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Tunable exotic Kondo effect on topological insulator surfaces LEONID ISAEV, LSU, GERARDO ORTIZ, Indiana University, ILYA VEKHTER, LSU — We study the fate of a spin-1/2 impurity on the surface of a $3D$ topological insulator (TI). Within a simple model, we derive an effective Hamiltonian which governs coupling of surface states to the impurity and show that Kondo screening of the local moment strongly depends on details of the bulk band structure and on specific surface properties. The Kondo exchange interaction has an XXZ form whose anisotropy can be tuned by changing parameters in the boundary conditions for the electron wavefunction at the TI surface. We determine the phase diagram of the resulting pseudogap Kondo impurity model as a function of these parameters. Our conclusions can be tested in the recently discovered TIs $Pb_{1-x}Sn_x(Se, Te)$. Moreover, we argue that magnetic impurities can be used as an experimental probe to discriminate between topological and band insulators, and that TIs serve as a "lab" to realize exotic Kondo physics.

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