

Deuteron and Helium-3 production cross sections and propagation in the Galaxy [10'+5']

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The AMS collaboration has published recent results on deuteron-over-helium-4 ($d/{}^4\text{He}$) and helium-3-over-helium-4 (${}^3\text{He}/{}^4\text{He}$) cosmic rays flux ratios with unprecedented precision and covering a wider energy range than previous experiments. Both $d/{}^4\text{He}$ and ${}^3\text{He}/{}^4\text{He}$ ratios are important to understand the propagation of cosmic rays in the Galaxy and the heliosphere, complementing observations with heavier nuclei like the boron-to-carbon ratio. Interestingly, the AMS has found that deuterons have a sizeable primary-like component, instead of being mostly secondary as expected. To better interpret such revealing observations is necessary to understand in more detail the secondary component that depends on production cross sections, propagation parameters in the transport model, and their uncertainties.

In this work, we revisit the deuterons and helium-3 production cross sections through fragmentation of heavier nuclei, as well as their uncertainties, and we study their propagation in the Galaxy comparing the resulting flux ratios to AMS measurements.

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