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Analytic approach to magneto-strain tuning of electronic transport through a graphenenanobubble: perspectives for a strain sensor

Abstract
We consider the scattering of Dirac particles in graphene due to the superposition of an external magnetic field and mechanical strain [1,2]. As a model for a graphene nanobubble, we find exact analytical solutions for single-particle states inside and outside a circular región submitted to the fields[1]. Finally, we obtain analytical expressions for the scattering crosssection, as well as for the Landauer current through the circular region. Our results provide a fully-analytical treatment for electronic transport through a graphene nanobubble, showing that a combination of a physical magnetic field and strain leads to valley polarization and filtering of the electronic current[1]. Moreover, our analytical model provides an explicit metrology principle to measure strain by performing conductance experiments under a controlled magnetic field imposed over the simple[1].

References

[1] Enrique Muñoz and Rodrigo Soto-Garrido, Journal of Physics: Condensed Matter 29 (2017) 445302.
[2] Enrique Muñoz, Ch. 17 in Graphene Science Handbook: Electrical and Optical Properties, CRC Press, pp. 253-269 (ISBN 9781466591318-CAT# K20507).

Figures

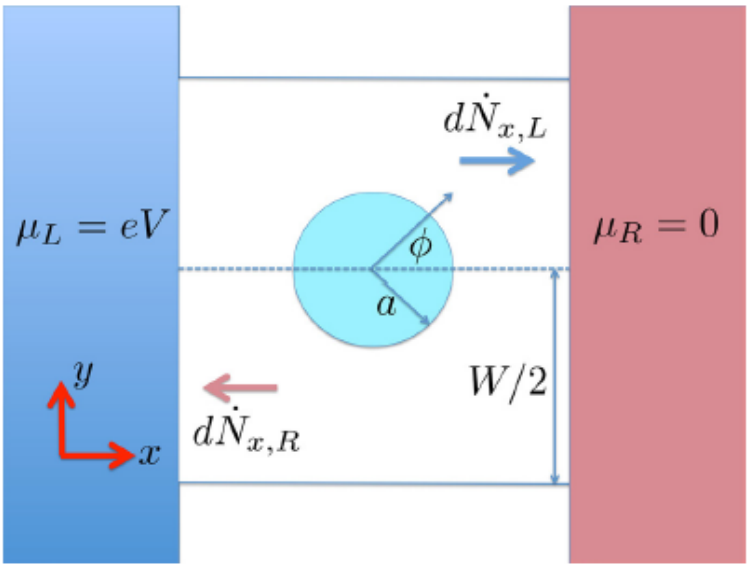

Figure 1: Transport through a graphene nanobubble of radius a, between two semi-infinite contacts