

Abstract Submitted  
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**Impurity-induced states on the surface of 3D topological insulators**<sup>1</sup> RUDRO BISWAS, Harvard (Physics), ALEXANDER BALATSKY, Los Alamos National Laboratory — We have investigated the modifications to local electronic structure on the surface of strong topological insulators (3D), due to local impurities and step edges. We find that in the case of a local impurity that is magnetic or non-magnetic in nature, prominent resonances can form near the Dirac point of the surface band. However, we find that the Dirac point itself is left unaffected by both types of impurity. We conjecture that increasing concentrations of local magnetic impurities or a mix of local potential impurities with both attractive and repulsive characters can contribute to opening a gap in the (originally) gapless spectrum of surface states by the gradual depletion of extended states around the Dirac point. We also find that these surface magnetic impurities should interact via an RKKY interaction that is antiferromagnetic in character (sign of the first oscillation; opposite in sign to the usually-obtained ferromagnetic interaction). Finally, we also present a general calculation of scattering at step edges on the surface consistent with the various symmetries and thus deduce the character of LDOS modulation near the step. Ref: Rudro R. Biswas and Alexander V. Balatsky, arXiv:0910.4604, Nov 2009.

<sup>1</sup>UCOP/T027-09

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