Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Microscopic Realization of 2-Dimensional Bosonic Topological Insulators ZHENG-XIN LIU, Institute for Advance Study, Tsinghua University, China, ZHENG-CHENG GU, Perimeter Institute for theoretical physics, Canada, XIAO-GANG WEN, MIT, USA — It is well known that a Bosonic Mott insulator can be realized by condensing vortices of a boson condensate. Usually, a vortex becomes an anti-vortex (and vice-versa) under time reversal symmetry, and the condensation of vortices results in a trivial Mott insulator. However, if each vortex/anti-vortex interacts with a spin trapped at its core, the time reversal transformation of the composite vortex operator will contain an extra minus sign. It turns out that such a composite vortex condensed state is a bosonic topological insulator (BTI) with gapless boundary excitations protected by $U(1)Z_2^T$ symmetry. We point out that in BTI, an external π flux monodromy defect carries a Kramers doublet. We propose lattice model Hamiltonians to realize the BTI phase, which might be implemented in cold atom systems or spin-1 solid state systems.

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Date submitted: 13 Nov 2014 Electronic form version 1.4