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

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Abstract

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 poster, 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

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