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# The effects of the hydrostatic pressure and temperature on binding energy and optical properties of a donor impurity in a spherical quantum dot under external electric field

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## Abstract

The effects of the hydrostatic pressure and temperature on the electronic and the linear and nonlinear optical properties (i.e., absorption coefficients and refractive indices) investigated in a spherical quantum dot in the presence of the electric field. The energy levels and wave functions are calculated using the variational method within the effective-mass approximation. The results show that these external factors have a significant effect not only on the binding energy of the donor impurity but also on the optical characteristics of the system. Moreover, it is found that the total absorption coefficient is strongly affected by the existence of impurity, the incident optical intensity, relaxation time.

*Keywords:* Quantum dot, Hydrostatic Pressure, Temperature, Impurity, Nonlinear optics

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## 1. Introduction

The investigations of low-dimensional semiconductor structures in the influence of external factors have aroused much interest in the last few years. This interest is due to these structures play an important role in designing

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