Abstract Submitted
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Numerical studies on the robustness of the topological surface modes of the topological insulator nanostructures HSIU-CHUAN HSU, AJIT COIMBATORE BALRAM, JAINENDRA JAIN, CHAOXING LIU, The Pennsylvania State University, DEPARTMENT OF PHYSICS TEAM — It has been found experimentally that the magnetoconductance oscillates as a function of the magnetic flux with a period of ϕ_0 ($\phi_0 = h/e$, one flux quantum) in strongly disordered topological insulator (TI) nanotubes. In an effort to understand the origin of the oscillation, we calculate the magnetoconductance of TI nanowire and nanotube within the Landauer formalism at different disordered strengths and Fermi levels. We found unambiguous oscillation features of the magnetoconductance which survive even in extreme disordered regime. The oscillation is attributed to the occurrence of gapless helical surface modes when the surface encloses a magnetic flux of integer multiples of $\phi_0/2$. These features demonstrate a robust transport signature of the helical surface mode(s) of the TI nanostructures.

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