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Multiband quasiparticle interference in the topological insulator $Cu_xBi_2Te_3$[1] ERIK VAN HEUMEN, van der Waals - Zeeman Institute, University of Amsterdam, S. JOHNSTON, IFW Dresden, Germany, E. RIENKS, A. VARYKHALOV, Helmholtz Institute Berlin, Germany, F. MASSEE, N. DE JONG, Y. HUANG, J. KAAS, J.B. GOEDKOOP, M.S. GOLDEN, van der Waals - Zeeman Institute, University of Amsterdam — One of the main interests in topological materials is their purported robustness against disorder. In the Bi_2X_3 family (X=Se,Te) cubic spin-orbit coupling terms play an important role through their effect on the dispersion of the surface states. The cubic terms are also responsible for the restoration of Friedel like oscillations around impurity sites, which may be important in surface transport processes. We have therefore investigated how impurity scattering affects the surface states using a combination of Fourier-transform scanning tunneling spectroscopy (FT-STS) and calculations of the charge density oscillations expected from the cubic spin-orbit coupling terms [1]. FT-STS allows us to map out the energy-momentum relation of the important scattering wave-vectors, which can be compared to scattering vectors predicted from a self-consistent single impurity scattering calculation. To fully explain the features observed in our experiments we need to take the condu ction band into account. Namely, for energies where the surface states and the conduction band overlap, the dominant scattering process turns out to be interband impurity scattering.

[1] E. van Heumen et al., arXiv: 1110.4406

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Erik van Heumen
e.vanheumen@uva.nl
van der Waals - Zeeman Institute, University of Amsterdam

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