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Protected Entanglement Spectrum in Disordered Topological Insulators EMIL PRODAN, Yeshiva University, TAYLOR HUGHES, University of Illinois at Urbana-Champaign, ANDREI BERNEVIG, Princeton University — The topological insulating phase is robust against disorder. However, the phase diagram of a topological insulator, more precisely the boundary between the trivial and topological phases, can be strongly reshaped by the disorder. It is therefore important to devise methods that can efficiently map the extent of the topological phase in the presence of disorder. This talk will describe two such methods and presents several applications. First, it is shown that, in the topological phase, the entanglement spectrum remains extended while in the trivial phase it becomes localized, in the presence of disorder. The localized/delocalized character of the entanglement spectrum has a clear signature in the level statistics, which can be used to efficiently map the boundary between topological and trivial phase. The second method is based on efficient real space calculations of the bulk invariants that do not involve twisted boundary conditions. In fact, it is shown that both methods involve only data encoded in the ground states of the systems.

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