Department of Computer Science, The University of Hong Kong

Quantum Information Seminar

Bounding the resources for thermalizing many-body localized systems

Dr. Carlo Sparaciari
Department of Physics and Astronomy,
University College London (UCL)

Date:
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Venue:
Room 308
Chow Yei Ching Building
The University of Hong Kong

Abstract:

Understanding the conditions under which physical systems thermalize is one of the long-standing questions in many-body physics. While it has been observed that generic quantum systems do thermalize, rather little is known about the precise underlying mechanism. Furthermore, instances in which thermalization is hindered for many-body systems have been uncovered, now known as many-body localization, offering promising insights into the mechanisms that underlie thermalization. In this work, we derive upper and lower bounds on the size of a heat bath required to thermalize a many-body localized system, for a broad class of interaction models. To obtain these bounds, we employ a recently developed tool from quantum information theory known as the convex split lemma. We apply our results to the disordered Heisenberg chain, which we study numerically, and we characterize the robustness of the MBL phase in this system for the family of thermalization processes considered, in terms of the required bath size. Part of the significance of this work stems from transferring tools from resource-theoretic quantum thermodynamics to the study of interacting quantum many-body systems.

About the Speaker:

Carlo Sparaciari is a postdoctoral fellow at the Department of Physics and Astronomy, University College London (UCL). He obtained his PhD in Physics at UCL in 2018, under the supervision of Jonathan Oppenheim. In 2018, he was awarded an EPSRC Doctoral Prize Fellowship at Imperial College London, and a UCLQ Fellowship at UCL. His research interests include quantum information theory and quantum thermodynamics.

All are welcome!
For enquiries, please call 2859 2180 or email enquiry@cs.hku.hk
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