Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

"Exactly Solvable Models of Topological Matter in 3D"

Curt von Keyserlingk
Oxford

Abstract: There are many open questions surrounding the kinds of topological and symmetry protected states of matter that exist in 3D. It therefore makes sense to investigate solvable models in 3D exhibiting topological behaviour, and understand their properties. In this work we study such a class of exactly solvable spin models, first put forward by Walker and Wang (2011). For some of these models, the point defects in the bulk are confined in meson-like pairs, but the surface excitations are more interesting: The model has deconfined point defects pinned to the boundary of the lattice, and these exhibit exotic (topological) statistics. The surface physics is reminiscent of a fractional quantum hall effect, and these considerations help motivate an effective field theoretic description for the lattice models in their topological limit based on a kind of BF theory. We will also discuss another Walker-Wang model that is more reminiscent of the 3D bosonic topological insulators recently proposed by Metlitski, Kane, and Fisher (2013).

2:00 pm
Friday, October 18, 2013
Duboc Seminar Room
Room 4-331

Host: Liang Fu