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Unusual Linear Magnetoresistance in Non-Metallic Topological Insulator Bi_2Te_3[1] DONGXIA QU, J.G. CHECKELSKY, YEW SAN HOR, R.J. CAVA, N.P. ONG, Princeton University — ARPES experiments have shown that, in both Be_2Se_3 and Bi_2Te_3, the energy gap is crossed by a single surface state (SS) with Dirac-like dispersion [1,2]. Spin-resolved ARPES [1] shows that the spin of the SS has a Rashba-like coupling, consistent with the identification of these materials as topological insulators. To explore the surface-state transport properties in Bi_2Te_3, we have examined in detail the low-temperature (T) transport properties in crystals with non-metallic ρ vs. T profiles. At 0.3 K, we observe an unusual H-linear magnetoresistance (MR) that extends in field H from 0.05 T to 14 T. The H-linear dependence is observed with $\mathbf{H} \parallel \mathbf{c}$ and $\mathbf{H}$ in-plane. We discuss a scenario in which the H-linear MR arises from the effect of $\mathbf{H}$ on the spins of the carriers in the topological SS. We also discuss a comparison with H-linear MR in $Bi_{1-x}Sb_x$.

[1] Y. Xia *et al.*, Nat. Phys. **5**, 398 (2009).
[2] Y. L. Chen *et al.*, Science, **325**, 178 (2009).

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