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Vanishing Heat Conduction Through Two Qubits by Strong and Continuous Environmental Measurement ANTHONY KNIGHTON, RYOICHI KAWAI, University of Alabama at Birmingham — Given a system of two qubits coupled to two thermal baths with a temperature differential, it is well known from classical thermodynamics that heat will flow from the environment of higher temperature to the environment of lower temperature. Corresponding to classical predictions, numerical simulations have demonstrated that the rate of heat flow depends on the coupling strength between the system consisting of the two qubits and the two thermal environments. However, as the coupling strength is further increased, the rate of heat flow will rise to a maximum and then vanish in the steady state. This phenomenon is explained by strong, continuous measurement of the system by the environment, which leads to environment-induced decoherence. Applying Zurek's einselection, the decoherence will project the Gibb's state onto the pointer basis in the high coupling regime. Using numerical simulations of the hierarchical equations of motion (HEOM) and analytical theory, we reproduce these previous results and extend them by confirming that they are valid for multiple symmetric and asymmetric coupling configurations.

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