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Numerical studies on magnetoconductance of the topological insulator nanotubes HSIU-CHUAN HSU, AJIT COIMBATORE BALRAM, JAINENDRA JAIN, CHAOXING LIU, The Pennsylvania State University — It has been shown that the conductance oscillates as a function of the parallel magnetic flux with a period of ϕ_0 ($\phi_0 = h/e$, one flux quantum)in topological insulator(TI) nanowires. A pair of gapless helical modes arise on the cylindrical surface of a TI nanowire when a magnetic flux of half-integer of ϕ_0 threads through it. This conductance oscillation has been a direct evidence of the transport of the surface helical modes of TI. Nonetheless, consider a TI nanotube, there are two cylindrical surfaces giving rise to two oscillation periods in terms of magnetic field. In an effort to study the magnetoconductance oscillation of TI nanotubes, we calculated the conductance within the Landauer formalism in clean and disordered limit. We found an unambiguous oscillation feature and discuss the origin of the magnetoconductance oscillation. This feature demonstrates a transport signature of the helical surface modes of the TI nanotube.

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