to use antinuclei to search for physics beyond the standard model.

In this talk, we show state-of-art predictions of the antinuclei flux from both astrophysical and standard dark matter annihilation models from combined fits to high-precision antiproton data as well as cosmic-ray nuclei measurements (B, Be, Li). Astrophysical sources are capable of producing $\mathcal{O}(1)$ antideuteron events and $\mathcal{O}(0.1)$ anti-helium events over 15 years of AMS-02 observations. Standard dark matter models could potentially produce $\mathcal{O}(1)$ antihelium event, while the production of a larger antihelium flux would require more novel dark matter model building. Finally, we discuss that the annihilation/decay of a QCD-like dark sector could potentially explain the AMS-02 preliminary observations of antihelium-3 and antihelium-4.

Would you be interested in presenting a poster? (this will not impact the decision on your talk)

no

Primary author: DE LA TORRE LUQUE, Pedro

Presenter: DE LA TORRE LUQUE, Pedro

Session Classification: Particle Astrophysics