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Precision Measurement of 3He-to-4He ratio in Cosmic Rays with the AMS Detector on the Space Station

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The knowledge of the energy dependence of the ^{3}He-to-^{4}He flux ratio (^{3}He/^{4}He) is one of the most important sources for studying and testing cosmic ray propagation models.

Similar to the B/C measurement, where B is assumed to originate from interactions of primary Carbon and Oxygen in Cosmic Rays, in the ^{3}He/^{4}He measurement ^{3}He is assumed to be produced by interactions of ^{4}He and heavier nuclei with the interstellar matter.

The ^{3}He/^{4}He ratio is a powerful tool for determining the amount of interstellar material traversed by cosmic rays and, and since ^{4}He has smaller cross section compared to C and O, this provides testing of the propagation models over larger travelled distances.

The AMS results are unique and distinct from all the previous data and they are presented here for the first time. The AMS ^{3}He/^{4}He flux ratio is based on 9 million ^{3}He events and 56 million ^{4}He events and it extends from 0.7 GeV/n to 10 GeV/n in a region where previous measurements have large errors and are not consistent with each other. This prevents accurate comparison with models. We will present comparison of our results with theoretical models.

Experimental Collaboration

AMS collaboration

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