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Spin-Orbit Torques in Ferromagnets and Antiferromagnets on the Surface of a Topological Insulator AURELIEN MANCHON, King Abdullah University of Science and Technology (KAUST) — It has been recently demonstrated that appropriately designed spin-orbit coupling can be used to generate spin torque in a single ferromagnet, without the need of an external polarizer [1,2,3]. In this work, I will first present recent theoretical investigations on the spin-orbit torque that emerges at the interface between a topological insulator and an insulating ferromagnet. This calculation shows that the symmetry of the intrinsic torque differs quite remarkably from the intrinsic torque obtained on the now standard magnetic Rashba 2-dimensional electron gas. I will then extend this exploration to the interface between a topological insulator and an insulating antiferromagnet. The analytical expressions obtained display remarkable differences from the previous case and allows for the coherent manipulation of the order parameter, as predicted in [4] in the case of an antiferromagnetic Rashba 2-dimensional electron gas. [1] A. Manchon and S. Zhang, Phys. Rev. B 78, 212405 (2008). [2] I. M. Miron et al., Nature Materials 9, 230 (2010). [3] A. Chernyshov et al., Nature Physics 5, 656 (2009). [4] Zelevny et al., Phys. Rev. Lett. 113, 157201 (2014).

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