

Quantum information theoretic aspects of neutrino oscillations

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The phenomena of entanglement and the nonlocal features of quantum correlations were initially introduced to elegantly abase the opponents of quantum mechanics. However, owing to the development of quantum information science, these quantum mechanical features have to be reassessed and to be elevated as resources that may be exploited to achieve tasks that are not possible within the realm of classical physics. Along these lines, quantum resource theories provide the framework to study and quantify these quantum effects, develop new protocols for their detection, and identify processes that optimize their use for a given application. Due to its weakly interacting nature, the system of oscillating neutrinos can maintain quantum coherence over a long distance, which can be detected in long baseline experiments. Hence, neutrinos can prove to be promising candidates for various quantum information tasks. Also, analyzing various aspects of quantum information and computation serve as an alternative platform that can reveal important information about several open problems in the neutrino sector. In this talk, I will discuss various such measures of nonclassicality in the context of neutrino flavor oscillations.

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