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Disorder induced quantized conductance with fractional value and universal conductance fluctuation in three-dimensional topological insulators LEI ZHANG, JIANING ZHUANG, Department of Physics, The University of Hong Kong, YANXIA XING, Department of Physics, The University of Hong Kong; Department of Physics,Beijing Institute of Technology, JIAN WANG, Department of Physics, The University of Hong Kong, DEPARTMENT OF PHYSICS, THE UNIVERSITY OF HONG KONG TEAM, DEPARTMENT OF PHYSICS, BEIJING INSTITUTE OF TECHNOLOGY COLLABORATION — We report a theoretical investigation on the conductance and its fluctuation of three-dimensional topological insulators (3D TI) in $Bi2Se3$ and $Sb2Te3$ in the presence of disorders. Extensive numerical simulations are carried out. We find that in the diffusive regime the conductance is quantized with fractional value. Importantly, the conductance fluctuation is also quantized with a universal value. For 3D TI connected by two terminals, three independent conductances Gzz, Gxx and Gzx are identified where z is the normal direction of quintuple layer of 3D TI. The quantized conductance are found to be $\langle G_{zz}\rangle = 1$, $\langle G_{xx}\rangle = 4/3$ and $\langle G_{zx}\rangle = 6/5$ with corresponding quantized conductance fluctuation 0.54, 0.47, and 0.50. The quantization of average conductance and its fluctuation can be understood by theory of mode mixing. The experimental realization that can observe the quantization of average conductance is discussed.

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