

## Quasienergy Spectra of a Charged Particle in Planar Honeycomb Lattices

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The low energy spectrum of a particle in planar honeycomb lattices is conical, which leads to the unusual electronic properties of graphene. In this talk we address the quasienergy spectra of a charged particle in honeycomb lattices driven by a strong AC field, which is of fundamental importance for its time-dependent dynamics. We find that depending on the amplitude, direction and frequency of the external field, many interesting phenomena may occur, including band collapse, renormalization of the velocity of “light”, gap opening etc.. Under suitable conditions, with increasing the magnitude of the AC field, a series of phase transitions from gapless phases to gapped phases appear alternatively. At the same time, the Dirac points may disappear or change to a line. We suggest possible realization of the system in Honeycomb optical lattices.