

**[P5] Violation of fluctuation theorem for heat: an exactly solvable case of a two-dimensional linear diffusion system.**

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Heat fluctuations are studied in a solvable two-dimensional linear system in contact with a single heat bath which consists of an isotropic harmonic potential and stirring force which is the source of making the system out of equilibrium. Whereas nonequilibrium work satisfies the fluctuation theorem in any time interval, heat does not satisfy the fluctuation theorem even in the limit of infinite time interval. To understand the reason, a modified form of a fluctuation relation for heat is introduced. It reveals that correlations between heat and the system's internal energy difference is the origin for the violation.