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Collective neutrino oscillations and r-process nucleosynthesis in supernovae

HUAIYU DUAN, University of New Mexico

Neutrinos can oscillate collectively in a core-collapse supernova. This phenomenon can occur much deeper inside the supernova envelope than what is predicted from the conventional matter-induced Mikheyev-Smirnov-Wolfenstein effect, and hence may have an impact on nucleosynthesis. The oscillation patterns and the r-process yields are sensitive to the details of the emitted neutrino fluxes, the sign of the neutrino mass hierarchy, the modeling of neutrino oscillations and the astrophysical conditions. The effects of collective neutrino oscillations on the r-process will be illustrated using representative late-time neutrino spectra and outflow models.