Quantum coherence and thermodynamics in non-equilibrium transport

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Transport in nano-scale systems often display intriguing quantum mechanical effects, which will be illustrated using examples such as the non-equilibrium spin-boson model, energy transfer networks, and three-level energy transfer systems. Using these examples, we hope to demonstrate non-trivial quantum effects: polaron-induced coherence, multiple steady-state solutions, and ballistic-diffusive transition. Our analysis will shed light on the coherent nature in quantum transport and will be relevant for the design and control of nano-scale quantum devices.

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