Contribution ID: **12** Type: **not specified**

Temporal Structures in Electron and Positron Spectra and Charge Sign Effects in Galactic Cosmic Rays

Monday, 25 September 2023 12:20 (15 minutes)

We present the precision measurements of eleven years of daily cosmic electron and positron fluxes in the rigidity range from 1.00 to 41.9 GV based on 2.0×10ˆ8 electrons and 3.4×10ˆ6 positrons collected with the Alpha Magnetic Spectrometer (AMS) aboard the International Space Station.

The electron fluxes exhibit variations on multiple timescales. Recurrent electron flux variations with periods of 27 days, 13.5 days, and 9 days are observed.We find that the electron fluxes show distinctly different time variations from the proton fluxes. Remarkably, a hysteresis between the electron flux and the proton flux is observed with a significance of greater than 6σ at rigidities below 8.5 GV. Furthermore, significant structures in the electron-proton hysteresis are observed corresponding to sharp structures in both fluxes. This continuous daily electron data provide unique input to the understanding of the charge sign dependence of cosmic rays over an 11-year solar cycle.

The positron fluxes show distinctly different time variations from the electron fluxes at short and long time scales. A hysteresis between the electron fluxes and the positron fluxes is observed with a significance greater than 5σ at rigidities below 8.5 GV. On the contrary, the positron fluxes and the proton fluxes show similar time variation. Remarkably, we found that positron fluxes are modulated more than proton fluxes with a significance greater than 5σ for rigidities below 7 GV. These continuous daily positron fluxes, together with AMS daily electron, proton, and helium fluxes over an eleven-year solar cycle, provide unique input to the understanding of both the charge sign and mass dependencies of cosmic rays in the heliosphere.

Primary author: Dr SUN, Zetong (高能所)

Presenter: Dr SUN, Zetong (高能所)

Session Classification: 粒子物理 1 组