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Neutron studies of SrCu2(BO3)2 under extreme conditions –a fruit fly for quantum many body physics

Thursday 27 April 2023 09:00 (30 minutes)

Neutron spectroscopy offer a unique insight into the emergent quantum phases and entangled dynamics in quantum materials.
A textbook example is offered by the compound SrCu2(BO3)2 realizing the theoretical Shastry-Sutherland model, which reveal a plethora of intriguing phenomena including: bosonic flat bands; a zoo of entangled bound states; correlated decay of magnons; valence bond solid of plaquette singlets; a quantum equivalent to the critical point of water; a putative deconfined quantum critical point; fractional magnetization plateaus and bosonic BEC of triplet bound states. Exploring this rich physics in parallel illustrates the challenges and rewards of technological advancements in neutron instrumentation and pushing the capabilities of extreme condition sample environments.
I will present some of the remarkable findings in SrCu2(BO3)2 and illustrate what outstanding questions can be answered through technological advancements like the MORIS programme.

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