

Possible primary-electron-spectrum hardening at ~ 240 GeV:

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The data collected by ATIC, CREAM and PAMELA all display remarkable cosmic-ray-nuclei spectrum hardening above the magnetic rigidity ~ 240 GV. One natural speculation is that the primary electron spectrum also gets hardened at ~ 240 GeV, which can partly account for the electron/positron total spectrum excess discovered by ATIC, HESS and Fermi-LAT. The subsequent positron-to-electron ratio may get flattened or even decreased, depending on the degree of the primary electron spectrum hardening. Such modification is detectable for AMS-02, a mission dedicated to measure the high energy cosmic ray spectra with unprecedented accuracy. The spectrum hardening of both primary-electrons and nuclei at ~ 240 GV, if confirmed by AMS-02 in the future, is likely attributed to a “nearby” supernova-remnant-like source with a lifetime $\lesssim 10^{13}$ s. Possible dark matter origin of the positron excess revealed by PAMELA is also investigated.

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