MAR14-2013-020038

Abstract for an Invited Paper
for the MAR14 Meeting of
the American Physical Society

Classification of interacting electronic topological insulators in three dimensions

CHONG WANG, Massachusetts Inst of Tech-MIT

A fundamental open problem in condensed matter physics is how the dichotomy between conventional and topological band insulators is modified in the presence of strong electron interactions. We show that there are 6 new electronic topological insulators that have no non-interacting counterpart. Combined with the previously known band-insulators, these produce a total of 8 topologically distinct phases. Two of the new topological insulators have a simple physical description as Mott insulators in which the electron spins form spin analogs of the familiar topological band-insulator. The remaining are obtained as combinations of these two "topological paramagnets" and the topological band insulator. We prove that these 8 phases form a complete list of all possible interacting topological insulators, and are classified by a Z_2^3 group-structure. Experimental signatures are also discussed for these phases.