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Evidence for a Dirac Spectrum in the Topological Insulator Bi_2Te_2Se from High-Field Shubnikov-de Haas Oscillations JUN XIONG, Princeton University, YONGKANG LUO, Zhejiang University, YUEHAW KHOO, SHUANG JIA, ROBERT CAVA, NAI PHUAN ONG, Princeton University — The transport properties of surface states in the 3D topological insulators based on bismuth have been observed in a number of experiments. However, there is still no direct evidence for the Dirac dispersion predicted for these states. We have measured the Shubnikov-de Haas (SdH) oscillations in Bi_2Te_2Se in intense dc fields. At B>40 T, we can reach the n=1 surface Landau Level. In the index plot (of 1/B versus n), the relatively large oscillation amplitudes in our crystals (as large as 17% of the total conductance) enables us to resolve, in the high-field limit, the $\frac{1}{2}$-shift predicted from the Berry phase in the Dirac spectrum. In addition, the linearity of the index plot shows that the surface Lande g-factor is quite small (less than 5) in Bi_2Te_2Se, in contrast with recent inferences based on low-B SdH experiments.
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