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Neutrino propagation in winds around the central engine of SGRB

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Content

Since neutrinos can escape from dense regions without being deflected, they are promising candidates to study the unexplored physics at the sources that produce them. In particular, current detectors can reconstruct, among other things, trajectory, energy, and flavor compositions of incident neutrinos, which are essential for this purpose. We centralize our study in those produced by thermal processes in short gamma-ray bursts (sGRBs) and their interactions within the central engine's anisotropic medium. On the one hand, we consider baryonic winds produced with a strong magnetic contribution, and on the other hand, we treat only neutrino-driven winds. First, we obtain the effective neutrino potential considering both baryonic density profiles around the central engine. Then, we get the three-flavor oscillation probabilities in this medium to finally calculate the expected neutrino ratios. We find a stronger angular dependence on the expected neutrino ratios, which, incidentally, contrast from the expected theoretical ratios without considering the additional contribution of the winds. The joint analysis of this observable, together with the sGRB ejected jet angle, could lead to an effective mechanism to discriminate between the involved merger progenitors (black hole-neutron star or neutron star-neutron star).

Summary

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