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JOHANNES GUTENBERG UNIVERSITÄT MAINZ

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

Jan. 16, 2020 at 2 p.m. c.t.
Lorentz-Raum (05-127), Staudingerweg 7

Shane P. Kelly
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Thermalization and Its breakdown: from spin chains to a large spin

In recent years, many experimental platforms have succeeded in producing quantumsystems that, on relevant time scales, are completely isolated from an environment.
This opens the possibility of observing equilibrium states that are not described by standard thermal ensembles and long time dynamics that indefinitely maintain memory of initial states.
In this talk, I discuss two mechanisms for this to occur: many body localization (MBL) and a novel mechanism which occurs in the semi-classical limit of a large spin.
In the first part of my talk, I will discuss the phenomenon of MBL in a disordered spin chain and its effects when coupled to a small environment.
We model this small environment as a clean spin chain and find that, under sufficient coupling and disorder, the dirty chain can induce an MBL effect in the clean chain.
In the second part of my talk, I will discuss the dynamics of a large spin evolving with a non-linear hamiltonian.
Using semi-classical techniques, we identify when the spin does and does not thermalize.
In doing so, we find a novel mechanism for the breakdown of thermalization based on the slow dynamics of an unstable fixed point.

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