

Precision Measurement of the Proton and Helium Flux in Primary Cosmic Rays with AMS-02

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Knowledge of the precise rigidity dependence of the proton and helium fluxes in cosmic rays is important in understanding their origin, acceleration and propagation processes. We present a precision measurement of the proton flux at rigidity from 1 GV to 1.8 TV

and the helium flux at rigidity from 2 GV to 3 TV. The measurement is based on the data collected by the Alpha Magnetic Spectrometer experiment on the International Space Station. We present the detailed variation with rigidity of the flux spectral indices.

The proton and helium fluxes are found to progressively harden at rigidities larger than 100 GV. The rigidity dependence of the helium flux spectral index is similar to that of the proton spectral index though the magnitudes are different. Remarkably, the spectral index of the proton to helium flux ratio increases with rigidity up to 45 GV and then becomes constant. The flux ratio above 45 GV is well described by a single power law.

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