
Topological Phenomena in Kagome Magnets

As a class of emergent materials, topological insulators and semimetals have attracted intensive attention in the last decade. In particular, magnetic materials provide a rich playground for realizing intriguing topological phenomena and hence tunable properties for a vast spectrum of applications. In this regard, we have accumulated solid experience in the last few years as documented by our work on magnetic antiperovskites.

In this project, we will focus on magnetic materials with kagome lattices and try to understand how the topological properties can be engineered in such compounds. Various aspects will be explored such as anomalous Hall/Nernst conductivity, spin Hall conductivity, topological orbital moments, nonlinear optoelectronic properties, and possible topological properties of the magnonic excitations. Such investigations will be done in collaboration with experienced PhD students and a Humboldt postdoc fellow in the group.

For the motivated candidates, expertise will be gained on parallel computation and coding with Python, and solid experience on sophisticated density functional theory calculations and in-depth understanding of concepts related to topological materials, valuable for both future PhD studies and industrial positions.

Please write Prof. Hongbin Zhang (Email: hongbin.zhang@tu-darmstadt.de) if you are interested.

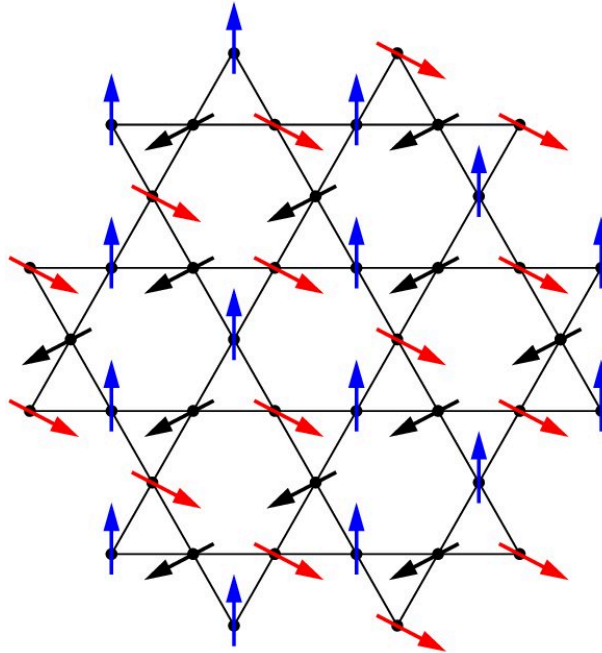


FIG. 1: Sketch of a kagome lattice with an intriguing magnetic ordering.