

A Data-Driven approach for the measurement of $^{10}\text{Be}/^9\text{Be}$ flux ratio in Cosmic Ray with magnetic spectrometers

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Cosmic Rays (CR) are a powerful tool for the investigation of the structure of the magnetic fields in the galactic halo and the property of the Inter-Stellar Medium.

Two parameters of the Cosmic Ray propagation models: the galactic halo thickness, H , and the diffusion coefficient, D , are loosely constrained by current CR flux measurements, in particular a large degeneracy exists being only H/D well measured.

The $^{10}\text{Be}/^9\text{Be}$ isotopic flux ratio (thanks to the 2 My lifetime of ^{10}Be) can be used as a radioactive clock providing the measurement of CR residence time in the galaxy. This is an important tool to solve the H/D degeneracy.

Past measurements of $^{10}\text{Be}/^9\text{Be}$ isotopic flux ratio in CR are scarce, limited to low energy and affected by large uncertainties. Here a new technique to measure $^{10}\text{Be}/^9\text{Be}$ isotopic flux ratio with a Data-Driven approach in magnetic spectrometers is presented.

As an example by applying the method to Beryllium data collected and published by PAMELA collaboration it is now possible to determine this important measurement avoiding the prohibitive uncertainties coming from the Monte Carlo simulation. It is shown that the accuracy of PAMELA data permits to infer a value of the halo thickness H within 25% precision.

Keywords

radioactive cosmic rays; propagation models; halo thickness; beryllium

Collaboration

other Collaboration

Subcategory

Theoretical Methods

Primary authors: NOZZOLI, Francesco (Istituto Nazionale Fisica Nucleare (INFN) - TIFPA); CERNETTI, Cinzia (Trento University & INFN-TIFPA)

Presenter: NOZZOLI, Francesco (Istituto Nazionale Fisica Nucleare (INFN) - TIFPA)

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