

Signatures of dark matter sterile neutrinos in core-collapse supernovae

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The nature of dark matter and the explosion mechanism of core-collapse supernovae may both be explained by the presence of a sterile neutrino. Observations of galaxies and galaxy clusters are indicative of a $\sim\text{keV}$ mass sterile neutrino. Oscillations between an electron neutrino and a sterile neutrino in the $\sim\text{keV}$ mass range may provide an efficient energy transport mechanism between the proto-neutron star and stalled shock wave. We have performed simulations of core-collapse supernovae for a range of sterile neutrino masses and mixing angles that are consistent with dark matter. We have found that, for many choices of mass and mixing angle, the presence of a sterile neutrino is sufficient to enhance the neutrino reheating and result in a successful explosion.

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