

Testing Neutrino Mass Origins with Supernova Neutrinos

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The origin of non-zero neutrino mass remains unknown. Currently, there are many possibilities for generating a neutrino mass. We divide them into two categories, the vacuum neutrino mass and the dark neutrino mass. Both the vacuum mass and the dark mass can fit the current oscillation data. For the vacuum mass, the value is only a constant. However, the dark mass is proportional to the DM number density and therefore varies on the galactic scale. This difference leads to different neutrino group velocities and the arrival time delay of core-collapse supernovae (SN) neutrinos. We find that this time delay can be used to distinguish the vacuum and dark neutrino masses.

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