Condensed Matter Theory Center Seminar

Tuesday, February 28
11:00 am – 12:15 pm
2205 John S. Toll Physics Building

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"Bosonic Symmetry Protected Topological States: Theory, Numerics, and Experimental Platform"

Abstract: Topological phases of matter is an active research area of condensed matter physics. Among various topics, the bosonic symmetry protected topological (BSPT) states have attracted enormous theoretical interest in the last few years. BSPT states are bosonic analogs of topological insulators. The Haldane phase of spin-1 chains is one famous example. I will talk about our recent proposal to realize two-dimensional BSPT states in the twisted bilayer graphene with strong magnetic field, as well as numerical simulations of the lattice model in various parameter regimes. The proposed BSPT state is a quantum spin Hall insulator with bosonic boundary modes only. The bosonic modes are spin and charge collective excitations of electrons. The quantum phase transition between the topological and the trivial phases happens by closing the gap of bosonic modes in the bulk, without closing the single particle gap of electrons, which is fundamentally different from all the well-known topological transitions in free fermion topological insulators. On the theory side, the phase transition is related to topics of deconfined criticality and duality of (2+1)D conformal field theories. The theoretical, numerical and experimental studies will deepen our understanding of quantum phase transitions.

Host: Xiao Li

Web: http://www.physics.umd.edu/cmtc/seminars.html

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