Abstract

TITLE: Magnetooptical Properties of Semiconductor Quantum Structures

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ABSTRACT: In this theoretical work, a detailed study of optical properties of excitons in double quantum wells subject to magnetic and electric fields is presented. Starting from the well-known Luttinger formulae describing the real valence-band structure of III-V semiconductor compounds, we developed an efficient way to solve the Schrödinger equation of a coulombically-bound pair electron-hole forming an exciton. Derived formulae were illustrated on relevant figures, giving us an opportunity to better understand the effects of external fields on the studied system. Dispersion relations, the shift of energy levels in an electric field, absorption and photoluminescence spectra, and charge density distribution were calculated and achieved results were discussed in detail.

KEYWORDS: exciton, double quantum well, coupled quantum wells, Luttinger (-Kohn) hamiltonian, valence-subband mixing