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Kyoto University
Emergent paramagnetic phases in Zn-paratacamite

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Recently, there has been much experimental progress in the search for new quantum paramagnetic phases of matter through successful fabrication of frustrated spin 1/2 magnets. In this talk, I will focus on one such material: a quasi-two-dimensional family of layered spin 1/2 kagome lattice systems \( \text{Zn}_x\text{Cu}_{4-x}(\text{OH})_6\text{Cl}_2 \) dubbed "Zn-paratacamite". Remarkably, at \( x=1 \) this material shows no sign of magnetic order down to the lowest temperatures studied. It is therefore considered one of the leading candidate systems for hosting a quantum spin liquid phase. In the undoped \( x=0 \) limit, two thermodynamic phase transitions are observed and the new phases are the subject of this talk. I will argue that the lowest temperature phase has Neel order induced by a frustration relieving structural distortion observed in this doping regime. By quantum disordering this Neel phase, I will argue that the intermediate temperature paramagnetic phase is a valence-bond-solid. Lastly, I will present predictions for future X-ray and inelastic neutron scattering experiments which can test our theory.

Multi-channel Kondo Models in non-Abelian Quantum Hall Droplets

Gregory Fiete
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We study the coupling between a quantum dot and the edge of a non-Abelian fractional quantum Hall state which is spatially separated from it by an integer quantum Hall state. Near a resonance, the physics at energy scales below the level spacing of the edge states of the dot is governed by a \( k \)-channel Kondo model when the quantum Hall state is a Read-Rezayi state at filling fraction \( \nu = 2 + k/(k + 2) \) or its particle-hole conjugate at \( \nu = 2 + 2/(k + 2) \). The \( k \)-channel Kondo model is channel isotropic even without fine tuning in the former state; in the latter, it is generically channel anisotropic. In the special case of \( k = 2 \), our results provide a new venue, realized in a mesoscopic context, to distinguish between the Pfaffian and anti-Pfaffian states at filling fraction \( \nu = 5/2 \).