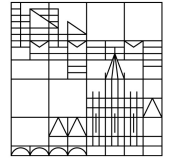


# Physikalisches Kolloquium

Universität  
Konstanz



Di 05.07.22  
15:15 Uhr  
R 513

Im Anschluss  
Kaffee/Snacks/Erfrischungen



**Prof. Dr. Ralf Eichhorn**

NORDITA -

Nordic Institute of Theoretical Physics, Stockholm

## How thermodynamics becomes stochastic — a short exploration of recent advances in statistical physics

Stochastic thermodynamics is a recently established discipline of statistical physics. It explores fundamental aspects of non-equilibrium processes by applying and extending concepts from equilibrium thermodynamics to the non-equilibrium realm, typically on the level of single particle trajectories monitored over the entire system evolution. This approach provides an adequate framework to investigate the behaviour of “small systems” on mesoscopic scales for which thermal fluctuations may have a significant or even dominant effect on the general system properties.

We consider such small systems consisting of so-called Brownian particles (like colloids in suspension or biological macromolecules in a cell). After introducing the standard model for Brownian motion, we briefly describe the ideas and concepts leading to a (trajectory-wise) thermodynamic characterization of Brownian motion, and finally elaborate on central results from stochastic thermodynamics. As a refinement of the second law of thermodynamics, the most famous amongst these results are probably the fluctuation theorems.