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Entanglement of Collective Neutrino Oscillations on a Quantum Computer[1] BENJAMIN HALL, Michigan State University, ALESSANDRO ROGGERO, University of Washington, ALLESANDRO BARONI, JOSEPH CARLSON, Los Alamos National Laboratory — We simulate the time evolution of collective neutrino oscillations on a quantum computer using a short-depth Trotter expansion. From the final state of the quantum computer we compute the probability of each neutrino in being in one of two neutrino flavors over time. We also characterize the change in pairwise entanglement of the system over time by computing two-qubit state tomography and extracting from this the the concurrence between pairs of neutrinos. Through this research, we present a promising way to characterize the entanglement of collective neutrino oscillations through the use of quantum computers.

[1]Los Alamos National Laboratory Quantum Computing Summer School

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