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Enhancement of Beta Measurements Accuracy in AMS-02 for Isotopes Analysis

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The Alpha Magnetic Spectrometer (AMS-02) is a precision particle physics detector installed on the International Space Station (ISS). It provides independent rigidity and beta measurements of cosmic particles with exceptional accuracy. While the rigidity measurements from AMS have been extensively studied, understanding the accuracy of beta measurements is crucial for isotopes analysis. This work focuses on studying the beta measurement accuracy from the AMS Ring Imaging Cherenkov Detector (RICH). The study investigates the dependencies of beta accuracy on cosmic nuclei charge, the fraction of reflected Cherenkov photons, time, and spatial positions. Corrections are applied to RICH beta measurements based on these results, ensuring a reliable template of mass for determining isotopic fractions. These methodologies guarantee the precision of the measurements of isotopes fluxes. The details of the methods are illustrated in this work.

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