

## **Theoriekolloquium**

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Am **18. Oktober 2018** um **14.15 Uhr** in **W2 1-143** hält

**Herr Prof. Dr. Ralf Eichhorn (Stockholm)**

einen Vortrag mit dem Titel

### **Irreversibility in active matter systems: Fluctuation theorem and mutual information**

Active particle systems consist of individual entities (“particles”) which have the ability to perform motion by consuming energy from the environment and converting it into a self-propulsion drive. Examples are suspensions of biological microorganisms or artificial microswimmers, such as bacteria and colloidal particles with catalytic surfaces. We consider such a Brownian particle which, in addition to being in contact with a thermal bath, is driven by active fluctuations. These active fluctuations do not fulfill a fluctuation-dissipation relation and therefore play the role of a non-equilibrium environment. Our main goal is to develop a trajectory-wise thermodynamic description as a natural generalization of stochastic energetics and thermodynamics for passive Brownian motion in a purely thermal equilibrium environment. After giving a short introduction to active matter, we discuss the main modeling concepts (Langevin equation) and recapitulate some basic results from the stochastic thermodynamics of passive Brownian motion, in particular that the log-ratio of path probabilities for observing a certain particle trajectory forward in time versus observing its time-reversed twin trajectory quantifies the entropy production in the thermal environment. We then calculate this path probability ratio for active Brownian motion and derive a generalized “entropy production”, which fulfills an integral fluctuation theorem. We show that those parts of this “entropy production”, which are different from the usual dissipation of heat in the thermal environment, can be associated with the mutual information between the particle trajectory and the history of the non-equilibrium environment.

Interessierte sind herzlich eingeladen.

gez. Prof. Dr. Andreas Engel