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Polarization selective micro-Raman spectroscopy of gated 3D topological insulators[1] JEFF SECOR, MILAN BEGLIARBEKOV, LUKAS ZHAO, HAIMING DENG, LIA KRUSIN-ELBAUM, Physics Department, City College of New York — One of the majors challenges to understanding the behavior of the quantum states in 3D topological insulators (TIs) is a significant carrier conduction in the bulk. Understanding phonons and electron-phonon interactions can shed light on the link between surfaces and the bulk and are critical in potential applications based on TIs. Raman scattering is a fast nondestructive technique used to analyze electron lattice interactions. In this work we study micro-Raman scattering of few quintuple layer thin 2^{nd} generation excellent crystalline quality 3D TIs, such as Sb_2Te_3, Be_2Te_3, and Bi_2Se_3 in the 15-300 K temperature range in order to probe the interaction of circularly polarized light between the lattice phonon modes and helical surface states of TI's. Circularly and linearly polarized light combined with an applied gate bias and the temperature dependence is used to examine the helicity dependence of Raman scatter to analyze the strength of electron-phonon coupling in these systems.

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