Erratum: Energy-gap modulations of graphene ribbons under external fields: A theoretical study [Phys. Rev. B 77, 195443 (2008)]

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(Received 6 August 2010; published 30 August 2010)

DOI: 10.1103/PhysRevB.82.089903 PACS number(s): 73.21.−b, 73.22.−f, 81.07.−b, 99.10.Cd

In our paper there are some small mistakes in the analytical expressions concerning the changes of the phase factor for the nanoribbon, appearing in Eqs. (3) and (4), and also in the numerical code used to derive Figs. 6 and 9, concerning armchair nanoribbon results. We emphasize that the changes required in this Erratum do not compromise the full work presented in the paper or the previous conclusions. The correct expressions are given by:

1. Replace Eq. (3). Here we show the correct version:

$$\Delta\Phi_{n,m} = \begin{cases} \pm aBy_n & \text{if } \mathbf{R}_{n,m} = \mp \mathbf{R}_1 \\ \dfrac{aB}{2}\left[\pm y_n - \dfrac{a\sqrt{3}}{4} \right] & \text{if } \mathbf{R}_{n,m} = \pm \mathbf{R}_2 \\ \dfrac{aB}{2}\left[\pm y_n + \dfrac{a\sqrt{3}}{4} \right] & \text{if } \mathbf{R}_{n,m} = \pm \mathbf{R}_3 \end{cases}$$

2. Replace the sentence following Eq. (3) by:
"with $\mathbf{R}_1 = a\hat{\mathbf{x}}$, $\mathbf{R}_2 = -(\hat{\mathbf{x}} + \sqrt{3}\hat{\mathbf{y}})\frac{a}{2}$, $\mathbf{R}_3 = (-\hat{\mathbf{x}} + \sqrt{3}\hat{\mathbf{y}})\frac{a}{2}$, $a = |\mathbf{R}_{n,m}|$, and $n \leqslant 2N$. For the zigzag ribbons one gets,"

3. Replace Eq. (4). Here we show the correct version:

$$\Delta\Phi_{n,m} = \begin{cases} 0 & \text{if } \mathbf{R}_{n,m} = \pm \mathbf{R}_4 \\ \dfrac{\sqrt{3}aB}{2}\left[\pm y_n + \dfrac{a}{4} \right] & \text{if } \mathbf{R}_{n,m} = \pm \mathbf{R}_5 \\ \dfrac{\sqrt{3}aB}{2}\left[\pm y_n - \dfrac{a}{4} \right] & \text{if } \mathbf{R}_{n,m} = \mp \mathbf{R}_6 \end{cases}$$

4. Replace the sequence following Eq. (4) by: "with $\mathbf{R}_4 = -a\hat{\mathbf{y}}$, $\mathbf{R}_5 = (-\sqrt{3}\hat{\mathbf{x}} + \hat{\mathbf{y}})\frac{a}{2}$, $\mathbf{R}_6 = (\sqrt{3}\hat{\mathbf{x}} + \hat{\mathbf{y}})\frac{a}{2}$."

5. Figures 6 and 9 must be replaced by the new ones, with the same figure captions.

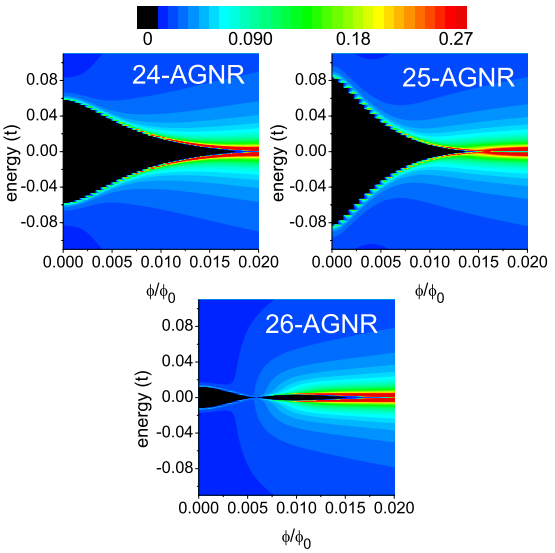

FIG. 6. (Color online) Energy-gap dependence on the magnetic field for $N_a = 24$, 25, and 26 N_a-AGNRs.

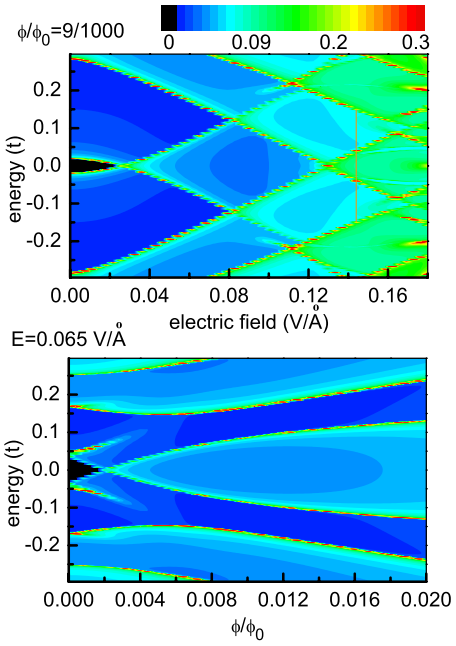

FIG. 9. (Color online) LDOS diagram plot for a 24-AGNR as a function of the electric field for $\Phi/\Phi_o=9/1000$ (top panel), and the magnetic flux for $E=0.065$ V/Å in the bottom panel. Black regions correspond to null density of states while the highest value of LDOS are exhibited in bright lines (yellow color online).

6. Replace the text discussing the results presented in Fig. 6 (page 3) starting at "When analyzing," and finishing with "naive tight binding models do not predict a semiconducting nature.[13]" by the new text: 'When analyzing the situation for armchair ribbons under magnetic fluxes, one notes an intriguing picture: ribbons, with quite small differences in their widths, present distinct gap evolution sensitivities to the increasing field, as shown in Fig. 6. The larger the zero field energy gap, the greater the gap reduction for a certain variation of the magnetic field. In the case of the 26-AGNR, the graphene ribbon belongs to an armchair family for which, naive tight binding models do not predict a semiconducting nature.[13]"

7. Replace also the comment "One interesting result is the enhancement of the energy…robust against changes of the magnetic field.", appearing in Section C (both electric and magnetic fields) on page 5, concerning Fig. 9, which appears on page 4, by:

"One can see that the electronic energy bands are as sensitive to a magnetic field as to an electric one. Another interesting aspect is the fact that the trajectories, marked by the van Hove singularities evolution, present opposite concavities if one compares the two cases. These results reveal additional possibilities for modulation of the energy bands and consequently for energy gaps of AGNR, when combining electric and magnetic fields."