Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Entanglement Spectrum Classification of Disordered Class AII Symplectic Systems[1] MATTHEW GILBERT, TAYLOR HUGHES, University of Illinois at Urbana-Champaign, ANDREI BERNEVIG, Princeton University — Of the available classes of random matrices which have been shown to contain topologically non-trivial properties[2], one of the most intriguing is class AII, which is characterizes a system that possesses time-reversal symmetry. This class of random matrices has been the subject of significant attention as it encompasses Z_2 topological systems of which the quantum spin Hall (QSH) state is a member [3]. We calculate the entanglement spectrum for disordered class AII symplectic systems in two-dimensions as a function of disorder strength, chemical potential, and bulk inversion asymmetry. We show that there is a one to one correspondence between the full system Hamiltonian and that of the entanglement spectrum not only in terms of level statistics but also in terms of the scaling of the inverse participation ratios. We also use the properties of the entanglement spectrum to illustrate the nature of the symplectic metal phase which appears when inversion symmetry is broken.

[1]MJG is supported by the AFOSR under grant FA9550-10-1-0459
[2]A. P. Schnyder, S. Ryu, A. Furusaki, and A .W. W. Ludwig, *Phys. Rev. B* **55**, 195125 (2008).
[3]C. L. Kane and E. J. Mele, *Phys. Rev. Lett.* **95**, 146802 (2005).

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Date submitted: 11 Nov 2011 Electronic form version 1.4