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**Current induced spin orbit torque in 2D ferromagnetic and anti-ferromagnetic system** HUAWEI GAO, Department of Physics, Texas A&M University, USA, TOMAS JUNGWIRTH, Institute of Physics ASCR, Czech Republic, JAIRO SINOVA, Department of Physics, Texas A&M University, USA and Institute of Physics ASCR, Czech Republic — Due to space inversion asymmetry in 2D ferromagnetic or anti-ferromagnetic system with spin orbit coupling, unpolarized electric current can induce non equilibrium spin polarization from carriers and act as torques on the magnetic order. We'll report analytical calculation of this effect in a simple 2D ferromagnetic model and numerical results for the 2D anti-ferromagnetic model using Kubo linear response formula. In ferromagnetic case, there is a disorder independent out-of-plane spin polarization component. This out-of-plane component has different signs for the sub-lattices in the anti-ferromagnetic case, which will exert a torque on the in-plane Neel order.

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