Autonomous demon with coupled qutrits

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Few-level systems coupled to thermal baths provide useful models for quantum thermodynamics and the role of heat currents in quantum information settings. Useful operations such as cooling or thermal masers have been proposed in autonomous three-level systems. In this work, we propose the coherent coupling of two qutrits as a simultaneous refrigerator and heat pump of two reservoirs forming a system. This occurs thanks to the coupling to two other reservoirs which are out of equilibrium but do not inject heat in the system. We explore the thermodynamic performance of such operation and discuss whether it can be distinguished from the action of a Maxwell demon via measurements of current fluctuations limited to the working substance [1].

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