

## The Galactic diffuse gamma-ray emission meets the PeV frontier

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The Tibet AS $\gamma$  and LHAASO collaborations recently provided the first evidence of a diffuse  $\gamma$ -ray emission in the Galaxy up to the PeV from the Galactic plane. Due to the challenges this imposes to current theoretical models it is crucial to carefully study different scenarios of diffuse  $\gamma$ -ray production, specially towards the centre of the Galaxy. In particular, the current models of diffuse emissions struggle to reproduce AS $\gamma$  and LHAASO data.

In this contribution, we show that these measurements seem to favour an inhomogeneous transport of cosmic rays throughout the Galaxy, specially motivated by the measurements of the Fermi-LAT detector. Moreover, we discuss the relevance of non-uniform cosmic-ray transport scenarios and the implications of these results for cosmic-ray physics and show that the energy spectra measured by Tibet AS $\gamma$ , LHAASO, ARGO-YBJ and Fermi-LAT in several regions of the sky can be consistently described in terms of the emission arising by the Galactic cosmic-ray “sea”. We also comment on the impact of other possible contributions, as the  $\gamma$ -ray emission from TeV halos or unresolved sources.

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