

Abstract Submitted  
for the MAR14 Meeting of  
The American Physical Society

**Electrostatic Coupling Between the Surface States of a Topological Insulator** VALLA FATEMI, STEPHEN L. ELTINGE, BENJAMIN HUNT, HADAR STEINBERG, MIT, NICHOLAS P. BUTCH, NIST CNR and LLNL, RAY C. ASHOORI, PABLO JARILLO-HERRERO, MIT — We report electronic transport measurements on nanofabricated topological insulator  $\text{Bi}_{1.5}\text{Sb}_{0.5}\text{Te}_{1.7}\text{Se}_{1.3}$  exfoliated devices with electrostatic top- and bottom-gate electrodes. We observe independent, ambipolar modulation of the device resistance on both the top and bottom surfaces. On thin devices, the bottom-gate capacitively couples to the top surface, indicating poor bulk screening which allows for surface-to-surface electrostatic coupling. We explain the data through a capacitance model and extract information about the surface and bulk density of states. Additionally, we show that the ambipolarity of the surface state resistance persists up to room temperature.

Valla Fatemi  
MIT

Date submitted: 15 Nov 2013

Electronic form version 1.4