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Magnetic Versus Non-magnetic Scattering of Topological Surface States in Bi_2Te_3[1] LINDSAY GORMAN, HAIM BEIDENKOPF, PEDRAM ROUSHAN, JUNGPIL SEO, Department of Physics, Princeton University, YEW SAN HOR, ROBERT CAVA, Department of Chemistry, Princeton University, ALI YAZDANI, Department of Physics, Princeton University — Due to their novel spin texture, the surface states of topological insulators are predicted to be impervious to backscattering from non-magnetic disorder. For impurities which break time-reversal symmetry, however, such backscattering is not forbidden by the topological character of the states. Here we use scanning tunneling microscopy to study scattering from impurities in doped Bi_2Te_3. In Mn-doped Bi_2Te_3, we have observed an interference pattern from the surface states throughout a broad range of energies, even in the region of linear dispersion near the Dirac point. We contrast these findings of the scattering of topological surface states from magnetic defects with similar measurements on Ca-doped Bi2Te3 using spectroscopic mapping. We will use the results of these experiments to probe whether the presence of magnetic impurities gives rise to backscattering in topological surface states.

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