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New Insights in Neutrino Oscillation Simulations on a Quantum Processor PABLO CASTAO BASURTO, University of California, Berkeley — Neutrinos, elementary particles with no electrical charge and a very small mass, are known to come in three different flavors: electron, muon, and tau. When travelling through space and time, a neutrino with an original flavor can be later detected as a different flavored neutrino. This quantum mechanical phenomenon is known as a neutrino oscillation. To simulate this phenomenon, one must find the probability of measuring a particular flavor for an oscillating neutrino and write it as a function of time or space traversed. In this talk, I will show and explain how to do this simulation on a Quantum Computer, using logic gates that encode the neutrino mixing matrix and evolution operator. Furthermore, I will present how to perform error correction on a quantum circuit and ways to reduce the error by choosing an appropriate computational quantum basis.

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