

Nonequilibrium Fluctuations in Linear Diffusion Systems

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Recently we have developed a path-integral formalism for the study of fluctuations of the work in nonequilibrium linear diffusion systems[†]. Applying the formalism to two-dimensional systems, we investigate the probability distribution of the work. Our study confirms the fluctuation theorem for the work. Furthermore, it uncovers a rich structure in the tail of the probability distribution function, which will be presented during the talk.

It has been puzzling whether the heat satisfies the fluctuation theorem as the work does. We will present a general theory showing that the fluctuation theorem is violated for the heat[‡]. The origin for violation is mutual correlations between thermodynamics quantities during nonequilibrium processes.

[†] C. Kwon, J.D. Noh, and H. Park, Phys. Rev. E. **83**, 061145 (2011).

[‡] J.D. Noh, and J.-M. Park, Phys. Rev. Lett. **108**, 240603 (2012).