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ML techniques to search for antideuterons with AMS-02 on the International Space Station

Most of the antimatter in cosmic rays is produced by collisions of high energy particles with the interstellar medium while they propagate through it. The detection of an antimatter component over the collisional background can be used to investigate new sources, as the presence of dark matter annihilations in the halo. A possible smoking gun for dark matter is given by the detection of antideuterons below the GeV/n scale, where the secondary production is forbidden by kinematics and the presence of anti-deuterons can be associated only with exotic processes. The Alpha Magnetic Spectrometer (AMS) installed in 2011 on the International Space Station, is a large field of view high-energy particle detector able to measure rare antimatter components. However, the antideuteron search requires a high level of background rejection, coming from cosmic protons and antiprotons. In this talk I will discuss the experimental methods, and the ML techniques, that are used to reject the background in the AMS data.

AI keywords

Classification, DNN, BDT

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Track Classification: Patterns & Anomalies