

Prediction of Purely Interfacial Giant Antidamping Spin-Orbit Torque induced by Skew Scattering

Alessandro Veneri

Aires Ferreira

Department of Physics, University of York, YO10 5DD, York, United Kingdom

Spin angular momentum transfer between conduction electrons and localized magnetic moments gives rise to interesting nonequilibrium spin-orbit coupling phenomena, including current-induced antidamping spin-orbit torque (ASOT), considered to be a crucial ingredient in next-generation spin memories [1]. In this talk, we present a new microscopic framework that accounts for intrinsic and extrinsic transport effects on equal footing and nonperturbatively, for the first time [2-3]. Calculations performed for generic $\mathbf{k}\cdot\mathbf{p}$ models of Rashba interfaces discloses a ubiquitous (yet hitherto neglected) mechanism for the generation of prominent interfacial ASOT: *skew scattering* activated by the out-of-plane tilting of spin-orbit textures in \mathbf{k} -space. Our findings show that current-carrying Rashba interfaces can exert strong ASOT even in the absence of magnetic scattering centers and bulk spin-orbit-coupled transport mechanisms.

References

- [1] A. Manchon et al, Rev. Mod. Phys., 91, 035004 (2019).
- [2] F. Sousa, G. Tatara, A. Ferreira, pre-print: arXiv:2005.09670
- [3] A. Veneri et al, to be published (2020)