清华大学高等研究院
Institute for Advanced Study, Tsinghua University

物理学术报告
Physics Seminars (biweekly)

Title: **Freezing transition and exponentially slow thermalization in 1D fragmented dynamics**

Speaker: **Zhicheng Yang (PKU)**

Time: **2:00pm, Tuesday, December 24, 2024**

Venue: **Conference Hall 322, Science Building, Tsinghua University**

Abstract

Quantum kinetically constrained models can exhibit a wealth of dynamical phenomena ranging from anomalous transport to Hilbert-space fragmentation (HSF). In the first part of the talk, I will describe a class of 1D kinetically constrained particle-number-conserving systems, where HSF can be understood as a sharp phase transition as the average particle density is varied. In the second part, I will discuss the thermalization dynamics of such fragmented systems when coupled to an infinite temperature bath at one boundary. The coupling to the bath eventually erases the effects of the constraints, causing the system to tend towards a maximally mixed state at long times. We show that for a large class of local constraints the time at which thermalization occurs can be extremely long. In particular, I present evidence for the following conjecture: when the constrained dynamics displays strong Hilbert space fragmentation, the thermalization time diverges exponentially with system size.