

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Topological Response Theory of Doped Topological Insulators

MAISSAM BARKESHLI, Stanford University, XIAOLIANG QI — We generalize the topological response theory of three-dimensional topological insulators (TI) to metallic systems – specifically, doped TI with finite bulk carrier density and a time-reversal symmetry breaking field near the surface. We show that there is an inhomogeneity-induced Berry phase contribution to the surface Hall conductivity that is completely determined by the occupied states and is independent of other details such as band dispersion and impurities. In the limit of zero bulk carrier density, this intrinsic surface Hall conductivity reduces to the half-integer quantized surface Hall conductivity of TI. Our theory is directly related to the TI materials currently under experimental investigation, which have finite residual bulk carrier densities.

Maissam Barkeshli
Stanford University

Date submitted: 19 Jan 2011

Electronic form version 1.4