



Condensed Matter Theory Center

Seminar

Kihwan Kim

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Friday, December 18

11:00 AM-12:30 PM

2202 Physics Building

“Quantum Frustration of Ising Spins with Trapped Ions”

Abstract: Spin systems exhibit frustration when the spins cannot satisfy all of their mutual interactions in a simple ordered configuration, which gives rise to a large ground state degeneracy with analogues in liquids and ice [1,2]. In quantum spins, the frustrated ground states are expected to be highly entangled. Here we report experimental simulations of three quantum Ising spins in a textbook example of triangular geometrical frustration. We study the ground state properties through adiabatic evolutions from simple polarized states, and also measure correlations and entanglement witnesses of these ground states. We directly observe that such ground states are accompanied by an added degree of degeneracy and entanglement when the underlying Hamiltonian features frustration.

[1] H. T. Diep, Frustrated Spin Systems (World Scientific Publishing Company, 2005).

[2] R. Moessner and A. P. Ramirez, Phys. Today 59, 24 (Feb 2006).