Abstract Submitted
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Electrostatic tuning of the surface states of irradiated topological insulators[1] INNA KORZHOVSKA, LUKAS ZHAO, YURY DESHKO, The City College of New York-CUNY, GHIDEWON AREFE, Columbia University, MARCIN KONCZYKOWSKY, Ecole Polytechnique, France, LIA KRUSIN-ELBAUM, The City College of New York-CUNY, COLUMBIA UNIVERSITY COLLABORATION — One of the main obstacles to accessing charge transport through Dirac surface states of topological insulators (TIs) is a significant conduction in the bulk. We have developed a new approach of reaching a *stable* charge neutrality point (CNP) using irradiation with 2.5 MeV energy electrons. By controlling the beam fluence and annealing protocol we can convert bulk conductivity from p- (hole-like) to n-type (electron-like) and back, crossing the Dirac point while preserving the robust topological signatures of surface channels. Electron beams act to compensate charged bulk defects and pull the Fermi level into the bulk gap – a process that decreases bulk conductivity by orders of magnitude to a minimum, σ_{min}, at CNP. We study the origins of minimum conductivity in electron-irradiated TIs in a transistor-like gated structures fabricated in inert environment by mechanical exfoliation with Bi_2Te_3 as a prototypical TI and h-BN as a gate dielectric. The effects of electrostatic tuning by the gate bias voltage on surface conductivity near CNP will be presented.

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