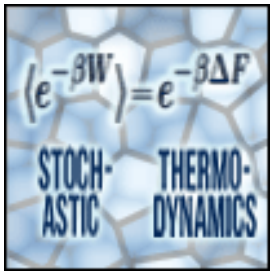

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Dissipation in simple non-equilibrium model systems

Thursday, March 14, 2013 3:00 PM (1 hour)

Stochastic thermodynamics is a framework for extending notions of classical thermodynamics to the level of individual trajectories which can be recorded in non-equilibrium conditions. While this framework is well established for stochastic systems described by markovian processes, the situation is less well understood when the strength of the noise depends on the driving or when non-markovian dynamics is involved. Such situations are not purely academic but arise in soft matter or biological systems.

In the first part of the talk, I will present an experimental study of a model system made of magnetic colloidal particles which are manipulated using a time-dependent magnetic field. By recording the trajectories of the colloidal particles, the distributions of thermodynamic quantities such as work or heat can be obtained. This experiment is interesting because (i) it involves state dependent hydrodynamic friction and (ii) it can be carried out with more than one degree of freedom.

In the second part of this talk, I will review a set of formal results which we obtained recently by generalizing the Hatano-Sasa relation to systems which have been prepared initially in a non-stationary non-equilibrium state. Such results include a generalized fluctuation-dissipation theorem and second-law like inequalities for non-equilibrium systems.

Presenter: Dr LACOSTE, David (ESPCI)