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Nuclei charge measurement with AMS-02 Silicon Tracker

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The Alpha Magnetic Spectrometer (AMS-02) is an astroparticle physics detector installed on the International Space Station (ISS) on May 16th 2011 during the STS-134 NASA Endeavour Shuttle mission. The purpose of the experiment is to study with unprecedented precision and statistics charged particles and nuclei in an energy range from 0.5 GeV to few TeV. The AMS-02 Tracker System accurately determines the trajectory and absolute charge (Z) of cosmic rays by multiple measurements of the coordinates and energy loss in nine layers of double sided silicon micro-strip detectors.

This energy loss is proportional to the square of the particle charge thus allowing the distinction between different nuclei. The analog readout and the high dynamic range of the front end electronics allows to identify nuclear species from hydrogen up to iron and above. The charge resolution is naturally degraded by a number of detector effects that need to be correctly accounted for.

In this contribution we describe the procedure that has been used to accurately calibrate the Tracker response and optimize its performances in terms of charge resolution. We will discuss the resulting analysis methods available to identify different particle species in the tracker, and present the overall measured performances.

Collaboration

AMS

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