Review Form2

Book Name:	Current Research Progress in Physical Science
Manuscript Number:	**Ms_BPR_2566**
Title of the Manuscript:	**Rabi oscillations, entanglement and teleportation in the anti-Jaynes-Cummings model**
Type of the Article	**Book chapter**

PART 1: Review Comments

Compulsory REVISION comments	**Reviewer's comment**	**Author's Feedback***(Please correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Please write a few sentences regarding the importance of this manuscript for the scientific community. Why do you like (or dislike) this manuscript? A minimumof 3-4 sentences may be required for this part.	This paper presents an in-depth study of Rabi oscillations, entanglement, and teleportation within the anti-Jaynes-Cummings (AJC) model, with a focus on generating maximally entangled qubit states, termed as entangled anti-polariton qubit states. The authors provide a thorough theoretical framework and demonstrate that Rabi oscillations in the AJC model occur in a reverse sense compared to the Jaynes-Cummings (JC) model, and that the time evolution of entanglement exhibits similar characteristics in both models.	
Is the title of the article suitable? **(If not please suggest an alternative title)**	The title of the article, "Rabi Oscillations, Entanglement and Teleportation in the Anti-Jaynes-Cummings Model", is generally appropriate, but I suggest a title(it is the will and wish of the author and Editor), "Exploring Rabi Oscillations, Maximally Entangled States, and Perfect Teleportation in the Anti-Jaynes-Cummings Model: Insights into Quantum Dynamics and Entanglement Applications" (or) "Exploring Rabi Oscillations and Entanglement in the Anti-Jaynes-Cummings Model: Applications to Quantum Teleportation" (else) "Rabi Oscillations, Entanglement, and Perfect Teleportation in the Anti-Jaynes-Cummings Model"	
Is the abstract of the article comprehensive? Do you suggest the addition (or deletion) of some points in this section? Please write your suggestions here.	Yes	
Are subsections and structure of the manuscript appropriate?	Yes	
Please write a few sentences regarding the scientific correctness of this manuscript. Why do you think that this manuscript is scientifically robust and technically sound? A minimumof 3-4 sentences may be required for this part.	The manuscript is scientifically robust and technically sound due to several key factors. Firstly, the theoretical analysis is grounded in well-established quantum optics principles, specifically addressing the anti-Jaynes-Cummings (AJC) model with rigorous mathematical derivations. The study effectively demonstrates the distinct behavior of Rabi oscillations in the AJC model compared to the Jaynes-Cummings model, providing clear and accurate graphical representations on the Bloch sphere. Furthermore, the paper's exploration of entanglement dynamics and the achievement of perfect teleportation with maximal fidelity (F = 1) is supported by comprehensive calculations and theoretical	

	arguments. The inclusion of von Neumann entropy for quantifying entanglement adds a layer of quantitative analysis that enhances the validity of the findings. Overall, the manuscript adheres to established quantum theory and provides a thorough examination of the AJC model's implications for quantum information science.	
Are the references sufficient and recent? If you have suggestions of additional references, please mention them in the review form. **:**	Based on the provided list of references, the manuscript includes a mix of foundational texts, such as those by Nielsen and Chuang, and relevant recent studies, Look for recent studies that discuss advancements or new findings related to the anti-Jaynes-Cummings model specifically. For example:"Updated Perspectives on the Anti-Jaynes-Cummings Model and Its Applications" – Recent papers in journals such as *Physical Review A* or *Quantum Science and Technology*. Consider the Relevant Experimental Work Including recent experimental papers could provide context for the practical applications of the theoretical results such as, "Experimental Realizations of Quantum Teleportation with High Fidelity" – Studies from *Nature Communications* or *Science Advances* focusing on experimental implementations related to teleportation.	
Minor REVISION comments **Is the language/English quality of the article suitable for scholarly communications?**	Based on the provided excerpts, the language and English quality of the article appear to be suitable for scholarly communication.	
Optional/Generalcomments	The paper demonstrates notable strengths by focusing on the relatively novel anti-Jaynes-Cummings (AJC) model, which adds significant value to the field of quantum optics and information. It provides a comprehensive analysis of Rabi oscillations, entanglement, and teleportation within this model, presenting a clear theoretical framework and contrasting it with the well-established Jaynes-Cummings model to highlight unique properties. The manuscript exhibits technical rigor through detailed mathematical formulations and theoretical descriptions, achieving perfect teleportation with maximal fidelity (F = 1), which underscores its practical applicability. The paper is well-structured, with a logical flow that guides the reader through theoretical models and their applications, and effectively summarizes key findings and future research directions. Its practical application of entanglement swapping further enhances its relevance, while the use of graphical representations aids in the understanding of complex concepts. Overall, the paper makes a significant contribution to quantum information science by advancing the understanding of quantum coherence and information processing through the AJC model.	

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PART 2:

	Reviewer's comment	**Author's comment***(if agreed with reviewer, correct the manuscript and highlight that part in the manuscript. It is mandatory that authors should write his/her feedback here)*
Are there ethical issues in this manuscript?	*(If yes, Kindly please write down the ethical issues here in details)*	

Reviewer Details:

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