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Semi-metal-insulator transition at the surface of a topological insulator with in-plane magnetization[1] FLAVIO NOGUEIRA, ILYA EREMIN, Theoretische Physik III, Ruhr-Universitaet Bochum — We discuss the role of quantum fluctuations when the surface of a topological insulator (TI) is used as a substrate for a layered ferromagnetic (FM) material. As is well known, an out-of-plane magnetization gaps the surface states and modifies the Landau-Lifshitz-Gilbert equation in an essential way, due to the topological magnetoelectric effect. On the other hand, for the case of in-plane magnetization the surface states are gapless. We show that quantum fluctuations may modify this picture if the exchange interaction between the TI and the FM is sufficiently large. Indeed, we will show that a gap is dynamically generated in this case, turning in this way the semi-metallic state into an insulating one. Another situation of interest where a similar mechanism applies involves the Coulomb interaction between the fermions at the interface between the TI and the FM. The interplay between the magnetization dynamics and the Coulomb interaction is discussed in detail.

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