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Cosmic-ray beryllium isotope ratio measured by BESS Polar-II

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The cosmic-ray propagation in the Galaxy has not yet been understood in detail. The flux ratio of secondary to primary components among the cosmic radiation have been measured by many experiments providing important information to understand the average amount of interstellar material traversed by cosmic rays. However, such ratio cannot strongly constrain another essential parameter of the cosmic-ray confinement time. The most direct method to estimate the confinement time is to measure the abundance of radioactive component that has a decay time comparable to the confinement time. Among them, the most attractive one is beryllium which has two stable isotopes (7Be and 9Be) and one unstable 10Be with a decay time of 1.4 Myr. The 10Be/9Be ratio has not been measured, except for few cases such as ISOMAX, because of the small statistics of 10Be and the difficulty of distinguishing these isotopes.
The Balloon-borne Experiment with a Superconducting Spectrometer (BESS) has carried out precise observation of the low-energy cosmic rays. Using a tracking system (in a 0.8 T uniform magnetic field) with a rigidity resolution of ~0.4% at 1 GV and a time-of-flight system with a time resolution of 120 ps, the BESS instrument enables us to distinguish isotope events. In December-January 2007- 2008, BESS-Polar II achieved a 24.5-day observation during its balloon flight over Antarctica. By using 4.7 billion cosmic-ray event data obtained during the flight, rare 10Be events have been searched and analyzed. We will report the beryllium isotope ratio integrated in the BESS-Polar II analysis.

Keywords

cosmic ray; isotope; balloon experiment; propagation

Collaboration

other Collaboration

Subcategory

Experimental Results

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