PHYSICS
COLORADO STATE UNIVERSITY

PRSE & Condensed Matter Physics Seminar

Magnetic Switching with Topological Insulator and Compensated Ferrimagnet

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372 Lory Student Center

Abstract

New materials and physics mechanisms are required to further lower down the power consumption and increase the switching speed of magnetic memory devices. In this talk, I will focus on two novel material systems which can provide new opportunities for magnetic switching. First of all, I will discuss our recent study on compensated ferrimagnetic alloys which have antiferromagnetically coupled sublattices, low magnetic moment and fast switching dynamics. Particularly, I will show that efficient electrical reading and writing can be realized in those thin films with zero magnetic moment. Moreover, via studying the current induced domain wall motion, we demonstrate the speed advantage associated with those materials. Secondly, topological insulators have spin momentum locked surface states. In our experiment, we observe current induced magnetic switchings in topological insulator/magnet bilayer films at room temperature. The large spin torque efficiency makes topological insulators outstanding candidates for realizing power efficient magnetic switching devices.

Biography

Luqiao Liu is an Assistant Professor of Electrical Engineering at Massachusetts Institute of Technology. He received his Ph.D. degree in Applied Physics from Cornell University in 2012. He worked as a Research Staff Member at the IBM Watson Research Center before joining the MIT faculty in 2012. Luqiao's current research focus is on advancing new materials and novel device structures for spintronics, including spin-based memory, logic and communication applications. Luqiao Liu is the recipient of William L. McMillan Award, NSF Career Award, Air Force Young Investigator Award, and International Union of Pure and Applied Physics Young Scientist Award.