Review of: "Evanescent Electron Wave Spin"

Ahmed Refaie Ali[1]

1 Menoufia University

Potential competing interests: No potential competing interests to declare.

Review Report on “Evanescent Electron Wave Spin”

The paper titled "Evanescent Electron Wave Spin" explores the existence and properties of an evanescent wave spin outside a finite quantum well. The authors employ the Dirac equation to analyze the phenomenon and claim that this newly discovered spin state could enable quantum spin information probing without destroying the entire spin state. They also argue that this approach offers a deterministic perspective in spin-based quantum processes and devices.

Overall Comments: The paper presents an intriguing concept with potential implications for quantum technology and spin-based processes. However, there are several points that require clarification, expansion, or further investigation. Below are my comments and questions on different aspects of the paper.

Introduction:

- The introduction could benefit from more context and motivation. Why is the study of evanescent wave spin important, and what are the potential applications?

Methodology and Analysis:

- The paper mentions solving the Dirac equation but lacks details on the computational methods or mathematical techniques used. Providing a step-by-step explanation of how the evanescent wave spin was derived would be valuable.

Validation:

- The analytical analysis validating the wave function inside an infinite quantum well is briefly mentioned. Could the authors elaborate on the validation process and its significance?

Evanescent Wave Spin Characteristics:

- More information is needed regarding the properties of this evanescent wave spin, such as its behavior, stability, and how it relates to traditional electron spin states.

Practical Implications:

- The paper suggests that this evanescent wave spin could be used to probe quantum spin information. What are the

practical implications of this proposal? How might it impact quantum computing or communication systems?

Deterministic vs. Probabilistic Nature:

- The assertion that a spin-based quantum process is deterministic rather than probabilistic is intriguing but not sufficiently explained. Could the authors provide more evidence or theoretical support for this claim?

Experimental Verification:

- Is there any plan for experimental verification of the proposed concept? If not, what would be the challenges in conducting such experiments?

References:

- The references provided are quite relevant and support the research. Ensure consistency in citation formatting throughout the paper. To enhance the work, please insert the related works with research and can be cited as references : a) O. M. Abo-Seida, N. T. M. El-dabe, A. Refaie Ali and G. A. Shalaby (2021), "Cherenkov FEL Reaction With Plasma-Filled Cylindrical Waveguide in Fractional D-Dimensional Space," in IEEE Transactions on Plasma Science, vol. 49, no. 7, pp. 2070-2079, doi: 10.1109/TPS.2021.3084904
b) Islam, S., Halder, B. & Refaie Ali (2023), A. Optical and rogue type soliton solutions of the (2+1) dimensional nonlinear Heisenberg ferromagnetic spin chains equation. Sci Rep 13, 9906 (2023). https://doi.org/10.1038/s41598-023-36536-z c) X.J. Yang, A. A. Abdulrahman, A. Refaie Ali (2023), An even entire function of order one is a special solution for a classical wave equation in one-dimensional space. Therm. Sci. 27(1B), 491–495 (2023). https://doi.org/10.2298/TSCI221111008Y
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e) Refaie Ali, A., Eldabe, N.T.M., El Naby, A.E.H.A. et al. EM wave propagation within plasma-filled rectangular waveguide using fractional space and LFD. Eur. Phys. J. Spec. Top. (2023). https://doi.org/10.1140/epjs/s11734- 023-00934-1

Figures and Graphs:

- Visual aids, such as diagrams or graphs, could help illustrate the concepts and findings discussed in the paper. Consider adding relevant figures to enhance understanding.

Add more physical explanations of results.