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Spin orbit driven ferromagnetic resonance and torques in single ferromagnetic layers[1] FERRAN MACIÁ, CHARLES PÉPIN, A.D. KENT, New York University, KENT'S GROUP TEAM — The coupling of spin and charge may convert electrical currents into spin currents in non-magnetic metals. In non-magnetic metals with strong spin orbit (SO) interaction in combination with magnetic metals one can also us the effect to excite magnetization dynamics; electrical currents in the non-magnetic metal transform to spin currents and the spin currents diffuse to the magnetic metal interacting with the magnetic moments. The combination of non-magnetic metals and magnetic metals has been recently used to determine spin hall angles. Here we demonstrate that spin currents in a ferromagnetic layer associated with SO interactions can excite ferromagnetic precession in the same layer. We have studied Co—Ni multilayers with both in-plane anisotropy and weak out-of-plane anisotropy. Results show that the samples have strong SO interactions. We have injected microwaves into patterned samples with several geometries and measured the mixed voltage in the same leads. Oscillatory currents drive FMR in the thin-film layer. We show that SO torques are primarily responsible for the magnetic excitations in samples with strong SO interactions, whereas samples with a weaker SO barely respond to the injected microwaves and show asymmetric components from charge current induced Oersted fields.

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