

POZVÁNKA / INVITATION

na seminář oddělení 15 Fyzikálního ústavu AV ČR, v.v.i.

Seminář se bude konat

Ve středu 19. prosince 2018 v 11.00 hod.

Wednesday 19th of December 2018 at 11am

v zasedací místnosti Fyzikálního ústavu, Cukrovarnická 10, Praha 6, budova A.
in the library room, building A, Cukrovarnická 10, Praha 6

Na programu je přednáška:

Non-equilibrium transport in topologically nontrivial systems: Application to spin-orbit torque

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Abstract:

Spin-orbit torque provides the most efficient and reliable way to manipulate magnetic memory. The heart of a spin-orbit torque device is a material with strong spin-orbit coupling. Recently it has been found that the topological insulators can be a powerful source of spin-orbit torque and can operate with two orders of magnitude smaller switching current compared to the heavy metal based devices. Although their superior performance is well established, the underlying physical mechanism is still in darkness. In this presentation, we give a heuristic explanation of the spin-dependent phenomena originated from the surface of the topological insulator. Using a minimal tight binding model with non-equilibrium Green's function formalism, we are going to explain the behaviour of the non-equilibrium spin density and spin-orbit torque in a topological insulator ferromagnet/antiferromagnet heterostructure as well as magnetic topological insulators and explain their connection with their nontrivial topology. We distinguish the contribution coming from the bulk and surface of the topological insulator and also show their robustness against impurity scattering. Finally, we demonstrate how the scattering can enhance the damping like torque in a two-dimensional magnetic insulator.

References:

1. Spin-orbit torque in a three-dimensional topological insulator–ferromagnet heterostructure: Crossover between bulk and surface transport, S. Ghosh, A. Manchon, Phys. Rev. B 97, 134402 (2018) arXiv:1711.11016.
2. Spin-orbit torque in two-dimensional antiferromagnetic topological insulators, S. Ghosh, A. Manchon, Phys. Rev. B 95, 035422, (2017) arXiv:1609.01174.
3. Non-equilibrium spin density and spin-orbit torque in three dimensional topological insulators antiferromagnet heterostructure, S. Ghosh, A. Manchon (Unpublished)