

Superconducting proximity coupling in thin films of magnetic topological insulators.

Daniele Di Miceli, Julian Legendre, and Thomas Schmidt

University of Luxembourg, Department of Physics and Materials Science, 2, place de l'Université, L-4365 Esch-sur-Alzette, Luxembourg

Inducing superconducting correlations in magnetic topological insulators (MTIs) has attracted a lot of research interest in recent years [1]-[2], being a promising way to realize topological superconductors with non-abelian anyons [3]. In principle, an effective pairing can be achieved straightforwardly by placing a topologically-nontrivial MTI in proximity to an ordinary s -wave superconductor. However, several challenges need to be overcome to observe the simultaneous coexistence of magnetism, topology and superconductivity.

Here, we investigate the proximity effect produced by an s -wave superconductor grown on top of a thin film of MTI material. Using the Green's function formalism, we derive and solve the quantum mechanically Gor'kov equations for the MTI-SC heterostructure in presence of translational invariance on the MTI plane. We analyze how the induced SC correlations depend on out-of-plane coordinate and magnetization, showing that p -wave superconductivity can be achieved.

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