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Diffuse Neutrino Emission from the Milky Way

The recent result from IceCube detecting the Milky Way (MW) in neutrinos is the first step towards including these particles in multi-messenger studies of our Galaxy.
The origin of the MW's cosmic rays (CRs) and their maximum energies can be constrained from the observed Galactic neutrino flux by comparing the measurements to the modelled spectra from CR propagation codes.

Using the latest version of the state-of-the-art GALPROP CR propagation framework we compute predictions for the Galactic diffuse neutrino flux.
We consider multiple smoothly varying distributions for the CR accelerator positions to construct a range of results from the diffuse models.
We then compare these neutrino predictions from GALPROP to the IceCube observations.
Additionally, as the Galactic neutrino and gamma-ray emissions are connected, we also investigate possible constraints provided by the LHHAASO observatory.
We derive a range of possible diffuse neutrino fluxes from the LHAASO gamma-ray observations and make comparisons to the GALPROP predictions.

We find that GALPROP successfully reproduces the neutrino observations from IceCube and the neutrino estimates from LHAASO within experimental uncertainties with no alterations to the models.

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