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Antiproton Flux and Properties of Elementary Particle Fluxes in Cosmic Rays Measured with the Alpha Magnetic Spectrometer on the ISS

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Precision measurements by AMS reveal unique properties of cosmic charged elementary particles. In the absolute rigidity range ~ 60 to ~ 500 GV, the antiproton flux and proton flux have nearly identical rigidity dependence. This behavior indicates an excess of high energy antiprotons compared with secondary antiprotons produced from the collision of cosmic rays. More importantly, from ~ 60 to ~ 500 GV the antiproton flux and positron flux show identical rigidity dependence. The positron-to-antiproton flux ratio is independent of energy and its value is determined to be a factor of $1.98 \pm 0.03 \pm 0.05$. This unexpected observation indicates a common origin of high energy antiprotons and positrons in the cosmos. Below 60 GV the antiproton spectrum can not be explained by cosmic rays collisions and above 60 GV the antiproton spectrum can not be explained by latest theoretical models.

Collaboration(s)

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