Exploring topological phonons in CdTe

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In condensed matter physics, the age of topology has led to the discovery of Weyl and Dirac fermions in electronic band structures with great potential for new types of electronic transport. In recent years, efforts have been made to extend the topology to bosonic systems in order to realize new types of vibrational/heat transport. Inelastic X-ray scattering (IXS) with meV resolution is a very powerful tool to study the topological phonons in condensed materials. Here, we report IXS measurements on CdTe single crystal. By mapping out the bulk phonon dispersions of CdTe, we show the observation of type-II Weyl points near the Brillouin zone boundaries. Moreover, topological phonons can lead to novel surface states, resembling those of the Weyl fermions such as Fermi arcs. Complimented with theoretical calculations, we try to explore the predicted surface state making use of IXS under grazing incidence conditions.