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Scattering on Magnetic and Non-Magnetic Impurities on a Surface of a Topological Insulator[1] T. VALLA, Z.-H. PAN, Brookhaven National Laboratory, D.R. GARDNER, S. CHU, Y.S. LEE, Massachusetts Institute of Technology — Dirac-like surface states on surfaces of topological insulators have a chiral spin structure that supresses back-scattering and protects the coherence of these states in the presence of potential scatterers. In contrast, magnetic scatterers are expected to open the back- scattering channel via the spin-flip processes and to degrade the state's coherence. We present angle-resolved photoemission spectroscopy studies of the electronic structure and the scattering rates upon adsorption of various magnetic and non-magnetic impurities on the surface of Bi_2Se_3, a model topological insulator. We uncovered an unusual insensitivity of the topological surface state to both non-magnetic and magnetic impurities. The electrons donated by the impurities fill the topological surface state and pairs of higher lying spin-orbit split surface bands, preserving the non-trivial spin texture of the surface.

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