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## Cover Letter : Hybrid Logical-Physical Qubit Interaction for Quantum Metrology

Dear Editor,

I wish to submit my original article entitled, "Hybrid Logical-Physical Qubit Interaction for Quantum Metrology" for consideration by the Physical Review Letters Journal. I can confirm that the attached article is an original piece of work and that I am not submitting it to other journals for consideration.

In the field of quantum computers the community widely believes that quantum error correction codes are the key for complex and high fidelity computations. In the field of quantum metrology, interest in using quantum gates and qubit manipulation for accurate sensing increases in recent years. This is called 'algorithmic quantum sensing'. In this work we introduce the idea of combining a logical qubit and a physical qubit. We conduct a full density-matrix simulation and observe that there is a unique parameter regime in which this kind of interaction is beneficial. We believe our work is interesting for the quantum information community because it demonstrates a new concept of entangling qubits of different logical layers, and it is important to the quantum metrology community because the thresholds we find are well within the capabilities of today's hardware.

Please send all correspondence regarding the publication of this article to [nadav.carmel1@mail.huji.ac.il](mailto:nadav.carmel1@mail.huji.ac.il). Attached are the letter and supplementary material. Thank you for your time and consideration of my article.

Sincerely,

**Carmel Nadav**