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Terahertz Kerr Measurements of the Surface States on n- and p-type Bi_2Se_3 Topological Insulators[1] G.S. JENKINS, A.B. SUSHKOV, D.C. SCHMADEL, M.-H. KIM, K.M. BHAMIDIPATI, P. SYERS, J. PAGLIONE, H.D. DREW, CNAM, University of Maryland, College Park, N.P. BUTCH, Cond. Mat. and Matls. Div., Lawrence Livermore National Lab, J.G. ANALYTIS, I.R. FISHER, Dept. of Physics, Stanford University — We report terahertz magneto-optical characterization of a single surface state on bulk crystals of n-type Bi_2Se_3 and p-type Bi_2Se_3 doped with Mg as well as Sm, breaking time reversal symmetry and opening a gap at the Dirac point. A gate is used to apply an electric field which creates and modulates a small depletion layer. The modulated Fermi energy of the surface state produces differential optical signals with no contribution arising from bulk carriers. The real and imaginary parts of the differential Kerr angle yield the transport scattering rate, spectral weight, and mass of the surface state carriers. Comparison with ARPES and other transport measurements will be discussed.

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