Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Optical characterization of Bi_2Se_3 in magnetic field: evidence for magneto-electric coupling ANDREW LAFORGE, University of California, Santa Cruz, ALEX FRENZEL, BRENNAN PURSLEY, University of California, San Diego, TAO LIN, XINFEI LIU, JING SHI, University of California, Riverside, DIMITRI BASOV, University of California, San Diego — We present an infrared magneto-optical study of Bi_2Se_3, one of a class of materials recently shown to exhibit topological surface states due to spin-orbit coupling. Far- and mid-infrared (IR) reflectance and transmission measurements have been performed in magnetic fields oriented both parallel and perpendicular to the trigonal c axis of this layered material, and supplemented with UV-visible ellipsometry to obtain the optical conductivity $\sigma_1(\omega)$. With lowering of temperature we observe narrowing of the Drude conductivity due to reduced quasiparticle scattering, as well as the increase of the band gap absorption edge. Magnetic fields $H \parallel c$ produce dramatic effects in the far-IR, revealing significant magneto-electric coupling. For the perpendicular field orientation, a new feature is observed in the far-IR, and the plasma edge is slightly shifted to higher energies. In both cases the band gap edge is softened in magnetic field.

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Date submitted: 19 Nov 2009 Electronic form version 1.4