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Understanding the Origin of Cosmic-Ray Electrons

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We present the latest precision measurements of the electron flux based on 57 million electron events collected by the Alpha Magnetic Spectrometer on the International Space Station during first eleven years of operations. These results on cosmic-ray electrons in the energy range from 0.5 GeV to 2 TeV reveal new features that are crucial for providing insights into their origins. Comparing the behavior of the electron spectrum with the spectrum of positrons measured by AMS, we found that at lower energies below few hundred GeV these two spectra have distinctly different magnitudes and energy dependences. This shows that at lower energies these two species of cosmic ray particles have very different origins. At high energies we observe that the source of high energy positrons, which has either particle or astrophysical origin, also manifests itself in the electron spectrum. This is the first indication of the existence of identical charge symmetric source term both in the positron and in the electron spectra and, as a consequence, the existence of new physics.

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