

Einladung
zu OPTIMAS und OSCAR Seminar
Montag, 08.04.2019, um 15:00 Uhr
Raum 46-387/388

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How do Correlations and Entanglement spread in Long-Range Quantum Systems?

The out-of-equilibrium dynamics of correlated quantum systems is attracting a growing attention. Much of the latter is sparked by the dramatic progress realized on the dynamical control of quantum matter or light in a variety of quantum-simulator platforms. Hence, exotic dynamical phenomena that were not realizable in conventional systems have now become a reality. Many fundamental questions remain open as regards many aspects, including transport phenomena, the propagation of information, and thermalization processes, for instance. One of this is to understand how quantum correlations and entanglement spread in a correlated system. The case of long-range interacting models, as relevant for Rydberg gases, artificial ion crystals, polar molecules and magnetic atoms, is particularly challenging for usual concepts, applicable to short-range systems, break down. For instance, whether a causality light-cone-like effect emerges in the presence of long range interactions is still debated.

In this talk, I will discuss universal scaling laws for the spreading of correlations and entanglement in quantum models with variable-range interactions. Using analytical arguments and exact numerics based on tensor-network techniques, I will show that a multifold dynamics generally emerges, which may be related to different characteristic properties of the many-body Hamiltonian. While in short-range systems the propagation is universal and ballistic, long-range interactions can lead to a rich non-universal dynamics. For instance, sub-ballistic and super-ballistic signals can coexist, depending on the observable, the quench, and the model for instance. This unexpected behavior has profound consequences on the spreading of information in long-range quantum systems and on the interpretation of experimental and numerical observations, for which our analysis provides a unified picture.

References

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Der Gast wird betreut von Prof. Dr. A. Widera
GÄSTE SIND HERZLICH WILLKOMMEN!