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Spin-to-charge conversion at interfaces: spin pumping, Rashba coupling, and topological insulators.

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My talk focuses on the conversion between spin and charge currents by exploitation of the spin-orbit coupling (SOC) in the 2DEG states at Topological Insulator or Rashba Interfaces and the resulting perspective for low power spintronic devices. I will show results of spin to charge conversion in spin pumping experiments on **Bi/Ag Rashba interfaces** [1] and thin films of the **newly discovered topological insulator α-Sn**, and their analysis in term of **inverse Edelstein Length**. I will show experimental evidence that direct contact of metallic ferromagnetic layer is detrimental for the surfaces states of topological insulators [2]. I will also discuss additional examples of conversion between spin-to-charge at **GeTe** [3], **LAO/STO** [4] **and Fe/Ge(111)** [5] **Rashba** interfaces. I will use the conversion parameters obtained at room temperature with α-Sn to demonstrate the very large **advantage of the SOC effects in 2D interface states** with respect to the Spin Hall Effect (SHE) of 3D metals. [1]J.-C. Rojas-Sánchez et al. Nat. Comm 4, 2943 (2013). [2] J.-C. Rojas-Sánchez et al. Phys. Rev. Lett. 116, 096602 (2016). ArXiv 1509.02973 (2015) [3] C. Rinaldi, J.-C. Rojas-Sánchez et al. Appl. Phys. Lett. Mat. 4, 032501 (2016) [4] E. Lesne, J.-C. Rojas-Sánchez et al. Nat. Mat. Doi : 10.1038/nmat4726 (2016) [5] S. Oyarzun, J.-C. Rojas-Sánchez et al. Nat. Comm. Accepted (2016).