

Influence of spatially random magnetization on the conduction of surface electrons in a topological insulator

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The influence of correlated fluctuations of magnetization on the transport properties of surface 2D electrons in topological insulators was studied by using the Green's function method. Both scattering from magnetization fluctuations and scattering from nonmagnetic impurities were taken into account on equal footing in the calculations of the relaxation time and the vertex function. The conductivity is remarkably reduced by scattering from magnetization fluctuations in comparison to that in the absence of such fluctuations—especially at higher Fermi energies, where scattering from impurities plays a dominant role. The temperature dependence of the conductivity follows not only from the Fermi distribution function but also from the temperature dependence of the correlation length of magnetization fluctuations. This can result, for a specific range of parameters, in an increase of the longitudinal conductivity with temperature.

References:

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