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Two Dimensional universal conductance fluctuations in topological insulator Bi2Te2Se microribbons[1] FENGQI SONG, ZHAOGUO LI, BAIGENG WANG, GUANGHOU WANG, Nanjing University — The universal conductance fluctuations (UCFs), one of the most important manifestations of mesoscopic electronic interference, have not yet been demonstrated for the two-dimensional surface state of topological insulators (TIs) to date. Even if one delicately suppresses the bulk conductance of TI crystals, the fluctuation of the bulk conductance still keeps competitive and difficult to be separated from the desired UCFs of the surface carriers. Here we report on the experimental evidence of the UCFs of the two-dimensional surface state in the bulk insulating Bi2Te2Se nanoribbons. The solely-B⊥-dependent UCF is achieved and its temperature dependence is investigated. The surface transport is further revealed by weak antilocalizations. Such quantum interference unexpectedly survives through the limited dephasing length of the bulk carriers in the ternary TI crystals. Based on the temperature-dependent scaling behavior, the electron-phonon interaction is addressed as a secondary source of the surface state dephasing. (Scientific Reports, 2, 595 (2012))

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