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# Matrix kinetic equation approach to calculation of neutrino emission accompanying formation of Cooper pairs in superfluid neutron star matter

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One of the important processes leading to neutrino emission from the interior of superfluid neutron stars is the process of neutrino emission during Cooper pairing of neutrons. When calculating the neutrino emissivity in this process, it is necessary to correctly consider the self-consistent response of the superfluid condensate. Such an analysis for spin-singlet pairing was carried out by many authors and for the spin-triplet case in a series of works by L.B. Leinson in the long-wavelength limit. All these calculations are based on relatively cumbersome equations within the framework of the Larkin-Migdal-Leggett theory or related approaches. We show that neutrino emission due to Cooper pair formation can be correctly calculated within a somewhat simpler formalism based on the use of the matrix kinetic equation for a superfluid Fermi system, which automatically respects the vector current conservation. The results for different types of pairing can be obtained within the same formalism and here it is applied to the cases of ${}^1S_0$, ${}^3P_2$, and ${}^3P_0$ types of pairing. In the limiting cases the previous results are reproduced.
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