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Intrinsic quantum coherence in particle oscillations

Thursday, 30 July 2020 12:00 (30 minutes)

The quantum field theoretical description of coherence in the oscillations of particles, especially neutrinos, is a standing problem in particle physics. In this talk, several inconsistencies of the standard approach to particle oscillations will be explained, and how they are resolved in a process-independent manner, by a novel approach inspired by the Bardeen-Cooper-Schrieffer theory of superconductivity and the Nambu-Jona-Lasinio model. The formalism leads to corrections to the neutrino oscillation probability originally written by Pontecorvo and Gribov, however the standard probability is validated in the ultrarelativistic neutrino limit. The massive neutrino states are interpreted as quasiparticles on a vacuum condensate of "Cooper pairs" of massless flavour neutrinos. The newly defined oscillating particle states are for neutrino oscillations what the Klauder-Sudarshan-Glauber coherent states are for quantum optics.

Secondary track (number)

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