Quantum genetic spiral the space-time

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ABSTRACT

The nature of quantum mechanics has various interpretations. In this paper we consider the hypothesis of quantum Darwinism. Quantum theory is closely connected with the concept of information. Perhaps there is an analogue of the genetic code for quantum Darwinism. Here the attempt of the genetic formulation of quantum gravity. It is based on the idea of the quantum genetic spiral the space-time, directed along the time axis. Such a mathematical form exists in braid theory. Matter how information is coded in the genetic structure of space-time. Natural and artificial selection of quantum Darwinism leads to the collapse of the wave function and the identification of a dominant gene.

1. INTRODUCTION

Formulation of quantum gravity is independent of the background suggests that space-time is emergent from a more fundamental concept of structure. Here will come from the heuristic assumption that the fundamental structure of space-time there is a flow of time and the torus. The volume of rotation of the torus is directly proportional to the flow of time [29].

$$\Delta V = \oint F \, dl = \frac{G \hbar}{c^2} \Delta t$$

What this means for the geometry of space-time? If you portray the rotation of the torus in the diagram of space-time, it turns out curl is wound in a spiral along the time axis. Here we assume that this spiral is the basic quantum structure of space-time. Twisting together all of the spirals creates the very fabric of space-time. The mathematical definition of helical structures and braids can be given using topological methods. In particular for genetic analysis applies the theory of the Chern-Simons. The action of this theory is defined as

$$S_{cs} = \int e^{ikj} \left( \Omega_i \frac{\partial \Omega_j}{\partial x^k} + \frac{2}{3} \Omega_i \Omega_k \Omega_j \right) dV$$

Where the curvature of topological connection

$$K_{ik} = \frac{\partial \Omega_i}{\partial x^k} + \frac{2}{3} \Omega_i \Omega_k$$

$$i, k, j = 1, 2, 3$$

Use the theory of the Chern-Simons and the definition of the quantum spiral of space-time (the torus of rotation is equal to the flow of time).

$$dS_{cs} = e^{ikj} \left( \Omega_i \frac{\partial \Omega_j}{\partial x^k} + \frac{2}{3} \Omega_i \Omega_k \Omega_j \right) dV$$
\[ dV = \frac{G\hbar}{c^2} dt \]

This yields a possible definition of the DNA helix in space-time. The temporal component of the connection (a measure of the rotation of the DNA helix along the time axis) will

\[ \Omega_0 = \frac{\partial S_{cs}}{\partial t} = \frac{G\hbar}{c^2} e^{ik_j} \left( \Omega_i \frac{\partial \Omega_j}{\partial x^k} + \frac{2}{3} \Omega_i \Omega_k \Omega_j \right) \]

It is possible genetic formula of the DNA helix in space-time. The interweaving of all quantum spirals of space-time at the genetic level, can encode a huge amount of information, in particular it proves the existence of holographic information in black holes. In addition, the matter also arises as a special genetic code into the structure of space-time. Consider the definition of energy as the frequency of information coding in the DNA helix in space-time.

\[ E = h\omega = h \langle \Omega_0 \rangle \]

\[ dE = \frac{G\hbar^2}{c^2} e^{ik_j} \left( \frac{\partial \Omega_j}{\partial x^k} + \Omega_i \Omega_j \right) d\Omega_i \]

Where the total energy of the particle is the integral of genetic coding

\[ E = \frac{G\hbar^2}{c^2} \int_0^L e^{ik_j} \left( \frac{\partial \Omega_j}{\partial x^k} + \Omega_i \Omega_j \right) dx_i \]

This formula shows that the energy of the particles arises as a special topology of DNA space-time. Information about the particle is contained in the topological complex of DNA and interaction with other emerging topological structures. This approach has in common with quantum Darwinism. Matter how information is encoded in the genetic DNA structure of space-time. Natural and artificial selection of quantum Darwinism leads to the collapse of the wave function and the identification of a dominant gene. The wave function from the point of view of Darwinism is the extent of knowledge about the system and supported a more traditional interpretation of quantum mechanics.

