



Thermodynamics and order beyond equilibrium – from eigentstate thermalisation to time crystal

Date: October 19, 2022 (Wednesday)

Time: 5:00 p.m.

Zoom Online Lecture: <https://bit.ly/3DSdNmV>

Meeting ID: 967 7300 3194

Password: 2859



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Abstract:

The field of thermodynamics is one of the crown jewels of classical physics. Thanks to the advent of experiments in cold atomic systems with long coherence times, our understanding of the connection of thermodynamics to quantum statistical mechanics has seen remarkable progress. Extending these ideas and concepts to the non-equilibrium setting is a challenging topic, in itself of perennial interest. Here, we present perhaps the simplest non-equilibrium class of quantum problems, namely Floquet systems, i.e. systems whose Hamiltonians depend on time periodically, $H(t + T) = H(t)$. For these, there is no energy conservation, and hence not even a natural concept of temperature. We find that certain structures from equilibrium thermodynamics are lost, while entirely new non-equilibrium phenomena can arise, including a spectacular spatiotemporal 'time-crystalline' form of order, recently observed experimentally on google AI's sycamore NISQ platform.

References: for an introductory overview, see Nature Physics 13, 424–428 (2017). For an in-depth review, see arxiv:1910.10745 . NISQ experiment: Nature 601, 531 (2022).

Biography:

Professor Moessner is a world-renowned theoretical physicist. He is currently the director of Max Planck Institute for the physics of complex systems at Dresden. He studied physics at Oxford University, where he was student of Neil Tanner's at Hertford College. At Oxford, he received his doctorate in theoretical physics under the supervision of John Chalker. After postdoc at Princeton University, he joined the Centre National de la Recherche Scientifique in France. After a faculty appointment at Somerville College and Theoretical Physics at Oxford University, he joined the Max Planck Institute for the Physics of Complex Systems in Dresden as the director of the condensed matter division and Scientific Member of the Max Planck Society in 2007. Since 2008 he is also honorary professor at TU Dresden. He has contributed extensively in many different areas of quantum many-body physics and has been the mentor for a generation of physicists.

Host: Professor Gang CHEN, The University of Hong Kong

Anyone interested is welcome to attend!

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