

Massachusetts Institute of Technology
Department of Physics

Condensed Matter Theory Seminar

“Bose insulators on the half-filled honeycomb: short-ranged entanglement protected by the lattice”

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Abstract: We consider bosons on the honeycomb lattice at filling one half per site. It is known that free fermions at this filling of the tight binding model cannot form an insulating state while preserving all symmetries, even though there is an integer number of particles per unit cell. We argue, however, that interacting bosons can form an insulating state that preserves all symmetries. We propose a wave function for this state and by a mapping to a classical partition function we compute its properties and demonstrate that the state is insulating, fully symmetric and has no topological order. Our construction suggests that featureless insulators are generically allowed for at a filling of one boson per unit cell on any symmorphic lattice in any dimension. We explicitly compute the entanglement signatures of the honeycomb lattice state, and discuss the roles of spatial symmetries and their lattice realization in protecting the nontrivial entanglement.

12:00noon
Tuesday, October 20, 2015
Duboc Seminar Room (4-331)