Fluctuation Relations and Nonequilibrium Thermodynamics in Classical and Quantum Systems

Guest Editor:

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Message from the Guest Editor

The recent advances in the control of microscopic systems down to the atomic level have triggered a renewed interest in the study of the thermodynamic processes of small systems. As these are characterised by strong fluctuations of thermal and quantum origins, thermodynamic quantities like heat, work, and entropy become stochastic variables. Fluctuation theorems, including the most celebrated Jarzynski relation, connect exponential averages of these quantities, even for out-of-equilibrium processes, with equilibrium observables like free energy differences.

The areas covered in this Special Issue include but are not restricted to:

*) Fluctuation relations in classical stochastic thermodynamics

*) Definitions of work, heat, and entropy and related fluctuation theorems in quantum systems

*) Quantum engines and refrigerators

*) Resource theory of quantum thermodynamics

*) Role of quantum correlations and coherence in quantum thermodynamics

Special Issue

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Message from the Editor-in-Chief

The concept of entropy is traditionally a quantity in physics that has to do with temperature. However, it is now clear that entropy is deeply related to information theory and the process of inference. As such, entropic techniques have found broad application in the sciences.

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