Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Spin textures for surface states with non-Rashba-type spin-orbit interaction KOKIN NAKAJIN, SHUICHI MURAKAMI, Tokyo Institute of Technology — Surface states in Tl/Si and Bi/Si surfaces show non-Rashba-type spin splitting due to spin-orbit interaction (SOI). We construct effective tight-binding models on the triangular lattice for the surface states of Bi/Si and Tl/Si surfaces with spin-orbit interaction, respecting the crystal symmetries. Consequently, band structures and spin textures calculated from these models qualitatively agree with the experimental results. We find a new term in the Tl/Si model, which does not exist in Rashba systems. In addition, we numerically find bound states at the junction between two surface regions which have different signs of the SOI parameters in the Bi/Si system and in the Tl/Si system. Interestingly, the spin direction of the bound states is perpendicular to the crystal surface, whereas the spins of the bulk states are in-plane in the Bi/Si junction model. We compare the results with calculations using continuum models in two junction models. We also discuss physical realizations of such junctions.

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Date submitted: 14 Nov 2014 Electronic form version 1.4