

Possible interpretations to AMS-02 electron and positron data

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We present a combined analysis of the recent AMS-02 data on electrons, positrons, electrons plus positrons and positron fraction. We consider a self-consistent framework where we realize a theoretical modeling of all the astrophysical components that can contribute to the observed fluxes. The primary electron contribution is modeled through a smooth spatial distribution of distant supernova remnants and with the fluxes from the local sources taken from the Green catalog. The secondary electron and positron contribution originates from interactions on the interstellar medium of primary cosmic rays, for which we derive a novel determination by using AMS-02 proton and helium data. Primary positrons and electrons from pulsar wind nebulae are calculated using the objects from the ATNF catalog. We obtain a remarkable agreement between our various modeling and the AMS-02 data for all types of analysis, demonstrating that the whole AMS-02 leptonic data admit a self-consistent interpretation in terms of astrophysical contributions. Other exotic emission mechanisms could produce a sizeable flux of electrons and positrons. Probably the most popular one is from the interaction of Weakly Interactive Massive particles (WIMPs) of Dark Matter (DM). Taking into account the above cited astrophysical contributions and adding also the flux from DM annihilation, we derive upper limits for the annihilation cross section of DM. We compare also the shape of high energy positrons flux from pulsars wind nebulae and DM respect to AMS-02 data trying to predict which of these two components should explain this part of the measured spectra.

Summary

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