Out of equilibrium dynamics across a discontinuous quantum phase transition

Jacopo Nespolo*[1]

[1]Department of Physics, Arnold Sommerfeld Center for Theoretical Physics,
Ludwig-Maximilians-Universität München (LMU) – Theresienstraße 37, D-80333 Munich, Germany

Abstract

We study the off equilibrium dynamics of systems when they are slowly driven across a discontinuous (first-order) quantum phase transition, thus extending previous results on classical and quantum systems at continuous transitions. We show that a scaling behaviour arises when the quench time-scale is appropriately rescaled with the system's size. The scaling behaviour is due to the interplay between dynamics and finite-size effects, and is entirely encoded in the static properties of the transition. We support our findings by numerical real-time evolution data on the ferromagnetic Ising chain with parallel and orthogonal fields.

*Speaker