

Neutrino spin-flavour and collective oscillations in supernovae

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We present an analysis of a neutrino flux evolution in an extreme astrophysical environment peculiar to supernovae accounting for effects of an arbitrarily moving media and a strong magnetic field. For neutrinos propagating inside a supernova the resonances in the flavour and spin-flavour oscillations engendered by the neutrino magnetic moment interaction with a magnetic field and weak interactions with the transversally moving matter are accounted for [1,2]. In addition, we also account for the effect of the collective neutrino oscillations and discuss possible spectral splits of the final neutrino fluxes that can arise due to spin and spin-flavour oscillations in this case.

[1] A. Studenikin, Neutrinos in electromagnetic fields and moving media, Phys.Atom.Nucl. 67 (2004) 993-1002 (Yad.Fiz. 67 (2004) 1014-1024).

[2] P. Pustoshny, A. Studenikin, Neutrino spin and spin-flavour oscillations in transversal matter currents with standard and non-standard interactions, Phys. Rev. D 98 (2018) 113009.

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