Review of: "Electron Wave Spin in a Cavity"

Yuriy Yerin

Potential competing interests: No potential competing interests to declare.

This theoretical work is devoted to the study of the behavior of the electron in the potential well within the framework of the Dirac equation. In my opinion, this paper deserves to be published; however, after the authors answer a number of my questions and take into account my comments.

i) Will the topological structure of the torus be preserved if more energy levels are taken into account during the computation of current and charge densities?

ii) Based on the previous question, why is the hole in the torus not conserved as in Figure 1 in Figure 2?

iii) How can the theoretical predictions of the authors be verified experimentally?

iv) I recommend that the authors mention in the introduction other theoretical papers devoted to the quantum-mechanical consideration of non-trivial topologies with the Euler characteristic equal to zero and the emergence of non-trivial current density profiles:

https://journals.aps.org/pra/abstract/10.1103/PhysRevA.82.062118

https://journals.aps.org/prb/abstract/10.1103/PhysRevB.85.195438

https://journals.aps.org/prb/abstract/10.1103/PhysRevB.104.075415

https://link.springer.com/article/10.1007/s13538-020-00764-9

Besides, I have some remarks of a technical character.

1) The notation \gamma^0 is not introduced in Eq. (1).

2) In Eq. (3), should it be \sigma or \alpha?

3) In Eq. (6), correct the typo in Region I (II).

4) In Eq. (10), the Bessel function is repeated twice.

5) It is better to use nm^(-1) instead of m^(-1) for the wave vector units.

6) In Figure 2, in what units are the charge density and current density measured?