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J.H. Marin, Y.A. Suaza, I.D. Mikhailov

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Hydrogen-like donor in a core-shell nanowire under electric and magnetic fields**J. H. Marin^{1)*}, Y. A. Suaza¹⁾, and I. D. Mikhailov²⁾**

¹⁾ Grupo Cerámicos y Vítreos, Escuela de Física, Universidad Nacional de Colombia, A.A. 3840, Medellín, Colombia

²⁾ Escuela de Física, Universidad Industrial de Santander, A. A. 678, Bucaramanga, Colombia

Abstract

The electric and magnetic field effects on the energy spectrum, the charge distribution and the electric dipole moment induced by the electron released from an off-axis donor confined inside the thin shell layer is studied by using the double Fourier series expansion method. The density of states exhibits strongly marked Aharonov-Bohm oscillations induced by the magnetic field, while the electric field modifies the charge distribution. The average electron-donor distance increases slowly as the electric field increases from zero, but then it rises sharply as the electric field exceeds a threshold value forming a giant permanent dipole moment.

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* Corresponding author. Tel.: + 57 7 6344000. E-mail address: jhmarin@unal.edu.co (J. H. Marín)

1. Introduction

Lately, there has been a great deal of attention to the study of quasi-one-dimensional nanostructures such as wires, rods, tubes, owing to their possible applications in fabrication of nanoscale devices with reduced dimensionality [1-4]. Another type of quasi-one-dimensional system so-called nanohelices was recently reported [5]. The presence of a single conducting channel in these structures, parallel to the nanowire axis, enables the

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