THEORETICAL PHYSICS SEMINAR CIRCUIT

S N BOSE NATIONAL CENTRE FOR BASIC SCIENCES

SALT LAKE, KOLKATA 700 106

NOTICE FOR SEMINAR

Title: Many-body localization and its signatures in quantum quenches

Speaker: Dr. Rajeev Singh

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Date: 19th July 2017

Time: 04:00 pm

Venue: Boson Hall

Abstract

The presence of disorder in a non-interacting system can localize all energy eigenstates, a phenomena dubbed Anderson localization. Many-body localization (MBL) is an extension of this phenomena to include interactions. Effects of interactions show up in the logarithmic growth of entanglement after a global quench. We perform a systematic study of the evolution and saturation of entanglement, and show that it can be used to detect the localization transition. We consider the bipartite fluctuation which also captures the transition and is promising as an experimental probe. For long-range models we find an interesting regime in the non-interacting disordered chain where the long-time entanglement entropy also shows a logarithmic growth and the saturated entanglement entropy scales logarithmically with system size. We further study the interplay of long-range hopping and interactions on the growth of entanglement and the MBL transition in this system. We develop an analogy to higher-dimensional short-range systems to compare and contrast such behavior with the physics of MBL in a higher dimension.

References:

[1] R. Singh, J. H. Bardarson, and F. Pollmann, "Signatures of the many-body localization transition in the dynamics of entanglement and bipartite fluctuations," New J. Phys., 18, 23046, 2016. http://stacks.iop.org/1367-2630/18/i=2/a=023046?key=crossref. 95942019286b11226082e7fb8450f51f

[2] R. Singh, R. Moessner, and D. Roy, "Effect of long-range hopping and interactions on entanglement dynamics and many-body localization," Phys. Rev. B, 95, 94205, 2017. http://link.aps.org/doi/10.1103/PhysRevB.95.094205

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