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Electron interference in the 3D topological insulator Bi_2Se_3 probed by scanning tunneling microscope MAO YE, A. KIMURA, S. KIM, K. KURODA, Hiroshima University, E.E. KRASOVSKII, E.V. CHULKOV, Universidad del Pais Vasco, K. MIYAMOTO, M. NAKATAKE, T. OKUDA, Hiroshima University, Y. UEDA, Kure National College of Technology, H. NAMATAME, Hiroshima University, M. TANIGUCHI — Three-dimensional topological insulators (TIs) have aroused great attention to the new state of quantum matter originating from the surface state that forms a massless Dirac cone. Among the recently discovered TIs, Bi_2Se_3 is regarded as the most promising candidate [1]. However, recent magnetotransport measurements showed that the bulk conductance dominates even in low carrier samples [2], which raises the question of possible scattering channels responsible for the reduced surface mobility. Band structure calculations predict the Dirac point of the surface state to be located close to the bulk valence band maximum [1]. In order to clarify the surface state scattering feature, we have performed differential tunneling conductance mapping for the surface of Bi_2Se_3. The fast Fourier transformation image shows an electron interference pattern near the Dirac node, which provides the evidence of near-surface scattering of the spin polarized surface electrons at the Dirac point in Bi_2Se_3 into the spin-degenerate bulk continuum states.

[1] Y. Xia et al., Nat. Phys. **5**, 398 (2009).
[2] N. P. Butch, Phys. Rev. B **81**, 241301(R) (2010).

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