Special Issue

Control of Driven Stochastic Systems: From Shortcuts to Optimality

Message from the Guest Editors

In recent years, the study of problems related to the control of stochastic dynamics has seen increasing interest. Control theory aims to identify protocols to steer a system to a desired target state in a given time ("shortcuts") or to complete a pre-assigned transition in an optimal way. Due to the relentless refinement of experimental techniques, it is now possible to control physical systems subject to different kinds of fluctuations with unprecedented precision, from the nanoscale level, where thermal fluctuations are not negligible, to the microscopic realm of bacteria and active matter, up to the macroscopic world. Therefore, the framework of control theory needs to be extended to the stochastic domain, in order to also be applicable to these systems. Besides its implicit applications, this line of investigation has deep connections with fundamental topics in stochastic thermodynamics and information theory.

The goal of this Special Issue is to gather contributions on the different aspects of the subject. We aim, in particular, to present the wide array of approaches that are adopted in this context.

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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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