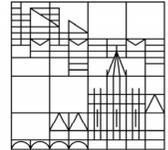


# Physikalisches Kolloquium

Universität  
Konstanz



Di 27.06.23

15:15 Uhr

P 603

im Anschluss

Getränke und Snacks



**Prof. Dr. Sergio Ciliberto**

Université Lyon, ENS de Lyon, Université Claude  
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Lyon / France

## Several applications of optimal protocols

In statistical physics optimal protocols are useful techniques which allow us to reduce either the time or the energy needed to perform physical processes. In this talk we will present several experiments in which such techniques have been applied. We will start by describing the Engineered Swift Equilibration (ESE) which is a method to switch a system from one state to another much faster than its natural equilibration time. The initial and final states can be either in equilibrium or out of equilibrium. For example, one can perform the compression of a single Brownian particle trapped in an harmonic potential by increasing its stiffness. We will discuss the parameters which can be tuned in order to reach the desired dynamics and the stability of the protocol to external perturbations. We will then present the application of ESE to the problem of first passage time. The resetting to the origin is one of the efficient theoretical strategies that allow a Brownian particle to reach a target in an optimal time. However we will show how in realistic situation the original assumptions used in these theoretical strategies must be modified in order to optimize the searching time. ESE is actually very useful to speed up the resetting. We will then describe how ESE can be applied to speed up the force measurements in atomic force microscopes. Finally we will present another technique that optimizes the amount of energy needed to perform a very fast ERASURE protocol in a 1 bit memory. We will show that thank to this technique the energy needed for fast erasure is only about twice that imposed by Landauer's bound which can be reached only in quasi static erasure protocols.

**Host: Prof. Bechinger**

**Organisation: Prof. Bechinger**