Poster 15

Quantum spin liquid in a langbeinite family member $K_2Ni_2(SO_4)_3$

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Quantum spin liquids (QSL) are interesting phases of matter, possessing highly entangled quantum states which are, at the same time, disordered. The states possesses fractional excitations, detectable using inelastic neutron scattering, giving rise to dispersionless excitations, which is a hallmark of QSLs. Ordered magnetic states being ubiquitous, their counterpart disordered QSL states of matter have been elusive and their detection has been a difficult course of matter over of the decades. All the materials which have been proposed to display QSL states have eventually been shown to order at low enough temperature. $K_2Ni_2(SO_4)_3$ is a member of langbeinite family and a candidate material for QSL. The material has a two-trillium lattice structure, which is highly frustrated, which plays a role in stabilizing the QSL state. Previous [1] experiments (specific heat, magnetic susceptibility, muSR, etc.) have shown a quantum spin liquid state exists in the material. In the recent work in our group [2], single crystal inelastic neutron scattering data compared with PFFRG and finite temperature classical Monte Carlo shows a remarkable conformity further establishing the existence of QSL state inside the material.

[1] Ivica Živković *et al.*, *Magnetic Field Induced Quantum Spin Liquid in the Two Coupled Trillium Lattices of $K_2Ni_2(SO_4)_3$*, Physical Review Letters **127** 157204 (2021).

[2] M. G. Gonzalez *et al.*, *Dynamics of $K_2Ni_2(SO_4)_3$ governed by proximity to a 3D spin liquid model*, arXiv:2308.11746 (2023).