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Scanning Tunneling Microscopy and Spectroscopy of $MnBi_2Te_4$

Wednesday 9 June 2021 16:10 (3 minutes)

It was recently demonstrated that the layered van der Waals bonded material $MnBi_2Te_4$ is an intrinsic antiferromagnetic topological insulator. The opening of an electronic gap in the surface state, originating in the presence of exchange interaction, was experimentally verified by ARPES. However, the presence and magnitude of this gap are still under debate. To develop a comprehensive understanding of this class of materials and ultimately achieve control over their topological phases, more experimental characterization of their spatial heterogeneity is needed.

In this talk we discuss low-temperature scanning tunneling microscopy and spectroscopy measurements of $MnBi_2Te_4$. We first use topographic maps to identify the surface profile, including steps which reflect the septuple-layer structure. Using scanning tunneling spectroscopy, we probe the local density of states and identify a bandgap with the same magnitude as some recent ARPES reports. We observe spatial inhomogeneity in the DOS which could be responsible for the reported differences in the size of this surface state gap. Using spectroscopic maps we characterize the electronic states associated with the presence of edges in the surface.

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