Steady-state entanglement in an autonomous quantum thermal machine

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Abstract

We discuss a simple quantum thermal machine for the generation of steady-state entanglement between two interacting qubits, with potential implementations in superconducting flux qubits or in a semiconductor double quantum dot. The machine is autonomous in the sense that it uses only incoherent interactions with thermal baths, but no source of coherence or external control. By weakly coupling the qubits to thermal baths at different temperatures, inducing a heat current through the system, steady-state entanglement is generated far from thermal equilibrium. We sketch how the required components and couplings of the machine can be realised in superconducting qubit or quantum dot systems and conclude that experimental prospects for steady-state entanglement are promising.

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