Thesis Project Offer

Joint Research and Education Programme “Palestinian-German Science Bridge PGSB”
Forschungszentrum Jülich GmbH & Palestine Academy for Science and Technology

Thesis type*

☐ BSc ☒ MSc ☒ PhD

Intended starting date (approx.): 01.06.2018

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Project description*

Title: Topology for magnetization control of complex magnets

While the topological properties of non-magnetic materials, such as topological insulators, are explored relatively well by now, the emergence of non-trivial topologies in materials which exhibit spontaneous magnetization is almost completely overlooked. The purpose of the current project is to use general group theory arguments, atomistic models and first principles calculations to fill the existing gap in our understanding of fundamental properties of matter and launch magnetic materials into the area of topological solid state theory. Starting from the quantum anomalous Hall effect as a fundamental manifestation of topology in magnets, our purpose is to classify possible magnetic topological phases prone to collinear ferromagnetic, antiferromagnetic and non-collinear complex materials. The ultimate goal of the project is to employ first principles theoretical calculations for establishing reliable means of switching between various topological phases in realistic magnetic materials by utilizing the effect of the electric field, as manifested in the phenomena of spin-orbit torque and magnetic anisotropy, thereby establishing the magnetization degree of freedom as a unique and technologically relevant tool to control the topological properties.

Date* Signature*
13.10.2018

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