

Neutrino predictions from choked GRBs and comparison with the observed cosmic neutrino flux

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The lack of spatial anisotropies in the sky map distribution of observed cosmic neutrinos hints towards the extra-galactic nature of their major sources. However, strong constraints are imposed by the Fermi-LAT data on the isotropic gamma-ray background regardless of the neutrino production mechanism, suggesting that the observed neutrinos might possibly originate in sources that remain hidden to gamma-ray observations. We discuss the possibility that neutrinos may come from choked jets, namely those resulting from a supernova explosion such that the collimated material fail to break out of the stellar envelope. Here we estimate the neutrino flux and spectrum expected from choked Gamma-Ray Bursts (GRB), by performing detailed calculations of $\text{p}\gamma$ interactions and accounting for all the neutrino production channels and scattering angles. We provide predictions of expected event rates for operating neutrino telescopes, as ANTARES and IceCube, as well as for under construction telescopes, as 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.

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