

## The Galactic diffuse gamma-ray and neutrino emission at 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 from the Galactic plane up to the PeV. 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 Galactic diffuse  $\gamma$ -ray emission struggle to reproduce AS $\gamma$  and LHAASO measurements, while consistently reproducing the lower energy 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 Fermi-LAT detector. Moreover, we discuss the relevance of non-uniform cosmic-ray transport scenarios and the possible detectability of the associated diffuse Galactic neutrino emission by IceCube or Km<sup>3</sup>Net in the next years.

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