

A novel approach for \overline{He} research in cosmic rays with neural networks.

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Anti-nuclei heavier than anti-D are unlikely to be formed during cosmic rays (CRs) propagation, as confirmed by the PHOENIX and ALICE collaborations. Anti-He observations could be related to Dark Matter interactions. Dedicated experiments must possess high charge sign discrimination to observe anti-He due to the He abundance in CR. Detector's effects, such as the rigidity resolution and the internal interactions, may lead to misidentifying matter as antimatter, producing a dominant background over rare signal candidates. In this work, we developed a Monte Carlo simulation to mimic the response of an AMS-02 like detector, identifying several phenomena that misidentify He as anti-He. We then implemented a fully connected neural network, trained over diverse sources of charge sign confusion, to quantify the event reconstruction quality. This tool could reduce the He background for the research for anti-He in CRs, improving the current capability to search for heavy antimatter in space.

Alternate track

1. Astro-particle Physics and Cosmology

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Yes

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