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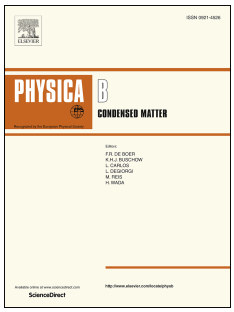

Third-harmonic generation of a laser-driven quantum dot with impurity

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Third-harmonic generation of a laser-driven quantum dot with impurity

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Abstract

The third-harmonic generation (THG) coefficient for a laser-driven quantum dot with an on-center Gaussian impurity under static magnetic field is theoretically investigated. Laser field effect is treated within the high-frequency Floquet approach and the analytical expression of the THG coefficient is deduced from the compact density-matrix approach. The numerical results demonstrate that the application of intense laser field causes substantial changes on the behavior of THG. In addition the position and magnitude of the resonant peak of THG coefficient is significantly affected by the magnetic field, quantum dot size and the characteristic parameters of the impurity potential.

Keywords: quantum dot, intense laser field, nonlinear optics, impurity

1. Introduction

Recent advances in crystal growth technology have provide a facility for the fabrication of low-dimensional semiconductor structures such as quantum dots(QDs), quantum wires and quantum wells [1]. QDs, in which the motion of the electron is quantized in all three spatial directions, display phenomena reminiscent of atoms owing to resemblance of the electronic properties and so they are generally referred as artificial atoms [2]. Furthermore, the nonlinear optical properties of QDs find a great number of applications in optoelectronic devices such as high-speed electro-optical

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