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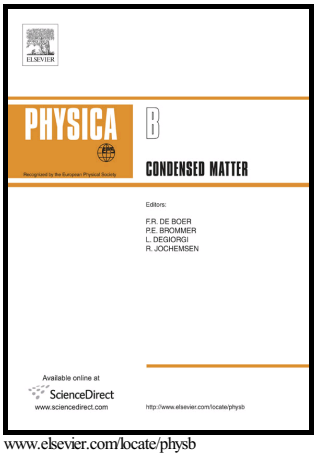

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PII: S0921-4526(16)30464-1
DOI: http://dx.doi.org/10.1016/j.physb.2016.10.005
Reference: PHYSB309665

To appear in: *Physica B: Physics of Condensed Matter*

Received date: 26 September 2016
Accepted date: 5 October 2016

Cite this article as: Weixian Yan, The strain effect on the Dirac electrons tunneling through the time-periodic scalar and vector barriers, *Physica B: Physic of Condensed Matter,* http://dx.doi.org/10.1016/j.physb.2016.10.005

The strain effect on the Dirac electrons tunneling through the time-periodic scalar and vector barriers

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Abstract

The tunneling of the massless and massive Dirac particle through the strained barriers driven by the time-periodic scalar potentials and the static vector potentials is investigated, where the interrelationships among the strain, the incidence angle, the dynamic scalar potential, the magnetic field and the transmission of the Dirac particle have been discussed. In either massless or massive case, the intersection angle between the obliquely incident Dirac particle and strain determines the extent of deviation of the tunneling profiles from the strainless case. The time-periodic scalar potentials can enhance the capability of the Dirac particle to surmount the energy gap induced by the mass, reflecting quantum nature of the photon-assisted tunneling. When the magnetic field is switched on, the transmission overall presents a remarkably different profile, and decreases with the increase of the magnetic fields due to the conservation of the transverse momentum, which reduces the number of the side-band channels for tunneling.

PACS numbers: 72.80.Vp, 73.22.Pr, 62.20.-x

Keywords: Graphene; Magnetic barriers; Strain; Side-band Transmission

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