Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

**Sum rule constraints on the surface state conductance of topological insulators** K.W. POST, B.C. CHAPLER, M.K. LIU, H.T. STINSON, M.D. GOLDFLAM, Univ of California - San Diego, A.R. RICHARDELLA, J.S. LEE, Pennsylvania State University, A.A. REIJNDERS, University of Toronto, K.S. BURCH, Boston College, N. SAMARTH, Pennsylvania State University, D.N. BASOV, Univ of California - San Diego — We report the Drude oscillator strength (D) and the magnitude of the bulk band gap of the epitaxial topological insulator alloy $(Bi,Sb)_2Te_3$. The bulk band gap is used in conjunction with f-sum rules to establish an upper bound for the D expected in a typical Dirac like system composed of linear bands. We expand our result from the linear band model to include both hexagonal warping and electron-hole asymmetry, as is typical in topological insulator systems. The corresponding maximum value of D arising from Dirac bands in this more complex system is also determined. The observed D is found to be close to this upper bound, demonstrating the effectiveness of alloying in eliminating bulk charge carriers. Moreover, Hall effect parameters and the weak anti-localization observed in transport on the same sample support assignment of the low-energy conduction to topological surface states.

Kirk Post
Univ of California - San Diego

Date submitted: 14 Nov 2014 Electronic form version 1.4