

Abstract Submitted
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The Origin of Dirac Cones for Classical Waves in Periodic Systems JUN MEI, Department of Physics, South China University of Technology, Guangzhou 510641, China, YING WU, Division of Mathematical and Computer Sciences and Engineering, King Abudllah University of Science and Technology, Thuwal 23955-6900, Saudi Arabia, CHE TING CHAN, ZHAO-QING ZHANG, Department of Physics and William Mong Institute of Nano Science and Technology, Hong Kong University of Science and Technology, Hong Kong — By using a perturbation method, we propose a general theory to understand the origin of Dirac cone dispersions for classical waves in periodic structures. A selection rule for the existence of Dirac cones is established under the group theory analysis, which reveals the relation between the unusual linear dispersions and the symmetry of the degenerate Bloch states at the Dirac point. The theory is capable of accurately predicting the linear slopes at various symmetry points in the Brillouin zone, independent of frequency and lattice structure. Furthermore, it can be also used to construct the Hamiltonian, which is in consistent with the Berry phase calculations.

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