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Topological Insulators sans lattices ADHIP AGARWALA, VIJAY B. SHENOY, Indian Institute of Science — Our understanding of topological insulators is based on an underlying lattice where the local electronic degrees of freedom at different site interact with each other in ways that produce nontrivial band topology. Indeed, the search for material systems to realize such phases have been strongly influenced by this. In this work, we show that topological insulating phases do not need a lattice. We demonstrate this by explicitly constructing models on set of sites randomly distributed in space. By studying the quantized conductances and Bott indices, we systematically show the topological character of the states in such random system in two spatial dimensions in the symmetry classes A, AII, D, DIII and C. We also demonstrate a time reversal invariant topological insulator on a random set of sites in three spatial dimensions. Our study not only provides a deeper understanding of the topological phases of non-interacting electrons, but also suggests new routes of creating them via a random distribution of impurities in an otherwise insulating host.

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