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[white paper = original insight + conjecture]

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The logistics of quantum spacetime

Open Quantum Collaboration*†

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Abstract

We conjecture that quantum superposition is the result of the existence of different orbits in the logistic equation (or other dynamical systems) due to the quantum interactions in spacetime.

keywords: quantum spacetime, logistic equation, chaos

The most updated version of this white paper is available at
https://osf.io/s2dnt/download
https://zenodo.org/record/4784570

Introduction

1. In case you're not familiar with the logistic equation or dynamical systems, please check this excellent introductory book [1].

Conjecture

2. *Some of the rules of quantum spacetime are governed by the logistic or logistic-type maps.*

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The logistic map in the quantum realm

3. The `logistic equation` is given by

$$f(x) = rx(1-x).$$

4. r is the `growth rate` and $(1-x)$ is the `growth limit`.

5. Clearly there are two opposite forces in (4).

Superposition of states

6. Let

$$|\psi\rangle = a_1 |\alpha_1\rangle + a_2 |\alpha_2\rangle + a_3 |\alpha_3\rangle + ...$$

be a normalized `quantum state`.

7. We apply (2) in (3) by performing the correspondence

$$|\alpha_i\rangle := i\text{-th orbit (final state) of (3)},$$

where $i \in \mathbb{N} = \{1, 2, 3, ...\}$.

8. For example, in the `bifurcation diagram` of the `logistic equation` [1], one can verify that a `qubit` can be represented in the domain $3.1 < r < 3.4$ in which there are only two final states.

Quantum spacetime

9. Suppose `spacetime` is `discretized` in the `Planckian units`.

10. The **quantum indeterminacy** would then be related to *the indeterminacy for which quantum cell of spacetime the object was during the measurement.*

Quantum chaos

11. According to our conjecture (2), since the chaotic regime in the logistic equation has infinitely many orbits, the corresponding system would then be in an infinite superposition of quantum states.

Quantum conservation

12. The **chaotic regime** *preserves the frequencies of the final states* due to `ergodicity`, as one can see from the corresponding histogram in [1] (p. 137).

13. In other words, `chaos` is *the source of randomness, and randomness is the source of quantum mechanics.*

14. Therefore **chaos** is the **source** of **quantum theory**.

Final Remarks

15. *Fractals* are the *geometric signature* of *chaos*, and they appear in the `micro` and `macro scales` of our `physical universe`.

16. The **quantum rules of spacetime** could be ultimately *relied on* `simple iterations of functions`.

17. `chaos` $\rightsquigarrow$ `randomness` $\rightsquigarrow$ `quantum theory`

Open Invitation

Review, *add* content, and `co-author` this white paper [2, 3].
Join the **Open Quantum Collaboration**.
Send your contribution to `mplobo@uft.edu.br`.

Open Science

The **latex file** for this *white paper* together with other *supplementary files* are available in [4, 5].

How to cite this paper?

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Agreement

All authors agree with [3].

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