PhD Summer School on Neutrinos

Here, There & Everywhere

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Constraining very high energy diffuse gamma (and neutrino) emission with Tibet ASγ data.

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The Tibet ASγ experiment provided the first measurement of the total diffuse gamma-ray emission from the Galactic disk in the sub-PeV energy range.
This measurement can be used to constrain the cosmic-rays (CRs) space and energy distribution and consequently the gamma-neutrino Galactic diffuse emission, produced by the interaction of CRs with the interstellar medium.
The interpretation of Tibet ASγ observational data might be not straightforward because of the presence of a non-negligible contribution from faint unresolved sources that adds up to the truly diffuse emission produced by CRs, shaping the energy and space dependence of the total (i.e. truly diffuse + unresolved) observed gamma-ray flux.
Based on analysis of the TeV sources included in the HGPS catalog, we predict the expected contribution of unresolved pulsar-powered sources in the two angular windows of the Galactic plane observed by Tibet ASγ. We show that, with the inclusion of this additional diffuse component due to unresolved sources, the Galactic diffuse emission well saturates the Tibet data, without the need to introduce a progressive hardening of the CR spectrum toward the Galactic center. Under this condition, one obtains a prediction of the Galactic neutrino diffuse emission above 100 TeV showing that they can contribute at most to 5% of the total neutrino flux observed by IceCube.

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