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Stuttgarter Physikalisches Kolloquium

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Fachbereich Physik, Universität Stuttgart

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Hybrid

Login data will be announced by e-mail and on the colloquium webpage.

Dienstag, 11. April 2023	16.15 Uhr	Lecture Hall 2D5

Max-Planck-Institut für Festkörperforschung, Heisenbergstraße 1, 70569 Stuttgart-Büsnau

Disorder in the Kitaev spin liquid

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Abstract

Quantum spin liquid (QSL), an exotic magnetic phase with fractionalized spin excitations and intricate entanglement structure, has been pursued both theoretically and experimentally since its first proposal by Anderson in 1973. Theoretical models and candidate materials with strong geometrical or exchange frustration are expected to greatly reduce the ordering temperature and reveal the quantum fluctuations. However, the presence of residual interactions in real systems usually leads to magnetic ordering and shatters the hope for finding QSL. Nevertheless, various compounds were discovered with no magnetic ordering even down to the lowest measurable temperature, and commonly the quenched randomness was found to serve as a potential cause of the sustaining disordered phase and intriguing dynamics of low-energy degrees of freedom. Therefore, the competition between quantum fluctuations and randomness raises a critical question about the true nature of the low-energy phase in those materials.

In some Kitaev materials, the so-called second-generation Kitaev materials, experimentally observed peculiar low-energy excitations may be ascribable to spin fractionalization in weakly disordered QSL, but it may also relate to the random singlet (RS) phase in strongly disordered magnets. In my talk, I will discuss these possible scenarios by considering disorder in the exactly solvable Kitaev spin liquid.