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Quantum Oscillations and Quantum Hall Effect in Topological Insulator Material Bi_2Se_3 HELIN CAO, IRENEUSZ MIOTKOWSKI, TIAN SHEN, YONG CHEN, Department of Physics, Purdue University, West Lafayette, IN 47907 USA — Bi_2Se_3 has attracted strong attention recently as a prototype topological insulator material. We have measured magneto-transport in metallic Bi_2Se_3 crystals. At high magnetic field (B), the longitudinal resistance (R_{xx}) displays characteristic Shubnikov–de Haas (SdH) oscillations (periodic in 1/B). The measurements in tilted magnetic field show the SdH oscillations are only controlled by the perpendicular component of B, indicating 2D nature of charge carriers. We also observed quantized plateaus in Hall resistance (R_{xy}) concomitant with the minima in R_{xx}. From the temperature dependence of the SdH oscillations, we extract a Fermi velocity $\sim 5.9*10^5$m/s, and an effective mass $\sim 0.14 m_e$ (m_e is the electron mass). We discuss possible relations of our observations to topological surface states, as well as contributions from individual 2D quintuple layers of Bi_2Se_3.

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