

Neutrino scattering in the neutrino heat conduction theory

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The neutrino heat conduction theory (NHC) has been first formulated in [1] when neutrino transport is dominated by neutrino absorption. Here we generalize the NHC by taking into account neutrino scattering as well. The NHC consistently describes fluxes of energy and lepton charge emerging from the neutrino opaque core. In comoving frame, the fluxes are proportional to the gradients of temperature and neutrino chemical potential. In the case of incoherent neutrino scattering (e.g., by electrons), the factors of proportionality are averaged over the neutrino energy using weight functions that can be found by numerical solution of simple integral equations. Incoherent neutrino scattering enters the NHC through 0-th and 1-st moments of the Legendre expansion of scattering kernel. Coherent scattering is described by the transport cross-section algorithm. We suggest a new method for calculating the neutrino-electron scattering functions that is based on Fermi-Dirac functions of integer indices. Further details and bibliography can be found in [2].

References

- [1] V. S. Imshennik, D. K. Nadyozhin, *Zh. Eksp. Teor. Fiz.* 63, 1548 (1972) [*Sov. Phys. JETP* 39, 583 (1972)].
- [2] A. V. Yudin, D. K. Nadyozhin, *Astronomy Lett.* 34, 198 (2008).

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