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The effect of the polarization charges on the optical properties of a spherical quantum dot with an off-central hydrogenic impurity

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Abstract

In this paper we have defined the energy spectrum of an off-central hydrogenic impurity, using the effective mass approximation method and taking into account the dielectric mismatch effect. We use the linear variational and the Ritz variational methods to calculate the energy of a hydrogenic impurity. Also we both take into account and neglect the polarization charges to make the comparison in both cases. The absorption coefficient associated with intersublevel transitions induced by the polarized light has been calculated using the compact density matrix approach. It is shown that the absorption coefficient depends on both the quantum confinement and the position of the impurity in the quantum dot. The influence of polarization charges on the absorption coefficient has been defined. © 2011 Elsevier B.V. All rights reserved.

Indexed keywords

Engineering controlled terms

Absorption; Approximation theory; Optical properties; Semiconductor quantum dots; Spectroscopy

Engineering uncontrolled terms

Absorption coefficients; Compact-density-matrix approach; Dielectric mismatch; Effective mass approximation; Energy spectra; Hydrogenic impurities; Intersublevel transitions; Polarization charges; Ritz variational method; Spherical quantum dot

Engineering main heading

Polarization

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