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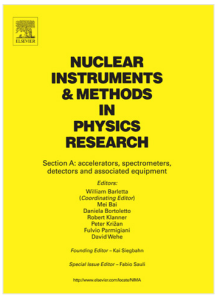

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Mass Resolution for Helium Isotopes in AMS-02

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Abstract

AMS-02 determines the mass and the isotopic composition of the helium cosmic rays nuclei in the kinetic energy range 0.5–10 GeV/n by means of the measurements of the momentum and velocity of the particles. A precise knowledge of the detector response to helium nuclei is required to accomplish these measurements. In this work, we present a detailed study of the mass resolution for helium isotopes comparing the Monte Carlo simulation of AMS with the 5-year data sample taken on the International Space Station.

Keywords: AMS-02, Cosmic Rays, Helium Isotopes
PACS: 98.35.Ce, 28.60.+s, 29.30.Aj

Introduction

Helium is the second most abundant element in cosmic rays. The precise measurement of the ^{3}He/^{4}He ratio in cosmic ray fluxes will improve the understanding of galactic cosmic ray propagation as ^{3}He is produced mainly from nuclear interactions of primary ^{4}He with interstellar matter [1]. In the past 50 years, many experiments have studied the ^{3}He/^{4}He ratio [2], but no experiment has ever before measured the ^{3}He/^{4}He in the range between 6 to 10 GeV/n. The Alpha Magnetic Spectrometer (AMS-02) will measure the ^{3}He/^{4}He ratio between a 0.5 of a GeV/n and 10 GeV/n with a statistical accuracy better than 0.008, owing to the 3×10^9 helium events collected over 5 years in space, an amount several orders of magnitude larger than all previous measurements. In this work a systematic study of the mass resolution for helium isotopes and its impact on the accuracy of the ^{3}He/^{4}He ratio measurement will be discussed.