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Quantum Studies of Neutrinos

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Two and three flavor oscillating neutrinos are shown to exhibit the properties bipartite and tripartite quantum entanglement [1]. Neutrino eigenstates are mapped to qubits used in quantum information theory. Such quantum bits of the neutrino state can be encoded on a IBMQ computer using quantum computing as a tool. We show the implementation of entanglement in the two neutrino system (in vacuum) on the IBM quantum processor [2]. Quantum simulation of entangled oscillating neutrinos in matter with non-standard interactions (NSIs) quantum circuits on IBM quantum computer is in progress.

References:

- [1]. A.K.Jha, S.Mukherjee and B.A.Bambah, Tri-Partite entanglement in Neutrino Oscillations, [arXiv:2004.14853 [hep-ph]]. (This paper was accepted on 5th January, 2021 for the publications in the journal Modern Physics Letter A).
- [2] A.K.Jha, A.Chatla and B.A.Bambah, Quantum simulation of oscillating neutrinos, [arXiv:2010.06458 [hep-ph]].

Collaboration name

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