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: Spin Seebeck Effect of Triangular-lattice Spin Supersolid

Speaker: Wei Li, Chinese Academy of Sciences

Time: 4:00 pm, Wednesday, May 13, 2026

Venue: Conference Hall 322, Science Building, Tsinghua University

Abstract

The supersolid — a state with both crystalline order and superfluidity — was proposed over half a century ago, yet its realization in condensed matter systems remains a major challenge. Recently, spin supersolidity was discovered in quantum magnets, offering a new platform, though direct observation of its macroscopic quantum properties is still unresolved. I present our progress on spin supersolid quantum transport. Using a new imaginary-time approximation within finite-temperature tensor networks, we studied the spin Seebeck effect on the triangular lattice. A temperature gradient induces a spin current that reverses sign with decreasing temperature, saturating to a non-zero value at low-temperature limit. This non-classical behavior stems from the spin superfluid component — a macroscopic quantum effect of the spin supersolid. We further propose spin current as a sensitive probe for novel quantum states and unconventional excitations in frustrated magnets, while also opening new avenues for ultra-low-temperature spin caloritronics.

Bio

Li Wei is a professor at the Institute of Theoretical Physics, Chinese Academy of Sciences (CAS), specializing in strongly correlated many-body computation and quantum magnetism. He has published over 90 papers in leading journals. Recent work on "spin supersolidity and giant magnetocaloric effect on the triangular lattice", by him and his collaborators, was selected among China's Top Ten Scientific Advances of 2024. He is a principal investigator of CAS basic research youth team, and serves on the editorial boards of Communications in Theoretical Physics and Chinese Physics Letters. He received the CAS Young Scientist Award in 2025.