Abstract Submitted
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Local temperature of an interacting quantum system far from equilibrium[1] CHARLES STAFFORD, University of Arizona — A theory of local temperature measurement of an interacting quantum electron system far from equilibrium via a floating thermoelectric probe is developed [1]. A number of relations are derived relating the probe temperature (and chemical potential) to the local properties of the nonequilibrium system, including a fluctuation-dissipation relation [2]. It is shown that the measured local electron temperature of a steady-state system arbitrarily far from equilibrium is consistent with the zeroth, first, second, and third laws of thermodynamics, provided the probe-system coupling is weak and broad band (ideal temperature measurement). For general probe-system couplings, there are corrections to the zeroth and first laws that are higher-order in the Sommerfeld expansion. The corrections to the zeroth and first laws are related, and can be interpreted in terms of the error of a non-ideal temperature measurement. [1] C. A. Stafford, arXiv:1409.3179; [2] J. Meair, J. P. Bergfield, C. A. Stafford, Ph. Jacquod, Phys. Rev. B 90, 035407 (2014)

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