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Magnetic effects in topological insulators

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Topological insulators (TIs) are narrow–gap semiconductors that exhibit Dirac-like surface state protected by time-reversal symmetry. External or internal magnetic field breaks this symmetry causing splitting of the topological surface state at the Dirac point making the surface insulating, and also results in complex spin texture on the surface of TIs[1,2]. Internal magnetic field in TIs can be created by various ways, in particular, by introducing vacancies or carbon atoms, doping with 3d-transition metal atoms, displaying magnetic semiconductor or organic overlayers as well as bulk materials on the surface of three- or two-dimensional TIs[1–6].

Here we present and discuss recent results of the study of magnetic and nonmagnetic impurities as well as magnetic proximity effects on electronic and spin structure of TIs and splitting of the topological surface state. We propose a method for engineering of structures that result systematically in big splitting of the Dirac cone. We also analyze magnetic effects in two-dimensional topological insulators and recent results for quantum anomalous Hall effect.

1 Henk J. et al. (2012), Phys. Rev. Lett. 109, 076801.
2 Henk J. et al. (2012), Phys. Rev. Lett. 108, 206801.
3 Roy S. et al. (2014), Phys. Rev. Lett. 113, 116802.
4 Eremeev S.V. et al. (2013), Phys. Rev. B 88, 144430.
5 Menshov V.N. et al. (2013), Phys. Rev. B 88, 224401.
6 Otrokov M.M., Chulkov E.V., Arnau A. (2015), Phys. Rev. B 92, 165309.