

Substrate-caused magnetic chirality in two-dimensional materials

Since 2017 and experimental discovery of the first magnetic two-dimensional material (M2DM) [1], the field of both theoretical and experimental studies of magnetic interactions in these systems has expanded tremendously. However, number of theoretical studies dealing with heterostructures containing M2DMs is limited [2-4], and the effect of substrate on the magnetic interactions in M2DMs on atomistic level is not sufficiently discussed in literature. On the contrary, experimental researchers were studying the effect of substrate, but only on the structural properties and formation of adjacent M2DM, and not on the magnetic interactions in it [5,6].

Therefore, in this master thesis research you will conduct the theoretical study of influence of a substrate on magnetic interactions in M2DMs by means of the first principles and density functional theory (DFT). Furthermore, in the center of attention will be the awakening of Dzyaloshinskii-Moriya interaction (DMI) in presence of a substrate, due to breaking of inversion symmetry between magnetic atoms in the system. DMI is chiral magnetic interaction which tends to organize interacting magnetic moments orthogonally to each other, and hence can lead to exotic magnetic patterns, as well as to interesting magnonic and spintronic properties, beyond the usual dichotomy of conventional ferromagnetic (FM) and antiferromagnetic (AFM) magnetic states.

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