## Rectification of thermal fluctuations in electrical conductors

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In electrical circuits hot spots occur naturally at places where energy is dissipated. Here we propose a controlled experiment which can demonstrate the appearance of directed current as a consequence of a hot spot. We investigate transport generated in Coulomb coupled electrical conductors from excess electric or thermal fluctuations at the coupling capacitance.

If one of the conductors supports a bias voltage, out of equilibrium charge fluctuations remove detailed balance in the unbiased system manifested in a drag current. Non linear fluctuation relations can nevertheless be obtained [1].

Coulomb coupled conductors permit separate directions of the heat and current flux [2]. In our model, one of the conductors is connected via only one lead to a hot reservoir. The other conductor connects to two leads. We investigate the minimal conditions needed to generate directed current flow for a system of two quantum dot conductors in which both energy and charge states are quantized. In quantum dots energy to current conversion can be optimal with one electron transferred for every heat quantum given up by the hot reservoir. We discuss the implications in the form of non linear fluctuation relations for heat and charge transfer statistics.

The scalability of the problem to larger systems open to transport is discussed. Chaotic cavity heat engines allow for larger power extraction with a reduced endciency [4].

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