

DY 14: Invited Talk Sabine Klapp

Time: Tuesday 9:30–10:00

Location: H18

Invited Talk

DY 14.1 Tue 9:30 H18

Non-Markovian Brownian systems: from single-particle thermodynamics to collective behavior — ●SABINE KLAPP — Institut fuer Theoretische Physik, TU Berlin, Hardenbergstrasse 36, 10623 Berlin

Recently, the dynamical behavior and the thermodynamics of stochastic systems involving time-delay or, more generally, memory effects has become a focus of growing interest. Indeed, memory is essentially omnipresent in many complex fluids and biological systems, but may also arise, e.g., due to delayed feedback protocols or sensorial delay in active systems. The theoretical description of such systems is still challenging due to the non-Markovian nature of the underlying

Langevin equations, particularly in the case of discrete time delays. Here we present, first, recent research for Brownian particles subject to feedback with discrete or distributed time delay. We discuss peculiar thermodynamic features, such as delay-induced heat production, and the theoretical treatment based on the introduction of auxiliary variables with non-reciprocal coupling. Considering an ensemble of delayed Brownian particles we demonstrate the occurrence of new phases resembling active particles. Our second focus lies on systems with fractional Brownian motion (fBm). fBM is a well-established model for anomalous diffusion, where non-Markovianity arises through the noise correlation function. We discuss strategies how to treat this system thermodynamically and the role of memory for the collective behavior.