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Quantum Transport theory for mixing neutrinos

Friday, 21 June 2024 17:30 (2 hours)

We derive quantum kinetic equations for mixing neutrinos including consistent forward scattering terms and collision integrals for coherent neutrino states. Our derivation is valid for arbitrary neutrino masses and kinematics, it includes the local coherence effects, and a comprehensive set of generalized Feynman rules for computing the coherent collision integrals. We discuss the importance of helicity coherence and particle-antiparticle coherence in the case of adiabatic background fields and in the case of an external magnetic field using field theoretical methods, that is, we do not need to rely on toy models or simplified numerical analyses. Our results can be used, for example, to model neutrino distributions accurately in hot and dense environments and to study the production and decay of heavy neutrinos in colliders.

Poster prize

Yes

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