

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Magneto-optical and Magneto-electric Effects of Topological Insulators in Quantizing Magnetic Fields¹ WANG-KONG TSE, A.H. MACDONALD, University of Texas, Austin — Topological insulators show novel magneto-electric effect when the surface Dirac cone dispersion is gapped by a weak Zeeman field. In this talk, we present our study of the magneto-optical and magneto-electric effects of a thin-film topological insulator in the presence of a strong quantizing magnetic field. We find that low-frequency magneto-optical properties depend only on the sum of top and bottom surface Dirac-cone filling factors, whereas the magneto-electric response depends only on the difference. The Faraday rotation is quantized in integer multiples of the fine structure constant α and the Kerr effect exhibits a full-quarter rotation. Strongly enhanced cyclotron-resonance features appear at higher frequencies that are sensitive to the filling factors of both surfaces. When the product of the bulk conductivity and the film thickness in e^2/h units is small compared to α , magneto-optical properties are only weakly dependent on accidental doping in the interior of the film.

¹This work was supported by the Welch grant F1473 and by DOE grant DE-FG03-02ER45985.

Wang-Kong Tse
University of Texas, Austin

Date submitted: 14 Dec 2010

Electronic form version 1.4