DAY 1: 10:40 – 11:20

Topological Phases in Frustrated Magnets

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I describe recent theoretical efforts to find quantum spin liquid phases with topological order in frustrated magnets. I also try to make connection between some of these theoretical developments and recent experimental works on newly discovered frustrated magnets such as hyperkagome antiferromagnet $Na_4Ir_3O_8$ and herbertsmithites.

DAY 1: 11:20 – 12:00

Destruction of Néel order in S=1/2 square lattice anti-ferromagnets

Ribhu Kaul
Harvard University

It has been long believed in the study of the cuprates that a thorough understanding of the possible insulating paramagnetic phases that are proximate to the Néel ordered parent materials may hold the key to the mysterious properties that appear on the introduction of charge carriers. The parent materials are well described by S=1/2 square lattice anti-ferromagnetic models. Hence the destruction of Néel order in such spin Hamiltonians, which is a subject of great theoretical interest in itself, might also shed light on one of the most exciting experimental puzzles of our time – high-temperature superconductivity. In this seminar, I will report numerical results on the first model S=1/2 square-lattice quantum anti-ferromagnet in which Néel order can be destroyed and which is nevertheless amenable to unbiased sign-problem free quantum-Monte Carlo simulations. Our numerical study which is carried out on lattices that contain in excess of 10,000 spins indicate that the paramagnetic state that emerges on the destruction of Néel order in this model has valence-bond solid order (VBS). Close to the transition there is evidence for quantum criticality and I will show how the observed scaling behavior may be understood by a comparison with large-N computations on a particular continuum field theory that is expected to describe the Néel-VBS transition. Connections to possible quantum transitions out of the Néel state by the introduction of a finite density of charge carriers will also be discussed.