

Interaction effects on the bulk and edge physics of topological insulators

Martin Hohenadler

We present quantum Monte Carlo results for the effects of strong interactions on the bulk and edge properties of two-dimensional topological insulators. Repulsive interactions in the bulk give rise to a 3D XY transition to a topologically trivial antiferromagnetic insulator. Compared to a Hubbard interaction, a long-range Coulomb repulsion promotes charge-density-wave fluctuations and pushes the magnetic transition to stronger couplings. However, no new phases are observed. For the quasi-one-dimensional helical edge states, we investigate the theoretical predictions of a Luttinger liquid to Mott insulator transition at half-filling, and comment on the experimental signatures of generic correlation effects.