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Lifting the core collapse supernova bounds on keV mass sterile neutrinos

We develop a radial- and time-dependent calculation of the ν_e-ν_s mixing inside the supernovae core by taking into account matter enhanced resonances, reconversions, and collisional production of the sterile neutrinos. The dynamical feedback, generated by the sterile neutrino production on the chemical potentials of leptons and baryons as well as the thermodynamic properties of the core, has major consequences for the supernovae physics for large mixing angles ($\sin^2 2\theta > 10^{-10}$). We find that the self-consistent treatment of the electron-sterile neutrino mixing in the supernova core lifts the bounds on the sterile neutrino mass and mixing in the parameter space (m_s, $\sin^2 2\theta$) relevant for the dark matter searches.

Mini-abstract

New treatment of active-sterile neutrino mixing in supernovae challenges sterile neutrino bounds.

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