

Theoretical study of the magnetic ordering of thin films and nanostructures

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In my doctoral work, I investigated the properties of various magnetic systems, such as thin films and spin chains, whose behavior plays an important role in the development of today's magnetic data storage devices. I used the well-tempered metadynamics method to calculate the temperature-dependent magnetic anisotropy energy of model and experimentally motivated magnetic thin films for a better understanding of the spin reorientation transitions. Using the same method on skyrmion-hosting thin films I calculated the collective topological charge of the lattice to count the hosted topological objects, and to obtain their respective chemical potential. I determined the magnetic ground state of Fe chains deposited on different heavy metal surface using an *ab initio* optimization scheme.