

Spin or orbital current-induced magnetization torques and self-induced torques

« how to distinguish between different contributions in magnetic materials »

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The language of the proposed JMC MC will be English.

The aim of the colloquium is to unify understanding of the torques exerted on a magnetization by spin or orbit currents, including self-induced torques in an single magnetic layer. After the first results of Miron et al. (Nature 2011) on spin-orbit-induced torques in Co/Pt/Al, followed by numerous results obtained with spin currents generated by Spin Hall Effect, there is now the emergence of works with torques generated by orbital currents. The so-called self-induced torques can also appear in isolated magnetic layers, as, for example, in L10 epitaxial FePt with torques linked to the composition gradient (Tang et al. Adv. Mat 2020) or amorphous GdFeCo (Cespedes et al. Adv. Mat 2021). For torque generation by orbital current, efficient orbital current generation or propagation is obtained with metals such as Ni or Ti, V, Cr. In many experiments, however, the respective roles of spin and orbital current contributions remain to be clarified, both in multilayers and for self-induced torques in an isolated magnetic layer.

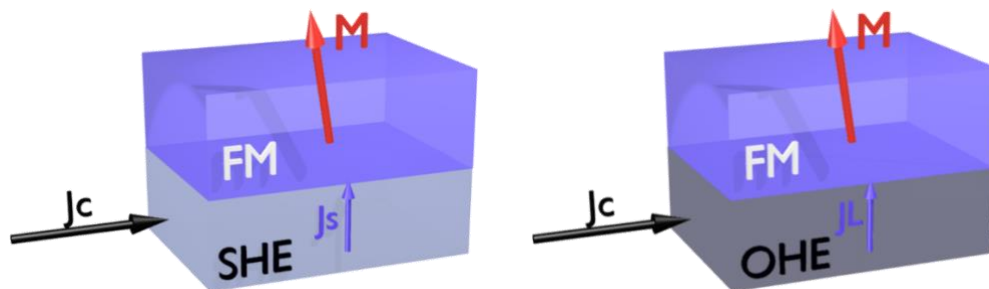


Figure : Current-induced magnetization-torque of the ferromagnetic layer (FM) induced by spin current J_S in a strongly spin-orbit-coupled layer (SHE) and by an orbital current-producing layer (OHE) induced by J_L .

The main topics of this symposium are the separation between different contributions, the conversion between different types of currents (charge, spin, orbital) and how to take advantage of the different effects in a constructive way to effectively manipulate magnetization.