

Making sense of recent results on electrons and positrons from cosmic ray experiments

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The new AMS-02 measurements of the cosmic-ray (CR) electron and positron energy spectra have provided spectacular confirmation of the earlier claim by PAMELA and FERMI of a rising positron-over-electron fraction and, for the first time, have identified a sharp drop-off of the positron flux above ~ 300 GeV and a tiny change of the electron slope at ~ 40 GeV. At the same time, HESS, CALET and DAMPE have reported substantial steepening of the total lepton spectrum at \sim TeV with a spectral index softening by about 1.

I will present the results of a novel calculation of the flux of electrons and positrons as produced by SNRs, Pulsar Wind Nebulae (PWN) and secondary interactions of CRs in the Galaxy. In particular, I will show under which conditions for the injection and transport of these particles the reported spectral features can be consistently reproduced and I will discuss the connection with the recent detection of extended “TeV Halos” around Pulsars.

Finally, I will review the consequences of the stochasticity in the occurrence of source events specifically if these are correlated with the spiral arms of the Galaxy, and I will oppose the scenario in which the observed features are the effect of prominent nearby sources.

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