DAY 5 (27 June): 9:00 – 9:40

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 though 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 $Zn_xCu_{4-x}(OH)_6Cl_2$ 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.