



July 31, 2023

To whom it may concern

I am writing on behalf of all authors to submit our research article entitled “Quantum simulation of Pauli channels and dynamical maps: algorithm and implementation” to be considered for publication as a research article in PLOS One.

In this article, we focus on one of the fundamental purposes of quantum computers since their inception: simulating quantum systems. Specifically, we propose and simulate on a quantum computer an algorithm for implementing Pauli channels. These channels are transformations of qubit systems typically arising from noise affecting quantum devices (Flammia S. and Wallman J., Efficient estimation of Pauli channels, 2020). Pauli channels are examples of the evolution of open quantum systems, which have garnered interest due to their applications in the study of entanglement (Farías O.J. et al, Observation of the emergence of multipartite entanglement between a bipartite system and its environment, 2012) and dissipative processes (Barreiro J. et al, An open-system quantum simulator with trapped ions, 2011).

Moreover, we extend the algorithm to encompass Pauli channels dependent on a parameter, which we refer to as Pauli dynamical maps. This extension leads us to investigate quantum algorithms with parameter-dependent operations, known as parametrized quantum circuits. In this manuscript, we establish the mathematical conditions necessary for implementing any parametrized operation using a quantum circuit using only one parametrized single qubit operation. We believe these findings will be of interest to readers of your esteemed journal.

We declare the manuscript’s originality and exclusivity for publication. In addition, we have not had any prior interactions with PLOS regarding this manuscript. In the event that our manuscript is chosen for review, we kindly suggest Dr. Fabio Sciarrino as a suitable editor, given his background and expertise to evaluate our findings. We have no objections to any other potential reviewers.

Each named author has significantly contributed to the research and preparation of this manuscript. Furthermore, the named authors have no conflicts of interest to disclose.

Most sincerely,

“POR MI RAZA HABLARÁ EL ESPÍRITU”

Universidad Nacional Autónoma de México, Ciudad de México,

Carlos Pineda
[Inv. Tit. B T.C.]