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Dielectric Screening of Surface States in a Topological Insulator
J.P.F. LEBLANC, Max Planck Institute for the Physics of Complex Systems, J.P. CARBOTTE, McMaster University — Hexagonal warping provides an anisotropy to the dispersion curves of the helical Dirac fermions that exist at the surface of a topological insulator. We show how modifications to the Dirac spectrum by inclusion of hexagonal warping, as well as a Schrödinger and gap term modify the polarization function of the surface states. We derive in the long wavelength limit the plasmon dispersion and show that it obtains a weak dependence on the direction of scattering momentum, q. Further, we show numerically the plasmon dispersions at large q and find considerable directional anisotropy of the plasmon bands in comparison to the pure Dirac plasmons.

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