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Spin pumping with interface spin-orbit coupling KAI CHEN, SHUFENG ZHANG, Univ of Arizona — The spin pumping has been formulated via a mixing conductance which characterizes the spin-dependent reflection coefficients [1]. The "mixing conductance" never mixes the spin at the interface, i.e., no spin-flip processes have been taken into account up till now. We have recently reformulated the spin pumping via linear response approach in which the interface spin-orbit coupling as well as spin-diffusion driven backflow can be explicitly included. In some limiting cases, our formulation reduces to that of the previous theory. In the presence of the interface spin-orbit coupling, the electron spin traveling through an interface will receive a spin-orbit torque that rotates and absorbs the spin angular momentum. Among many distinctions with the previous theory [1], we predict a spatial dependent spin current in both magnetic and non-magnetic layers, an anisotropic enhanced damping parameter, and a plausible resolution on the controversial experimental results obtained by different methods such as the inverse spin Hall signal and the broadening of ferromagnetic resonance linewidth. This work is supported by NSF-ECSS.

[1] Y. Tserkovnyak, A. Brataas and G. E. W. Bauer, Phys. Rev. Lett. 88, 117601 (2002).

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