# PHYSIKALISCHES KOLLOQUIUM

AM 28. MAI 2018 UM 17 UHR C.T.

IM GROßEN HÖRSAAL

## POWER FUNCTIONAL THEORY FOR BROWNIAN, NEWTONIAN AND QUANTUM NON-EQUILIBRIUM SYSTEMS

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I give an overview of a very recent theoretical approach for the description of the non-equilibrium behaviour of many-body systems, such as sheared colloidal dispersions, molecular dynamic liquids and quantum systems governed by Schrödinger's equation. The theory is based on one-body distribution functions, such as the density and the current, which depend on position and on time. These distribution functions are computationally well accessible and experimentally measurable. The variational approach regards the distribution functions as fundamental variables, whose physical value is determined by minimizing an appropriate functional, which is the free power (energy per time) functional in case of overdamped Brownian motion. In cases with no driving the approach reduces to density functional theory, which is a formally exact framework for equilibrium systems. I explain the key theoretical concepts underlying power functional theory and show supporting numerical evidence for their validity.