Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Topology, Delocalization via Average Symmetry and the Symplectic Anderson Transition CHARLES KANE, University of Pennsylvania, LIANG FU, Massachusetts Institute of Technology — A field theory of the Anderson transition in two dimensional disordered systems with spin-orbit interactions and time-reversal symmetry is developed, in which localization is driven by the proliferation of vortex-like topological defects. The sign of the vortex fugacity determines the Z_2 topological class of the localized phase. There are two distinct fixed points with the same critical exponents, corresponding to transitions from a metal to an insulator and a topological insulator respectively. The critical conductivity and correlation length exponent of these transitions are computed in a $N = 1 - \epsilon$ expansion in the number of replicas, where for small ϵ the critical points are perturbatively connected to the Kosterlitz Thouless critical point. Delocalized states, which arise at the surface of weak topological insulators and topological crystalline insulators, occur because vortex proliferation is forbidden due to the presence of symmetries that are violated by disorder, but are restored by disorder averaging.

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Date submitted: 05 Nov 2012

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