LECTURES ON FRONTIERS OF QUANTUM MATTERS

量子物质前沿讲座

清華大學 Tsinghua University

TITLE |

Many-body Localization and Floquet Phases of Matter

SPEAKER |

Norman Yao
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TIME |
3:00 p.m. August 13, 14, 16, 2018

VENUE |
Room 322, Science Building
Tsinghua University

主办方：清华大学高等研究院

ABSTRACT

Statistical mechanics is the framework that connects thermodynamics to the microscopic world. It hinges on the assumption of equilibration; when equilibration fails, so too does much of our understanding. In isolated quantum systems, this breakdown is captured by the phenomenon known as many-body localization. Many-body localized phases violate Ohm's law and Fourier's law as they conduct neither charge nor heat, they can exhibit symmetry breaking and/or topological orders in dimensions normally forbidden by Mermin-Wagner arguments, and they hold potential as strongly interacting quantum memories due to the slow decay of local coherence.

In this series of lectures, I will introduce the basic phenomena of many-body localization and review its theoretical status. Then, I will describe how to coherently prepare, protect and detect symmetry protected topological order in a non-equilibrium setting. Even in the presence of generic interactions, I will show that disorder leading to many-body localization prevents arbitrary heating of the system and leads to an exponential enhancement of the edge spin coherence at infinite temperature. Finally, time permitting, I will discuss recent work exploring the possibility of realizing time crystalline order in periodically driven (Floquet), many-body localized systems.