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Detecting topological phase transitions of insulators in the complex crystal momentum space[1] XUGANG HE, WEI KU, Brookhaven Natl Lab; Stony Brook University — We present an intuitive picture of topological phase transitions in insulators via topological properties of band dispersion in the *complex* crystal momentum space. Specifically, the dispersion, when analytically contiuned to the complex crystal momentum space, has doubly degenerate "branch point" where two bands can meet, and the topological property of the branch point contains clear signature of the phase transition. In addition, the residue of the branch point in the reduced Berry curvature is shown to give the change of topological invariants across the phase transitions, thus providing a convenient way to detect topological phase transition. We demonstrate the general idea using the generic Bernevig-Hughes-Zhang (BHZ) model originated in the quantum spin Hall effect on a square lattice.

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