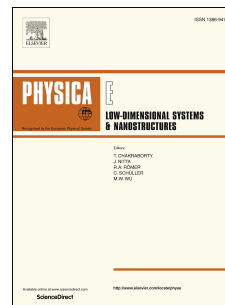


Accepted Manuscript

Anisotropic optical absorption induced by Rashba spin-orbit coupling in monolayer phosphorene

Yuan Li, Xin Li, Qi Wan, R. Bai, Z.C. Wen



PII: S1386-9477(17)31211-0

DOI: [10.1016/j.physe.2017.12.022](https://doi.org/10.1016/j.physe.2017.12.022)

Reference: PHYSE 12993

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

Received Date: 9 August 2017

Revised Date: 7 December 2017

Accepted Date: 10 December 2017

Please cite this article as: Y. Li, X. Li, Q. Wan, R. Bai, Z.C. Wen, Anisotropic optical absorption induced by Rashba spin-orbit coupling in monolayer phosphorene, *Physica E: Low-dimensional Systems and Nanostructures* (2018), doi: 10.1016/j.physe.2017.12.022.

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 proof before it is published in its final 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.

Anisotropic optical absorption induced by Rashba spin-orbit coupling in monolayer phosphorene

Yuan Li^{a,*}, Xin Li^a, Qi Wan^a, R. Bai^b, Z. C. Wen^a

^a*Department of Physics, Hangzhou Dianzi University, Hangzhou, Zhejiang 310018, China*

^b*Center for Integrated Spintronic Devices (CISD), Hangzhou Dianzi University, Hangzhou, Zhejiang 310018, China*

Abstract

We obtain the effective Hamiltonian of the phosphorene including the effect of Rashba spin-orbit coupling in the frame work of the low-energy theory. The spin-splitting energy bands show an anisotropy feature for the wave vectors along k_x and k_y directions, where k_x orients to ΓX direction in the k space. We numerically study the optical absorption of the electrons for different wave vectors with Rashba spin-orbit coupling. We find that the spin-flip transition from the valence band to the conduction band induced by the circular polarized light closes to zero with increasing the x-component wave vector when k_y equals to zero, while it can be significantly increased to a large value when k_y gets a small value. When the wave vector varies along the k_y direction, the spin-flip transition can also increase to a large value, however, which shows an anisotropy feature for the optical absorption. Especially, the spin-conserved transitions keep unchanged and have similar varying trends for different wave vectors. This phenomenon provides a novel route for the manipulation of the spin-dependent property of the fermions in the monolayer phosphorene.

Keywords: Phosphorene, Rashba spin-orbit coupling, Optical absorption

*Corresponding author

Email address: liyuan@hdu.edu.cn (Yuan Li)

Download English Version:

<https://daneshyari.com/en/article/7933624>

Download Persian Version:

<https://daneshyari.com/article/7933624>

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