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Generalized Haldane Model and Molecular Excitons' Spectra

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Haldane model is devoted to explore the electron spectra of honeycomb hexagonal 2D lattice. In this paper we treat its connections with the excitonic spectra of two types of molecular excitations, Frenkel excitons (FEs) and Charge Transfer Excitons (CTEs) and study the generalized Haldane model in 2D Lattices of hexagonal symmetry. Excitations with transition dipole moment perpendicular to the lattice or in-line moments are consider in the following cases: a) FEs in honeycomb model with two identical nonequivalently positioned molecules in unit cell; b) FEs and CTEs coupling in Donor-Acceptor (DA) solids with two different molecules in unit cell; c) indirect coupling of FEs in DA solids vice their coupling with CTEs. The equations for the excitonic spectra, especially in case c, could be used in more precious interpretation of spectroscopic data or in other applications of Haldane model.

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