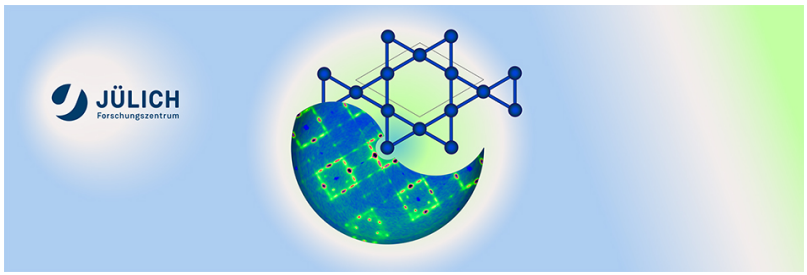

Beitrag ID: **110** Typ: **Poster**

Unconventional highly fluctuating spin in dirty magnet γ-Ba3CoNb2O9

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The search for the quantum spin liquid state has recently been extended from one-dimensional to three-dimensional systems. Nevertheless, the role of strong quenched disorder in three dimensions remains theoretically less explored due to the complexity of the computational methods. The cubic lattice, being the simplest three-dimensional lattice, provides a useful platform for examining the effects of disorder on quantum states in 3D.

It has been established that γ-Ba3CoNb2O9 exhibits a disordered cubic lattice [1], characterized by a 1:2 site mixing ratio between magnetic Co2+ and non-magnetic Nb5+. In the low-temperature limit, the effective spin-1/2 state of Co2+ is a consequence of the interplay between spin-orbit coupling and the octahedral crystal fields.

Surprisingly, the frozen magnetic moment, which is typically exhibited in conventional spin glasses, has not been identified in such a disordered magnet. Instead, short-range dynamical magnetic correlations have been observed, which mimic the quantum spin liquid behavior.

In this poster I will present the experimental evidence of short-range dynamical spin correlations [1] in this disordered spin-1/2 cubic lattice, in combination with Muon Spin Rotation, Neutron Diffraction and Neutron Spin Echo. The present study demonstrates that the absence of frozen spin is due to the quantum nature of the spin 1/2, as evidenced by the quantum cluster expansion approximation method.

Reference:
[1] Fanjun Xu, et al. Under review 2025.

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