

**UNIVERSITY OF NAIROBI**

#### College of Biological and Physical Sciences

##### DEPARTMENT OF PHYSICS



**21st October 2023**

To,

Editor,

Journal of Quantum Computing

Dear Editor,

**RE: SUBMISSION OF REVISED MANUSCRIPT FOR EVALUATION**

I am writing to submit our revised manuscript entitled “Design and Implementation of Quantum Repeaters: Insights on Quantum Entanglement Purification” for publication in the Journal of Quantum Computing. We express our gratitude to the reviewers for their valuable feedback as we committedly work to ensure we deliver a manuscript that meets the publication standards of the journal.

The feedback and comments from the reviewers were carefully reviewed, and their suggestions, recommendations, concerns and critiques thoroughly addressed. The necessary implementations were done to the best of our ability. This has arguably enhanced the quality of the paper.

Below is a succinct summary of the revisions and improvisions made in response to the reviewer’s input:

1. Recent literature on the same topic has been incorporated and the sources duly cited. We have analyzed their approaches, proposals, similarities, and differences, while also highlighting the results in relation to our research. This addition provides a more comprehensive overview of the status of entanglement purification.
2. We ensured that all figures presented are well elaborated and explained in detail. Consequently, some of the quantum circuits presented were refined for enhanced clarity and their corresponding code was also refined and improved to match these revisions.
3. More details were provided regarding quantum memory, highlighting how it works and the technologies used in its practical implementation as well as how it was achieved on our quantum circuits. However, we limited the discussion to align with the scope of our work, avoiding extensive details on quantum memory.
4. The content addressing quantum entanglement swapping has been beefed up to provide more clarity and comprehension, addressing the need for it to be more elaborate.
5. Extensive debugging of the code was conducted to eliminate any elusive bugs, errors or assumptions that may have been present in our original code.
6. Further analysis of the results was conducted to obtain more quantitative results to reinforce the discussions, ideas and conclusions presented.
7. One of the purification strategies, namely post-Bell-pair production purification strategy, was omitted from the paper because it was decided that it did not introduce significant novelty or have substantial impact on quantum repeaters. Instead, its focus should be redirected towards the entanglement generation process. Its simulations and results were thus excluded.
8. We ensured that all quantum circuits were executed on real quantum hardware without reliance on the quantum simulated backends that incorporated a noise model that reflected and emulated the properties of a real quantum computer. This transition allowed us to update some of our graphs to reflect this more accurate data obtained. Currently, all the data presented is exclusively obtained from running the simulations on actual quantum computers.

All authors listed on the manuscript have reviewed and approved the final revised version of the manuscript.

Thank you for your time and attention to our submission. We remain available to address any queries or provide further information that may be required.

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