

Erratum: Graphene Antidot Lattices: Designed Defects and Spin Qubits
[Phys. Rev. Lett. **100, 136804 (2008)]**

Thomas G. Pedersen, Christian Flindt, Jesper Pedersen, Niels Asger Mortensen, Antti-Pekka Jauho, and Kjeld Pedersen
(Received 10 April 2008; published 8 May 2008)

DOI: [10.1103/PhysRevLett.100.189905](https://doi.org/10.1103/PhysRevLett.100.189905)

PACS numbers: 73.21.La, 03.67.Lx, 73.20.At, 99.10.Cd

In our Letter we present results of numerical tight-binding calculations for the antidot lattice defined on graphene. In order to corroborate these results in a physically transparent way, we also use the linearized Hamiltonian approximation treating electrons as massless Dirac fermions subject to the periodic perturbation of the antidot lattice. The antidots (or holes) are introduced in the Dirac equation [Eq. (1) of the Letter] by adding a scalar potential $V(x, y)$, which is infinite at the location of the holes and zero outside. Subsequently, we use the boundary condition that the two-component spinor wave function vanish in the antidots, leading to Eq. (2). Strictly speaking, however, this boundary condition is incorrect, since a scalar potential cannot confine Dirac fermions. Instead of the scalar potential $V(x, y)$, a mass term $M(x, y)$ should be added in the Dirac equation [1,2], such that Eq. (1) reads

$$H = \begin{pmatrix} M(x, y) & v_F(p_x - ip_y) \\ v_F(p_x + ip_y) & -M(x, y) \end{pmatrix}, \quad (1)$$

where $M(x, y)$ is infinite at the location of the holes and zero outside. We have calculated numerically the band structure corresponding to Eq. (1) and found that for sufficiently large values of $M(x, y)$ in the antidots, the two-component spinor wave function effectively vanishes inside the antidots, such that Eq. (2) and the corresponding boundary condition lead to numerically correct results. Thus, in spite of the incorrect formulation, the simple physical argument remains valid. None of our other conclusions are affected by this correction.

We thank Dr. B. Trauzettel for drawing our attention to the flaw in the derivation of Eq. (2), for providing us with useful references, and for useful discussions.

[1] M. V. Berry and R. J. Mondragon, Proc. R. Soc. A **412**, 53 (1987).

[2] J. Tworzydło, B. Trauzettel, M. Titov, A. Rycerz, and C. W. J. Beenakker, Phys. Rev. Lett. **96**, 246802 (2006).