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## Unravelling the Nature of Collapsar Jets with Neutrinos

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Collapsar jets may be copious factories of high energy neutrinos, whose production takes place through photo-hadronic and hadronic interactions. Since neutrinos point back to the source that produced them, they have the potential to unravel puzzling features displayed by astrophysical objects. We post-process the outputs of state-of-the-art general relativistic magneto-hydrodynamic simulations of collapsar jets and investigate possible sites of particle acceleration and neutrino production in the deepest outflow regions. If the jet is magnetized, subphotospheric neutrinos with energies up to  $E_\nu \leq \mathcal{O}(10^5)$  GeV can be produced through collisionless sub-shocks and magnetic reconnection. More than one neutrino event could be observed in Hyper-Kamiokande and IceCube DeepCore for nearby jets. Such a signal is only expected from magnetized outflows. Hence, follow-up searches in the direction of transients harboring relativistic jets with existing and upcoming neutrino telescopes will be crucial to unravel the nature of collapsar jets.

### Submitted on behalf of a Collaboration?

No

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