Effects of transverse magnetic anisotropy on current-induced spin switching

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Knowledge of transport properties of individual large-spin (S> 1/2) atoms/molecules exhibiting magnetic anisotropy is of key importance for information processing technologies. Incorporating such objects as functional elements of spintronic devices, the objective is to employ spin-polarized currents to control the magnetic state of the system. In particular, for an atom/molecule with the predominant 'easy-axis' uniaxial magnetic anisotropy this allows for switching the system's spin. Yet, the uniaxial magnetic anisotropy, underlying the magnetic bistability, is often accompanied by the transverse anisotropy, whose presence manifests, e.g., as quantum tunneling of magnetization (QTM). Here, we show that not only does QTM determine an effective energy barrier for the spin switching, but also its effect on the transport reveals as an additional signal in transport characteristics. Furthermore, we propose how to experimentally investigate QTM by means of the STM inelastic transport spectroscopy.

References:

[1] M. Misiorny and J. Barnaś, Phys. Rev. Lett. **111**, 046603 (2013).