

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Topologically nontrivial Fermi regions and their novel electromagnetic response properties CHING HUA LEE, Institute of High Performance Computing, Singapore, XIAO ZHANG, Sun Yat-Sen University, China — In the last decade, there has been a surge of interest in the application of topology to condensed matter physics. So far, most studies have been concerned with the novel properties that arise due to nontrivial band topology, i.e Quantum Anomalous Hall and Z₂ topological insulators (TIs). In this talk, I shall describe another context where nontrivial topology also leads to interesting, measurable effects. Within the semi-classical Boltzmann approach, it can be shown that a topologically nontrivial Fermi sea region generically exhibits a non-monotonic nonlinear electromagnetic response in the limit of low chemical potential. Such topologically nontrivial regions of filled states can arise in experimentally realized TI heterostructures or materials with large Rashba splitting, i.e. BiTeI, where the Fermi sea is not simply connected. A non-monotonic electromagnetic response implies regimes of negative differential resistance, which have important applications in technologies involving microwave generation, like motion sensing and radio astronomy. We hope that nontrivial Fermi sea topology will hence provide another route for the realization of such technologies.

Ching Hua Lee
Stanford Univ

Date submitted: 04 Nov 2015

Electronic form version 1.4