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1 Abstract

Bulk dislocation lattice defects are instrumental to identify translationally active topological insulators (TATIs), featuring band inversion at a finite momentum ($\mathbf{K}_{inv}$). TATIs host robust gapless modes around the dislocation core, when the associated Burgers vector ($\mathbf{b}$) satisfies $\mathbf{K}_{inv} \cdot \mathbf{b} = \pi$ (modulo 2π). From the time evolution of appropriate density matrices, we show that when a TATI via a real time ramp enters into a trivial or topological insulating phase, devoid of any gapless dislocation mode, signatures of the preramp defect modes survive for a long time. More intriguingly, as the system ramps into a TATI phase from any translationally inert insulators, signature of the dislocation mode dynamically builds up near the defect core, which is more prominent for slow ramps. We exemplify these generic outcomes for two-dimensional time-reversal symmetry breaking insulators. Proposed dynamic responses at the dislocation core can be experimentally observed on quantum crystals, optical lattices and metamaterials with time tunable band gap.

1.1 Reference

Sanjib Kumar Das, Bitan Roy: **arXiv:2210.15661**