Qeios

Peer Review

Review of: "On the Gupta-Bleuler and Dirac-Fock Quantization Schemes Revisited"

Mosbah Difallah[1]

1. Physics, El-Oued University, Algiers, Algeria

This paper revisits the Gupta–Bleuler and Dirac–Fock quantization schemes for the electromagnetic field and addresses an important conceptual issue in quantum electrodynamics. The proposed Dirac–Fock construction, based on a reduced Fock space satisfying the strong Lorenz condition, is interesting and provides a potentially valuable alternative formulation.

The manuscript is generally well organized, but several points should be clarified before publication:

1. The discussion comparing the Dirac–Fock and Gupta–Bleuler approaches should be made more balanced. In particular, the distinction between the auxiliary indefinite-metric space and the physical Hilbert space in the Gupta–Bleuler formalism should be acknowledged more clearly.
2. The justification for imposing the strong Lorenz condition should be strengthened by explaining that the reduced space still contains the correct physical photon degrees of freedom.
3. The claims regarding the positivity of the Hamiltonian and the shortcomings of the Gupta–Bleuler scheme should be presented more cautiously, avoiding overly strong conclusions that are not fully demonstrated.
4. The English should be improved throughout the manuscript. Several grammatical errors, typographical mistakes, and awkward expressions should be corrected, and the abstract and introduction should be made more concise and neutral in tone.

Overall, the work presents an interesting contribution to the discussion of electromagnetic field quantization. After addressing the above comments, I believe the manuscript will be suitable for publication.

doi.org/10.32388/R6X7FN

Declarations

Potential competing interests: No potential competing interests to declare.