TECHNISCHE UNIVERSITÄT DRESDEN

**Bereich Mathematik und Naturwissenschaften** Fakultät Physik

# PHYSIKALISCHES KOLLOQUIUM

*Vortrag:* **Prof. Dr. Xingye Lu**
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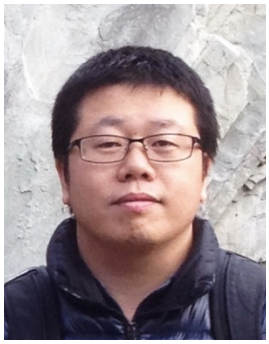

*Thema:* **Spinon Fermi Surface Spin Liquid in a Triangular Antiferromagnet NaYbSe2**

*Zeit und Ort:* Dienstag, 29.6.2021, 16:40 Uhr, Online-Meeting: ZOOM
https://tu-dresden.zoom.us/j/82116298617?pwd=Wi9kRXQvcTUrRUl6aGNwU3JISDFydz09
Meeting-ID: 821 1629 8617 // Kenncode: NaYbSe_2

*Leitung:* Prof. Dr. Dmytro Inosov

*Kurzfassung:* The quantum spin liquid (QSL) refers to correlated magnetic system in which spins are highly entangled over long distances while do not order down to zero temperature. It represents a new state of matter and is fundamentally important in understanding quantum physics. Proposed by Anderson in 1973, it revives recently and have attracted numerous research interest because of its connection to the microscopic mechanism of high-Tc superconductivity and non-trivial topological properties which could promote the development of quantum computation. Hence, searching for QSL states in real materials has been an important mission of condensed matter physics. Triangular lattice of rare-earth ions with interacting effective spin-1/2 local moments is an ideal platform to explore the physics of quantum spin liquids in the presence of strong spin-orbit coupling, crystal electric fields, and geometrical frustration. The Yb delafossites, NaYbCh2 (Ch=O, S, Se) with Yb ions forming a perfect triangular lattice, have been suggested to be candidates for QSLs. Previous thermodynamics, nuclear magnetic resonance, and powder-sample neutron scattering measurements on NaYbCh2 have supported the suggestion of the QSL ground states. The key signature of a QSL, the spin excitation continuum, arising from the spin quantum number fractionalization, has not been observed. Here we perform both elastic and inelastic neutron scattering measurements as well as detailed thermodynamic measurements on high-quality single crystalline NaYbSe2 samples to confirm the absence of long-range magnetic order down to 40 mK, and further reveal a clear signature of magnetic excitation continuum extending from 0.1 to 2.5 meV. The comparison between the structure of the magnetic excitation spectra and the theoretical expectation from the spinon continuum suggests that the ground state of NaYbSe2 is a QSL with a spinon Fermi surface.

*Biographie:* Xingye obtained his PhD in 2014 from Institute of Physics, Chinese Academy of Sciences, majoring in neutron scattering studies of iron-based superconductors (advisor: Prof. Pengcheng Dai). After that he moved to Swiss Light Source, Paul Scherrer Institut for postdoctoral research as a PSI fellow, where he used resonant inelastic x-ray scattering (RIXS) to study the elementary excitations in various correlated electron systems such as cuprates and iridates (with Dr. Thorsten Schmitt as mentor). After finishing his postdoc study, he joined the Center for Advanced Quantum Studies and Department of Physics in Beijing Normal University as an assistant professor. Now he is using various state-of-the-art neutron and X-ray scattering techniques to study emergent quantum phenomena, intertwined order and fluctuations of novel quantum materials including high-Tc superconductors (iron pnictides, cuprates etc), low-dimensional quantum magnets and 5d-electron materials such as iridates and osmates.