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Analysis of quantum interference in mesoscopic channels of epitaxial Bi_2Se_3 ABHINAV KANDALA, DUMING ZHANG, ANTHONY RICHARDELLA, NITIN SAMARTH, Penn State University, University Park PA 16802 — Predictions of topologically protected surface states lead to expectations of longer scattering lengths from the surface channel in candidate topological insulators such as Bi_2Se_3. In this context, we probe coherent transport in mesoscopic channels of MBE-grown Bi_2Se_3 at temperatures down to 0.5K and magnetic fields up to 6T. The magnetoresistance reveals two types of quantum corrections superimposed upon a classical background: low-field weak antilocalization and an aperiodic, reproducible fingerprint. Analysis and comparison of the quantum corrections data are used to extract important length scales and provide insights into the origin of these corrections. The channel length and temperature dependence of the magnetofingerprint is consistent with the theory of universal conductance fluctuations for diffusive systems that are two dimensional in phase coherent phenomena. Periodic oscillations in the autocorrelation of the fingerprint, persistent to high fields and high temperatures, point towards the presence of dominant scattering centers. Work supported by NSF-MRSEC and ONR.

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