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Electric-field control of spin-orbit torque in magnetically doped topological insulators[1] YABIN FAN, QIMING SHAO, XUFENG KOU, PRAMEY UPADHYAYA, KANG WANG, University of California, Los Angeles — Recent advances of spin-orbit torques (SOTs) generated by topological insulators (TIs) [1-2] have drawn increasing interest to the spin-momentum locking feature of TIs' surface states, which can potentially provide a very efficient means to generate SOTs for spintronic applications. In this presentation, we will show the magnetization switching through current-induced giant SOT in both TI/Cr-doped TI bilayer [1] and uniformly Cr-doped TI films [3] In particular, we show that the current-induced SOT has significant contribution from the spin-momentum locked surface states of TIs. We find that the spin torque efficiency is in general three orders of magnitude larger than those reported in heavy metal/ferromagnetic heterostructures. In the second part, we will present the electric-field control of the giant SOT in magnetically doped TIs [3], which suggests promising gate-controlled spin-torque device applications. The giant SOT and efficient current-induced magnetization switching exhibited by the magnetic TIs may lead to innovative spintronic applications such as ultralow power dissipation memory and logic devices. [1] Y. Fan, *et al.*, *Nature Mater.* **13**, 699-704 (2014). [2] A. R. Mellnik, *et al.*, *Nature* **511**, 449-451 (2014). [3] Y. Fan, *et al.*, *under preparation.*

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Yabin Fan
University of California, Los Angeles

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