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Remaining compact object during the collapse scenario: a neutrino approach

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Gamma-ray bursts (GRBs) correspond to the most energetic electromagnetic events known. These events can release a large amount of energy during a time scale ranging from a few milliseconds to tens of seconds. Based on their duration, we can classify them into short and long events, being the production process in each case different. In this work, we study this sort of astrophysical source through neutrinos. In particular, we focus our work on those neutrinos produced by thermal processes during the collapsar model that explain the production of the long GRBs (lGRBs). Within this model, the central remnant left after the star's collapse is either a neutron star (NS) or a black hole (BH). In the first case, several authors have even discussed a magnetar whose magnetic field is stronger than in the second case. Considering this additional contribution, we study neutrino oscillation and propagation in both scenarios to find how the neutrino flavor ratios are modified when propagating through both media with different background conditions. These results act as an additional detection channel to determine the surviving compact object left behind.

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