

Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Wannier representation of Z_2 topological insulators ALEXEY SOLUYANOV, Rutgers University, DAVID VANDERBILT — We consider the problem of constructing Wannier functions for Z_2 topological insulators. For Chern insulators it is well known that there is a topological obstruction to the construction of Wannier functions, and one may wonder whether this is also true in the Z_2 case. We consider a model system for the Z_2 problem in 2D. In the Z_2 -even phase the system is an ordinary insulator, and the usual projection-based scheme can be used to build the Wannier representation. In the Z_2 -odd phase we do find a topological obstruction, but only if one insists on choosing a gauge that respects the time-reversal symmetry, corresponding to Wannier functions that come in time-reversal pairs. If instead we are willing to violate this gauge condition, a Wannier representation becomes possible. We present a scheme for constructing Wannier functions for the Z_2 -odd phase, showing explicitly that the Wannier functions do not come in Kramers pairs despite the presence of time-reversal symmetry.

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Date submitted: 19 Nov 2009

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