

Kolloquium des SFB/TR 49 gemeinsam mit Theoretisch-Physikalischem Kolloquium

Donnerstag, den 18.05.2017 um 15:30 Uhr in Raum 46-576

Non-equilibrium quantum criticality: from isolated systems to driven-dissipative platforms

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In this talk I discuss the onset of novel non-equilibrium quantum critical behaviour in isolated and driven open systems.

Specifically, I will show that critical pre-thermalization is governed by a quantum and classical non-equilibrium fixed point, analogue of the zero and finite temperature fixed points of equilibrium phase transitions. I will also examine the physical conditions which control the crossover among them, as well as the emergence of aging close to pre-thermal critical states.

While the first part of the talk relies on a field theoretical approach, I will also discuss results concerning the non-equilibrium phase diagram of a microscopic model. In particular, I will discuss as instance the dynamics of a non-integrable quantum spin chain after a quench, elucidating how quantum fluctuations can reshape a mean-field phase diagram in a dynamical scenario.

Finally, on the side of open systems, I will demonstrate how to realise a driven-dissipative analogue of quantum criticality, engineering a diffusion Markovian noise in a one-dimensional driven open Bose gas.

Salient features of this novel fixed point are the persistence of both non-equilibrium conditions as well as quantum coherence close to criticality. This provides a sharply distinct situation from more generic driven systems where both effective thermalization as well as asymptotic decoherence ensue, paralleling classical dynamical criticality.