Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Fluctuation theorems and entropy production with odd-parity variables[1] HYUNGGYU PARK, Korea Institute for Advanced Study, HYUN KEUN LEE, University of Seoul, CHULAN KWON, Myongji University — We show that the total entropy production in stochastic processes with odd-parity variables (under time reversal) is separated into three parts, only two of which satisfy the integral fluctuation theorems in general. One is the usual excess contribution, which can appear only transiently and is called non-adiabatic. Another one is attributed solely to the breakage of detailed balance. The last part not satisfying the fluctuation theorem comes from the steady-state distribution asymmetry for odd-parity variables, which is activated in a non-transient manner. The latter two parts combine together as the house-keeping (adiabatic) contribution, whose positivity is not guaranteed except when the excess contribution completely vanishes. Our finding reveals that the equilibrium requires the steady-state distribution symmetry for odd-parity variables independently, in addition to the usual detailed balance.

[1]This work was supported by Mid-career Researcher Program through NRF grant (No. 2010-0026627) funded by the MEST.

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Date submitted: 08 Nov 2012 Electronic form version 1.4