

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Cumulant generating function formula of heat transfer in ballistic systems with lead-lead coupling and general nonlinear systems HUANAN LI, National University of Singapore — Based on a two-time observation protocol, we consider heat transfer in a given time interval t_M in a lead-junction-lead system taking coupling between the leads into account. In view of the two-time observation, consistency conditions are carefully verified in our specific family of quantum histories. Furthermore, its implication is briefly explored. Then using the nonequilibrium Green's function method, we obtain an exact formula for the cumulant generating function for heat transfer between the two leads, valid in both transient and steady-state regimes. Also, a compact formula for the cumulant generating function in the long-time limit is derived, for which the Gallavotti-Cohen fluctuation symmetry is explicitly verified. In addition, we briefly discuss Di Ventura's repartitioning trick regarding whether the repartitioning procedure of the total Hamiltonian affects the nonequilibrium steady-state current fluctuation. All kinds of properties of nonequilibrium current fluctuations, such as the fluctuation theorem in different time regimes, could be readily given according to these exact formulas. Finally a practical formalism dealing with cumulants of heat transfer across general nonlinear quantum systems is established based on field theoretical/algebraic method.

Huanan Li
National University of Singapore

Date submitted: 03 Dec 2012

Electronic form version 1.4