

Theory and computer simulations of chiral systems for spintronics

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Chirality induced spin selectivity is an effect which takes place when the flow of an electrical current induces a spin polarization in a non-magnetic chiral system (see Fig. 1). As a result, the chiral system acts as a spin filter and the transport of one spin component is favored over the other. Exploiting this effect offers a promising path toward the next generation of efficient and simple memory devices with high speed, low power, and high device densities.

In this project, the student will first gain fundamental knowledge about the theory of electron transport at the quantum level and about density functional theory. Subsequently, he/she will perform computer simulations of electron transport through either chiral bulk crystals such as the one shown in Fig. 2 or/and through chiral molecules adsorbed on magnetic surfaces.

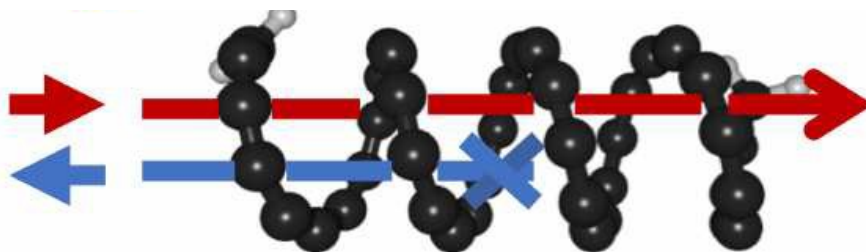


Figure 1: Schematic representation of spin filtering in a chiral system

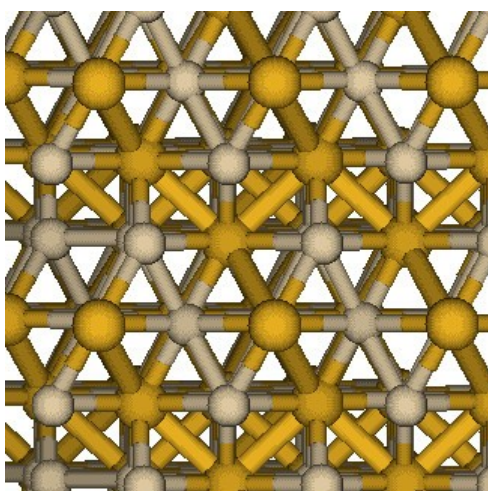


Figure 2: Bulk Structure of NbSi₂