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Band Topology of Insulators via Entanglement Spectrum ASHVIN VISHWANATH, YI ZHANG, ARI TURNER, University of California, Berkeley —
The entanglement spectrum has been proposed as a ground state property that captures characteristic edge excitations. Here we study the entanglement spectrum of topological insulators. We first show that insulators with topological surface states will necessarily also have protected modes in the entanglement spectrum. However, surprisingly, the converse is not true. Protected entanglement modes can also appear for insulators without physical surface states, in which case they capture a more elusive topological property. This occurs in insulators with only inversion symmetry. The entanglement spectrum remains gapless, because inversion acts in a counterintuitive way on the entanglement states. A many-body characterization of the topological phase via the entanglement spectrum is helpful for understanding the interacting case.

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