Controllable transport of surface electrons in a topological-insulator-based magnetic structure

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We discuss the possibility of using a structure with a local magnetization region on top of a topological insulator (TI) to control transport of surface electrons. If the magnetization is oriented perpendicularly to the surface of TI, it opens the gap in the energy spectrum of surface electrons. The structures of this type attracted a lot of attention recently due to the possibility of effective control of magnetization and resistance by the electric current [1]. We consider the cases of one- and two-dimensional motion of electrons. For the 1D case we find similar formulae like presented in [2] for a different choice of the Hamiltonian describing Bi_2Se_3 TI. We have calculated conductance and thermoelectric coefficient [3]. Both of them reveal some oscillations because the main effect is related to the dependence of transmission on the length of magnetic region.

References:

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