130.

Accession number:20113114192131

Title:Magnetic field effect on the laser-driven density of states for electrons in a cylindrical quantum wire: Transition from one-dimensional to zero-dimensional behavior

Authors:Lima, C.P. (2); Lima, F.M.S. (1); Fonseca, A.L.A. (1); Nunes, O.A.C. (1)
Author affiliation:(1) Institute of Physics, University of Brasilia, International Center of Condensed Matter Physics, PO Box 04455, 70919-970, Brasilia-DF, Brazil; (2) CEFET-MG, Campus 1X, Centro, 37250-000, Nepomuceno-MG, Brazil
Corresponding author:Lima, F.M.S.(fabio@fis.unb.br)

Source title:New Journal of Physics
Abbreviated source title:New J. Phys.
Volume:13
Issue date:2011 July
Publication year:2011
Article number:073005
Language:English
ISSN:13672630
Document type:Journal article (JA)
Publisher:Institute of Physics Publishing, Temple Circus, Temple Way, Bristol, BS1 6BE, United Kingdom

Abstract:The influence of a uniform magnetic field on the density of states (DoS) for carriers confined in a cylindrical semiconductor quantum wire irradiated by a monochromatic, linearly polarized, intense laser field is computed here non-perturbatively, following the Green's function scheme introduced by some of the authors in a recent work (Lima et al 2009 Solid State Commun. 149 678). Besides the known changes in the DoS provoked by an intense terahertz laser field-namely, a significant reduction and the appearance of Franz-Keldysh-like oscillations-our model reveals that the inclusion of a longitudinal magnetic field induces additional blueshifts on the energy levels of the allowed states. Our results show that the increase of the blueshifts with the magnitude of the magnetic field depends only on the azimuthal quantum number m (m = 0, 1, 2, . . .), being more pronounced for states with higher values of m, which leads to some energy crossovers. For all states, we have obtained, even in the absence of a magnetic field, a localization effect that leads to a transition in the DoS from the usual profile of quasi-1D systems to a peaked profile typical of quasi-0D systems, as e.g. those found for electrons confined in a quantum dot.