Abstract Submitted
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Quantum Thermoelectric Effects on the Nanoscale JUSTIN BERGFIELD, CHARLES STAFFORD, University of Arizona — An exact expression for the heat current in a nanostructure coupled to multiple metallic electrodes is derived, including both electron-electron and electron-phonon interactions. We use this formalism to investigate quantum effects on the flow of charge and entropy, and find an enormous quantum enhancement of thermoelectric effects in the vicinity of higher-order interferences in the transmission spectrum of a nanoscale junction. A nonequilibrium quantum analysis of a single-molecule junction based on 3,3'-biphenyldithiol demonstrates a maximum operating efficiency of 27% of the Carnot limit. Nonlocal quantum corrections to thermoelectric transport coefficients in multiterminal geometries are predicted.

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