## 2. Genetic Quantum Gravity

It was found that matter is encoded in the topology of the spirals of space-time. However, this also leads to the change of the metric of space-time in the neighboring areas. In general, it is necessary to determine the influence of matter on the internal topological curvature of DNA four-dimensional space-time.

The main definition of the genetic structure of space-time can be averaged over larger distances than the scale of quantum gravity

\[ S_{cs} = \frac{c^2}{G\hbar} \langle \Omega_0 \rangle V = \frac{c^2}{G\hbar} \int \Omega_0 dV = \int e^{ik_j} \left( \Omega_i \partial_k \Omega_j + \frac{2}{3} \Omega_i \Omega_k \Omega_j \right) dV \]

This means, frequency coding the genetic information of space-time averaged and tend to zero. The positive and negative frequency averaged at large distances.
However, there are situations when it may not tend to zero frequency. Then there is the minimum average energy, which can be defined as the temperature of the Unruh vacuum.

\[ \langle E \rangle = \frac{1}{2} k T_U = \hbar \langle \Omega_0 \rangle \]

That means the average fluctuations of genetic information of space-time

\[ T_U V = \frac{2G\hbar^2}{k c^2} \int e^{ik_j} \left( \Omega_i \partial_k \Omega_j + \frac{2}{3} \Omega_i \Omega_k \Omega_j \right) dV \]

This situation is similar to the thermodynamic condition of the vacuum in accelerated reference frames and gravitational fields. Where the Einstein equations are considered as a specific type of law thermodynamic geometry of space-time.

\[
R_{\alpha\beta} - \frac{1}{2} \gamma_{\alpha\beta} R = \frac{8\pi G}{c^2} T_{\alpha\beta}
\]

\[ a = g \]

\[ T_U = \frac{\hbar g}{2\pi k c} \]

The law of thermodynamic parameters: temperature, energy and entropy. In addition, the latest value can be calculated from the average amount of genetic information of space-time

\[ g V = \frac{4\pi G\hbar}{c} \int e^{ik_j} \left( \Omega_i \partial_k \Omega_j + \frac{2}{3} \Omega_i \Omega_k \Omega_j \right) dV \]

\[ l_p^2 = \frac{G\hbar}{c^3} \]

Hence, it turns out the quantum state of the genetic code of space-time in the form of the wave function

\[ \Psi = A \exp \left\{ 2\pi \int e^{ik_j} \left( \Omega_i \partial_k \Omega_j + \frac{2}{3} \Omega_i \Omega_k \Omega_j \right) dV \right\} = A \exp \left\{ i \frac{\pi c^2 k}{G\hbar^2} T_U V \right\} \]

This allows for a fresh look at the problem of determining the energy density of the gravitational field and its non-local nature

\[ T_g = \frac{dE}{dV} = - \frac{g^2}{4\pi G} \]

The energy density of the gravitational field is determined by the average density of genetic information of space-time

\[ T_g = - \frac{G\hbar^2}{\pi c^2} \left( \frac{S_{cs}}{V} \right)^2 \]

Also introduced a new concept of thermal wave function of the gravitational field

\[ \Psi(T_U, V) = A \exp \left\{ i \frac{\pi c^2 k}{G\hbar^2} T_U V \right\} \]
In this case, the entropy of the vacuum is a measure of the entanglement of space-time

\[ S_{en} = -k \ln p \]

Hence, the nonlocal character of the energy density of the gravitational field due to the density of the entropy of non-locality entanglement of the geometry of space-time

\[ T_g = -\frac{Gh^2}{\pi k^2 c^2} \left( \frac{S_{en}}{V} \right)^2 \]

**Conclusion**

Thus, the problem of quantum gravity is reduced to the search for the answer to the question about the presence of space-time of the stored information and the information capacity of black holes. It is necessary to determine exactly the model of the geometry of space-time to explain these phenomena.


[6] N. Pinto-Neto, gr-qc 0410001, 0410117, and 0410225


