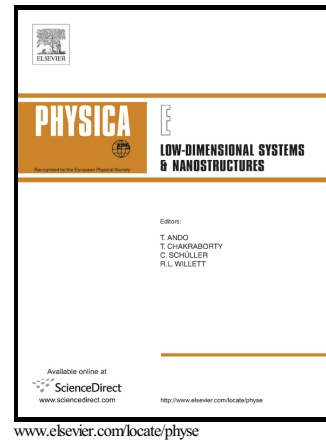


Author's Accepted Manuscript

The Hartman effect in monolayer graphene with Rashba spin-orbit interaction

Kobra Hasanirokh, Hakimeh Mohammadpour, Mohammad Esmaelpour, Arash Phirouznia



PII: S1386-9477(15)30059-X
DOI: <http://dx.doi.org/10.1016/j.physe.2015.05.023>
Reference: PHYSE11975

To appear in: *Physica E: Low-dimensional Systems and Nanostructures*

Received date: 2 May 2014
Revised date: 13 May 2015
Accepted date: 22 May 2015

Cite this article as: Kobra Hasanirokh, Hakimeh Mohammadpour, Mohammad Esmaelpour and Arash Phirouznia, The Hartman effect in monolayer graphene with Rashba spin-orbit interaction, *Physica E: Low-dimensional Systems and Nanostructures*, <http://dx.doi.org/10.1016/j.physe.2015.05.023>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

The Hartman effect in monolayer graphene with Rashba spin-orbit interaction

Kobra Hasanirokh, Hakimeh Mohammadpour, Mohammad Esmaelpour, Arash Phirouznia

Department of Physics, Azarbaijan Shahid Madani University, 53714-161 Tabriz, Iran

** Tel: +98 412 4327500 Email: mhmdpour@azaruniv.ac.ir*

Abstract

In this paper, the Hartman effect is investigated in electron tunneling through a barrier on the graphene channel in the presence of Rashba spin orbit interaction (RSOI). Two cases of normal and ferromagnetic channel are considered. The calculated results indicate that the occurrence of the Hartman effect in tunneling process depends strongly on Rashba SOI parameter, incidence angle, energy of the carriers and the ferromagnetic exchange energy of the leads.

*PACS No.*03.65.Xp; 03.75.Lm; 42.70.Qs; 42.50.Xa

Keywords

Hartman effect, Graphene, Rashba effect, magnetic tunnel junction.

Introduction

The long range spin relaxation length^{2,3} beside the unique and fantastic electronic properties, makes graphene¹ a promising candidate for prospective applications in spintronic and nanoelectronics^{4,5}.

Recently, the tunneling time through the magnetic barrier in graphene-based nanostructures has been investigated both theoretically^{6,7} and experimentally⁸⁻¹⁰. The Hartman effect is identified as the independency of the quantum tunneling time on the barrier width¹¹.

Spin-orbit interaction in graphene includes the intrinsic and Rashba (extrinsic) components¹²⁻¹⁴. Carbon intra-atomic SOI induces the intrinsic one which is weak in a free standing graphene¹⁴, so we have neglected it in this paper. The Rashba SOI arises due to the structure inversion asymmetry in the system and introduces an effective magnetic field. This interaction may open a

Download English Version:

<https://daneshyari.com/en/article/7933994>

Download Persian Version:

<https://daneshyari.com/article/7933994>

[Daneshyari.com](https://daneshyari.com)