

Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

“Symmetry enriched U(1) quantum spin liquids”

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Abstract: We classify and characterize three dimensional U(1) quantum spin liquids (deconfined U(1) gauge theories) with time reversal and SO(3) spin rotational symmetries. We find there are 15 distinct such quantum spin liquids based on the properties of their bulk excitations, and we show how to interpret them as gauged symmetry-protected topological states (SPTs). Some of these states possess fractional response to an external SO(3) gauge field, for which we dub them as "fractional topological paramagnets". By examining the properties of the monopoles of an SO(3) gauge field to which the quantum spin liquid can couple, we identify 11 other anomalous states that can be grouped into 3 classes. When the surface properties of these quantum spin liquids are also of interests, the classification is further enriched by weakly coupling these quantum spin liquids to bosonic SPTs with the same symmetry. Taking this into account, we find there are 168 distinct such U(1) quantum spin liquids.

12:00pm
Tuesday, May 23, 2017
Duboc Room (4-331)

Host: Michael Pretko