

Novel Topological Phase with a Zero Berry Curvature

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Abstract

Recalling the scenario of Aharonov-Bohm effect that electrons experience a phase shift induced by a magnetic vector potential in spite of a zero-magnetic field, we have a similar story in topological version to tell here, where the magnetic field and the magnetic vector potential are replaced by their geometric counterparts, Berry curvature and Berry connection, respectively.

Starting from a simple two-dimensional tight-binding model with two types of hopping, i.e. intercellular γ and intracellular hopping γ' based on square lattice, we show that nontrivial topological phase emerges when $|\gamma| < |\gamma'|$ under a zero Berry curvature. Our work offers a new way to design topological materials without Berry curvatures [1].

References

[1] F. Liu; K. Wakabayashi, Novel Topological Phase with a Zero Berry Curvature. *Physical Review Letters*. 118, 076803 (2017). doi:10.1103/PhysRevLett.118.076803

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