

Anomalies in the gamma-ray diffuse emission of the Galaxy and implications for the interpretation of IceCube results

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Several independent analyzes of Fermi-LAT results found evidences of a spatial dependence of the cosmic ray (CR) proton spectral index which is not accounted for in conventional models of CR transport in the Galaxy. Moreover, several CR experiments have established the presence of a CR spectral hardening above few hundred GeV.

We show that these results may have a relevant impact on the gamma-ray and neutrino diffuse emissions of the Galaxy above the TeV. Indeed a phenomenological model which adopts a spatial dependent diffusion coefficient, so to account for those features, also reproduces the gamma-ray excess found by Milagro at 15 TeV as well as other gamma-ray data sets. HAWC and LHAASO should soon confirm or reject this scenario. The same model predicts a neutrino emission along the Galactic plane which is significantly larger than expected on the basis of conventional models. This emission is compatible with ANTARES upper limits and may soon be detected by IceCube.

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