Conical diffraction in honeycomb lattices

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Abstract:

Conical diffraction in honeycomb lattices is analyzed in this talk. Conical diffraction is an optical phenomenon that a narrow beam entering an inhomogeneous crystal spreads into a hollow cone within the crystal. Our analysis focuses on the phenomenon arose in nonlinear Schrödinger equations with honeycomb lattice potentials which has been recently observed experimentally [1]. A key property associated with this phenomenon is the existence of the Dirac points in the linear dispersion relation of the honeycomb potential. In the tight-binding approximation, the dispersion relation is obtained analytically and we also demonstrate that the input wave envelope propagates within the crystal in a manner governed by a nonlinear Dirac system. Numerical simulations show that the Dirac system and the lattice NLS equation have the same conical diffraction properties. Similar conical diffraction occurs in both the linear and nonlinear regimes. The nonlinear Dirac system reveals the underlying mechanism for the existence of conical diffraction in honeycomb lattices [2].

References:

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