Pseudo-magnetic field and resonant transport in strained graphene ribbons

Diana A. Gradinar[1], Marcin Mucha-Kruczynski[1,2], Henning Schomerus[1], and Vladimir I. Fal'ko[1]

[1] *Department of Physics, Lancaster University, LA1 4YB Lancaster, United Kingdom*
[2] *Department of Physics, University of Bath, Claverton Down, Bath, BA2 7AY, United Kingdom*

In graphene, inhomogeneous strain affects electrons in a manner similar to that of a valley-antisymmetric magnetic field [1, 2, 3, 4]. In suspended graphene membranes, inhomogeneous strain may be expected near the clamped contacts [5], and here we show how the pseudo-magnetic Landau Level formation can be manifested in the transport characteristics.

As a model we study an armchair graphene ribbon (GR) suspended from two metallic contacts and show that the conductance of an armchair GR subject to 5% inhomogeneous deformations exhibits resonances which we trace (a) to standing waves in the middle of the suspended ribbon and (b) to the peculiar $n = 0$ LL for Dirac electrons in an effective pseudo-magnetic field.

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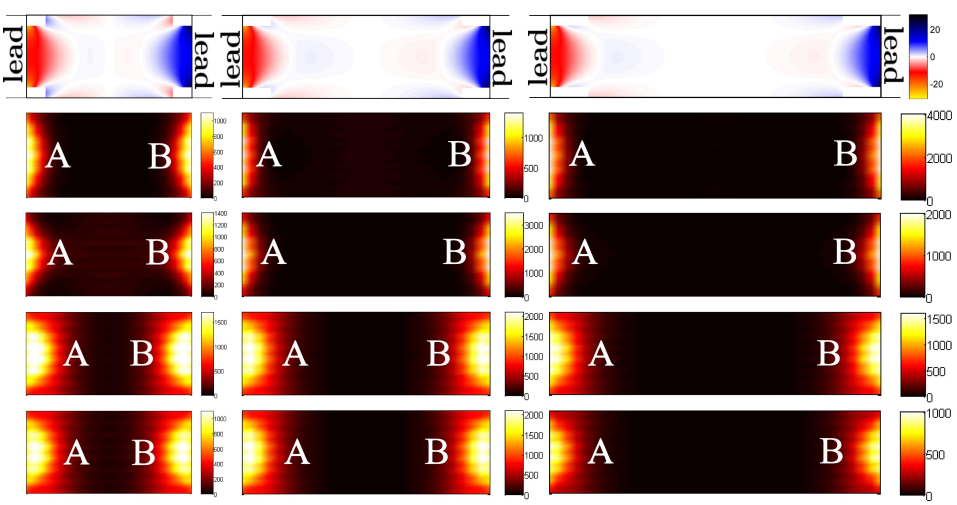

Figure 1: Top row: Distribution of the pseudo-magnetic fields (measured in Tesla) for electrons in the K valley, for ribbons of $W = 40$nm and aspect ratios $W/L = 0.5$, 0.33 and 0.25 arranged from left to right. All other rows: Distribution of the LDOS at fixed energies corresponding to the four peaks at the DP, linked to the $n = 0$ LL. The profiles also show the sublattice favored by the fields at the two ends.