Emergent electrodynamics in a quantum antiferromagnet

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Abstract

In this talk, I will discuss the stability of ordered states in a two-dimensional quantum spin-1/2 $J_1$-$J_2$ antiferromagnet on a frustrated triangular lattice. In the presence of next-nearest-neighbor antiferromagnetic coupling, $J_2$, the model is shown to undergo a continuous transition from $120^\circ$ ordered state to a quantum U(1) Dirac spin-liquid (QED$_3$) at $J_2/J_1 \sim 0.089$, in accordance with previous variational Monte-Carlo and DMRG studies. The Maxwell U(1) gauge field emerges in a narrow parameter interval of $0.089 < J_2/J_1 < 0.116$, that stabilizes the spin liquid. I will discuss the interplay of ordering and the emergence of the gauge field in the vicinity of unconventional criticality.

References:

