

Single-photon heat conduction in electrical circuits

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We report our results on the photonic heat conduction between two resistors which are weakly coupled to a single superconducting microwave cavity. For temperatures $T \ll 1$ K the heat transport in this system is, in practice, entirely photonic and quantization of the thermal conductance can be observed. We show that by altering the temperature of one of the resistors, it is possible to control the temperature of the other as a direct result of the quantum mechanical coupling between the resistors and the photonic modes of the cavity. This is a signature of single-photon heat conduction and suggests a simple method for the remote cooling and heating of electrical components at an extremely narrow bandwidth, thus having a minimal perturbation to the usual operation of the component.