

# Seminar über Quanten-, Atom- und Neutronenphysik (QUANTUM)

Dec. 14, 2017 at 2 p.m. c.t.  
Lorentz-Raum (05-127), Staudingerweg 7

Note: Vortrag im Rahmen des SFB/TR 49-Kolloquiums

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## **Many-body localization: How quantum dynamics wins against thermodynamics**

The out-of-equilibrium dynamics of interacting many-body systems presents one of the most challenging problems in quantum physics with implications ranging from thermalization dynamics over transport properties to the formation of order.

Traditionally, however, out-of-equilibrium dynamics was mostly confined to short transients, since typical systems would ultimately relax back into well-understood thermal states. In this talk, I will demonstrate that synthetic many-body systems offer access to intrinsically non-ergodic dynamics, where a quantum non-equilibrium system can beat thermodynamics and never relax to a thermal state.

We use ultracold atoms in optical lattices as a very versatile platform to study quantum many-body physics in a clean and well-controlled environment. I will present a realization of Many-Body Localization of interacting fermions, where the presence of disorder creates a non-ergodic state. In a closed system, this state will never forget its initial state and never thermalize.