MAR17-2016-020094

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

Fingerprints of quantum spin ice in Raman scattering[1]

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Quantum spin liquids (QSLs) emerging in frustrated magnetic systems have been a fascinating and challenging subject in modern condensed matter physics for over four decades. In these systems the conventional ordering is suppressed and, instead, unusual behaviors strongly dependent on the topology of the system are observed. The difficulty in the experimental observation of QSLs comes from the fact that unlike the states with broken symmetry, the topological order characteristic of cannot be captured by a local order parameter and thus cannot be detected by local measurements. Identifying QSLs therefore requires reconsideration of experimental probes to find ones sensitive to features characteristic of topological order. The fractionalization of excitations associated with this order can offer signatures that can be probed by conventional methods such as inelastic neutron scattering, Raman or Resonant X-ray scattering experiments. In my talk I will discuss the possibility to use Raman scattering to probe the excitations of Quantum Spin Ice, a model which has long been believed to host a U(1) spin liquid ground state.

[1]NSF DMR-1511768