Spin Orbit Torque in Quantum Well Edges

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Spin orbit torques generated by topologically protected spin currents can be used to switch magnetic moments using lower current densities than conventional spin transfer torques, making them potentially useful for spintronics devices. Here we investigate the torque generated on the edge of time reversal invariant quantum spin Hall (QSH) systems also known as the two-dimensional or $\mathbb{Z}_2$ topological insulators which are known to posses spin polarized, robust, propagating edge states. The helical edge modes of QSH systems can be utilized as a source of spin-polarized current to induce magnetization dynamics in the ferromagnetic island adjacent to it. We have studied the proximity effect of a (anti-)ferromagnetic island on the properties of the edge-states of the QSH system and the possibility of achieving efficient spin transfer via the polarized edge currents. We will report on the robustness of the polarized edges and the spin torque exerted on the neighbouring magnetic material.