



SDI Review Form 1.6

Journal Name:	Asian Journal of Research and Review in Physics
Manuscript Number:	Ms_AJR2P_44711
Title of the Manuscript:	Entropic Uncertainty Relations, Entanglement and the Generalized Uncertainty Principle
Type of the Article	Original Research Article

General guideline for Peer Review process:

This journal's peer review policy states that **NO** manuscript should be rejected only on the basis of '**lack of Novelty**', provided the manuscript is scientifically robust and technically sound. To know the complete guideline for Peer Review process, reviewers are requested to visit this link:

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PART 1: Review Comments

	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)
Compulsory REVISION comments	The authors provide a well-established body text on entropic uncertainty relations, entanglement, and the GUP, as the manuscript title indicates. Sections 1 to 5 are readable and comprehensible; only minor comments apply (see next box). The abstract and conclusions however are at least partially misleading, and require major revision: The authors mention the examination of quantum gravity effects (first sentence of the abstract) and elaborate on the relation of their work with entropic gravity research (last two paragraphs of the conclusions), but in fact remain vague and very speculative. This moreover does not match with the body text. The authors should therefore rewrite (the first sentence of) the abstract, and especially the conclusions. The text from line 475 onwards could be shortened and included into a section on future work, but certainly not as conclusions of the body text.	To avoid confusion with the rest of the paper, we removed the phrase "quantum gravity effects" in the first sentence of the abstract. To make the flow of the ideas clearer, we divided the first paragraph of the CONCLUSIONS into two paragraphs: one paragraph discussing the connection with reference 11 and the other paragraph (now the second paragraph of the new draft) discussing the distinction of the results for the pure and mixed states. We also made changes of the draft copy on lines 473 onwards (which comprise the last two paragraphs of the original paper). • The last paragraph of the original draft was made the second to the last paragraph to flow well with the added new second paragraph discussed above since both these paragraphs discuss the Renyi entropy. We explicitly mentioned that this discussion is "a possible future extension of our work". We decided to still include this paragraph in the CONCLUSIONS since the journal manuscript guidelines do not have a separate section discussing future work. In addition, CONCLUSIONS in other journals often allow the discussion of possible extensions of the work discussed in a paper. • The second to the last paragraph of the original draft was made the last paragraph since it discusses an idea which, although not directly related to the GUP, is nevertheless relevant. In the first paragraph of the CONCLUSIONS, we added the statement "As mentioned in section 1, the GUP is a result of formulating a quantum theory of gravity leading to the inclusion of gravitational effects in quantum mechanics.". In addition, we included the statement, "By applying the GUP ..." in this paragraph. These statements are meant to remind the reader that the GUP is related to gravity. Since we discussed the effect of GUP on entanglement, our paper gives some connection of gravity and entanglement. Hence the last paragraph which discusses another link between entanglement and gravity is relevant. We explicitly added the word "speculate" to characterize our comment as suggested by the referee. We also removed any mention of the entropic force to lessen the speculative nature of the discussion. We consequently removed reference [37] of the original draft. Hence, we had to renumber the references and the citations of these references within the paper.



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Minor REVISION comments	- Mention the interpretation of $0\rangle$ and $1\rangle$ in terms of electron spin already at Eqs. (4) and (5) instead of delaying this clarification to line 104 and following. - Line 80 and Eq. (7), make a note/reference on where this expression originates. - Do not use unnecessary emphasis (capitals, underlining) throughout the text. - Lines 119-120: Please make a note on notations, why the previously used tensor product is not needed here. - Remove lines 161-167, this does not need to go into a journal paper. - Elaborate on Eq. (16): Due to the appearance of a sum in the GUP instead of a product in the HUP, one of the terms could be zero; please clarify. Also make a note on (the left hand side quantities with respect to) the size of the number $\ln(\Pi e)$. - Eq. (36): Should the round h be a straight h (at the end)? - Eq. (38): Avoid double brackets. - Line 380: Quantify "a similar increase" with reference to [11].	• We mentioned the interpretation of spin before equation 4 and 5. • We added the phrase "which can be formed from Eq. (6)" to indicate where Eq. (7) came from. • We removed all capitalizations and underlines. • We added a footnote on page 5 of the new manuscript to briefly explain the change in notation from Eq (10). • We removed line 161-167 of the original draft as suggested by the referee. • From what we understood about the remark of the referee regarding Eq. (16), we are being asked to comment on the advantage of having the sum instead of the product of the HUP in Eq. (11). We added a sentence about this at the end of the paragraph after Eq. (16). To clarify this further, we divided the second paragraph of section 3 to separate the two "weaknesses" of the HUP. In the new second paragraph, we worked out briefly why the right hand side of equation (11) vanishes for an eigenstate of the operator. On the size of the left hand side of equation (16) compared to $\ln(\Pi e)$, we also added a comment at the end of the paragraph after Eq. (16) and cited references for the interested reader to get more details. • We changed the straight h to a round h in Eq. (37). • We removed the double brackets in Eq. (38). • We rewrote the sentence on Line 380 (the end of the paragraph after Eq. (48)) to avoid the confusion that may result with the use of the word "similar". The GUP correction in ref [11] is very different from the GUP correction in the present paper. What we meant to say is that in both cases (in this paper and in ref [11]) there was an increase in the bounds.
Optional/General comments	NA	

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?	<u>(If yes, Kindly please write down the ethical issues here in details)</u>	