



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: Strongly correlated physics beyond pairwise interactions-- new opportunities brought by quantum simulation

Speaker: Zi Cai (Shanghai Jiao Tong University)

Time: 4:00 pm, Wednesday, November 12, 2025

Venue: Conference Hall 322, Science Building, Tsinghua University

Abstract

Although in most practical systems, the pairwise interaction dominates while the three or higher-body interactions only provide small corrections due to their perturbative character, recent experimental progresses in synthetic quantum simulators provided new opportunities for exploring the strongly correlated physics beyond pairwise interactions. In this talk, I will present two examples, the first is a quantum slush state induced by a five-site interaction originated from the anti-block mechanism in Rydberg atom array. In the second example, we show that a periodic driving of a hard-core boson system can result in an effective Floquet Hamiltonian with three-site interactions, which is responsible for a bosonic pairing condensate with $px+ipy$ symmetry.

Bio

蔡子，2010年于中国科学院物理研究所凝聚态理论专业取得博士学位。先后在美国加州大学圣迭戈分校，德国慕尼黑大学，奥地利科学院量子光学与量子信息研究所从事博士后工作。现任上海交通大学物理与天文学院教授，博士生导师。主要从事凝聚态物理以及相关领域的数值计算和理论方面的工作，主持国家自然科学基金青年基金A类（2025年），面上项目（2017年，2022年）等。