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Current Induced Spin-Polarization in Chiral Molecules

The inverse spin-galvanic effect, or, current induced spin-polarization is mainly associated with interfaces between different layers in semiconducting heterostructures, surfaces of metals, and bulk semiconducting materials. Here, we theoretically predict that the inverse galvanic effect should also be present in chiral molecules, as a result of the chiral induced spin selectivity effect. As proof-of-principle, we calculate the non-equilibrium properties of a model system which previously has been successfully used to explain a multitude of aspects related to the chiral induced spin selectivity effect. Here we show that current driven spin-polarization in a chiral molecule gives rise to a magnetic moment which is sensitive to external magnet field. The chiral molecule then behaves like a soft ferromagnet. This, in turn, suggests that magnetic permeability measurement in otherwise non-magnetic systems may be used non-invasively to detect the presence of spin-polarized currents.