Dual-qubit heat valve: an experimental study on collective photonic heat transport

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A photonic quantum heat valve [1] is investigated here experimentally, in the configuration of two superconducting qubits placed in parallel between two temperature-biased local reservoirs. The setup is such that the two qubits collectively mediate the photonic heat current across the reservoirs [2][3], which is experimentally determined by normal metal - insulator - superconductor (NIS) thermometry. The suppression of steady-state heat current is observed when both qubits are in action. Our study implies that steady-state collective coherence can be sustained autonomously in a dissipative system, without the need for external coherent drives.

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