Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"A New Kind of Topological Quantum Order: A Dimensional Hierarchy of Quasiparticles Built from Stationary Excitation"

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Abstract: We introduce exactly solvable models of interacting (Majorana) fermions that realize a new kind of topological quantum order. These models have extensive topological ground-state degeneracy, and a hierarchy of point-like excitations that are only free to move within sub-manifolds of the d-dimensional lattice. In particular, one of our models has fundamental excitations that are completely stationary. To demonstrate these results, we introduce a powerful polynomial representation of commuting Majorana Hamiltonians. Remarkably, the physical properties of the topologically-ordered state are encoded in an algebraic variety, defined by the common zeros of a set of polynomials over a finite field. This provides a "geometric" framework for the emergence of topological order.

12:00noon
Tuesday, May 5, 2015
Duboc Room (4-331)

Host: Liang Fu