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Neutrino predictions from choked Gamma-Ray Bursts and comparison with the observed cosmic diffuse neutrino flux

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The strong constraints from the Fermi-LAT data on the isotropic gamma-ray background suggest that the neutrinos observed by IceCube might possibly come from sources that are hidden to gamma-ray observations. A possibility emerged in recent years is that neutrinos may come from jets of collapsing massive stars which fail to break out of the stellar envelope, and for this reason they are known as choked jets, or choked Gamma-Ray Bursts (GRBs). We here show our predictions of neutrino flux and spectrum expected from these sources, focusing on Type II SNe, through detailed calculations of $\nu\nu$ interactions and accounting for all the neutrino production channels and scattering angles. We provide predictions of expected event rates for ANTARES, IceCube, and the next generation neutrino telescope KM3NeT. We also compute the contribution of the choked GRB population to the diffuse astrophysical neutrino flux, thus providing constraints on the local rate of this source population as to reproduce the observed neutrino flux.

Summary

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