

Announcement of Seminar
Quantum Science on Strong Correlation Theory Forum

Date & Time: May 30th (Wednesday), 2012
14:00~15:30
Place: 4F meeting room (#435, 437), Main Research Building
RIKEN-Wako Campus

Symmetry and classification of Z_2 topological spin liquids

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Some of the very simplest topologically ordered phases of matter are Z_2 spin liquids, which are ground states of quantum spin systems with Z_2 topological order but without spontaneously broken symmetry. Beyond mere simplicity, there is recent evidence that Z_2 spin liquids occur in fairly realistic models. However, we lack a systematic understanding of how to classify Z_2 spin liquids for systems with symmetries (e.g. space group, time reversal, spin rotation).

In this talk I will discuss recent progress toward a classification of Z_2 spin liquids:

- (1) I will show that one of the existing approaches to classify spin liquids (S=1/2 fermionic parton approach) can be expanded. Upon expanding it, new Z_2 spin liquids with S=1 Majorana fermion excitations are found, which may occur in systems with competing ferromagnetic and antiferromagnetic interactions. I will discuss some of the properties of these phases.
- (2) Existing approaches do not in fact classify distinct phases, but rather classify effective theories. This can lead to a redundant classification, because two different effective theories may describe the same phase. I will discuss progress toward a true classification of distinct Z_2 spin liquid phases.