Contribution ID: **278** Type: **Talk**

Stochastic cosmic ray sources and the TeV break in the all-electron spectrum

Thursday, 30 August 2018 14:00 (17 minutes)

Despite significant progress over more than 100 years, no cosmic ray accelerator has been unambiguously identified as the source of the locally measured flux. High-energy electrons and positrons are of particular relevance in the search for sources as radiative energy losses constrain their propagation to distances of about 1 kpc. At the highest energies, the measured spectrum is dominated and shaped by only a few sources whose properties can likely be inferred from the fine structure of the spectrum. Ignoring the stochasticity of nearby sources leads to models that cannot fit the data at energies currently accessed by experiments like AMS-02, CALET, DAMPE, Fermi-LAT, HESS and ISS-CREAM.

We start by critically assessing the reliability of using catalogues of known sources to model the electron-positron flux. Next, we present the results from a large suite of Monte Carlo simulations for the electron-positron flux based on a statistical ensemble of sources. This allows assessing the statistical compatibility of the models with the measurements. Specifically, we quantify the non-Gaussian fluctuations due to the stochasticity of sources in a realistic propagation setup. For the first time, we also consider the correlations of the measured flux in different energy bins, which allows differentiating astrophysical source models from exotic explanations, like dark matter. We conclude that the spectral break observed in the all-electron spectrum by HESS and recently by DAMPE is fully compatible with a distribution of astrophysical sources like supernova remnants.

Primary author: MERTSCH, Philipp (TTK, RWTH Aachen University)

Presenter: MERTSCH, Philipp (TTK, RWTH Aachen University)

Session Classification: Cosmic Rays

Track Classification: Cosmic Rays