Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Disorder tuned anomalous Hall effect in thin films of Cr doped topological insulators[1] ZHIYI CHEN, LUKAS ZHAO, INNA KORZHOVSKA, HAIMING DENG, The City College of New York - CUNY, SIMONE RAOUX, JEAN JORDAN, IBM Research - Yorktown, LIA KRUSIN, The City College of New York - CUNY — The anomalous Hall effect (AHE) – an appearance of a voltage transverse to the electric current in the absence of an external magnetic field – is a process that arises from the spin-orbit coupling between current and magnetic moments that has been fundamentally linked to the topological nature of the Hall current. Recent first-principle calculations predict that when topological insulators (TIs) are doped with transition metal ions, such as Cr or Fe, a novel *magnetically ordered* insulating state will form – a state that in thin samples may support a *quantized* anomalous Hall conductance. Here we report an observation of AHE in *rf* sputtered thin Cr doped films of Bi_2Te_3. The anomalous Hall resistivity ρ_{xy} scales with the longitudinal resistivity squared, ρ_{xx}^2, and a distinct ferromagnetic hysteretic response (loops) at temperatures below 10 K with coercive fields of the order of 0.5 T is observed. In as-deposited films the resistivity is below the resistivity quantum h/e^2. Using 2.5 MeV electron beam irradiation with varying fluence we can tune the resistivity upward by orders of magnitude. A large effect of controlled quenched point disorder on the quantization of AHE in Bi_2Te_3 will be discussed.

[1]Supported in part by NSF-DMR-112259

Zhiyi Chen
The City College of New York - CUNY

Date submitted: 09 Nov 2012 Electronic form version 1.4