Dirac Large-Numbers Hypothesis in the Scale-Symmetric Theory

Sylwester Kornowski

Abstract: Contrary to the mainstream theories, within the Scale-Symmetric Theory (SST) the dimensionless physical-constants/numbers are calculated. Here we show that two large physical-constants/numbers are very important. First of the two large numbers relates ratio of the fine-structure constant and the coupling constant of gravitational interaction of the components of the electron-positron pairs to ratio of densities of the gravitating Einstein spacetime and the non-gravitating Higgs field (HF) which has inertial mass only - it is some 42 powers of ten. The second one relates the mass/size cosmological scales and proton scales - it is some 40 powers of ten. SST shows that since the end of the inflation the gravitational constant is invariant. Gravity and quantum entanglement emerged during the inflation as a result of phase transitions of large part of the Higgs field. Due to the properties of the quantum entanglement, controlling or removing quantum decoherence is impossible. SST shows that we cannot explain correctly both gravity and quantum entanglement neglecting the two size scales below the Planck scale i.e. the HF scale and the quantum-entanglement scale.

1. Introduction

In 1937, P. A. M. Dirac formulated his large-numbers hypothesis. Contrary to the mainstream theories, within the Scale-Symmetric Theory (SST) [1] the dimensionless physical-constants/numbers are calculated. Here we show that two large physical-constants/numbers are very important. They are $N \approx 4.2 \cdot 10^{42}$ (it relates gravity and electromagnetism via Higgs field and Einstein spacetime) and $R \approx 0.39 \cdot 10^{40}$ (it relates the mass/size cosmological scales and proton scales).

The Scale-Symmetric Theory (SST) shows that the succeeding phase transitions of the superluminal non-gravitating Higgs field (HF) during its inflation (the initial big bang) had led to the different mass/energy scales and size scales (bigger structures consist of smaller structures) [1A]. Due to a few new symmetries and 7 parameters only, there appear the superluminal binary systems of closed strings (the spin-1 entanglons) which are responsible for the quantum entanglement (it is the quantum-entanglement scale), neutrinos and the very stable spin-1 neutrino-antineutrino pairs (NAPs) moving with the speed of light in “vacuum”, c, which are the components of the gravitating Einstein spacetime (ES) (it is the Planck scale;

mass of lightest neutrino is the smallest gravitational mass; neutrinos acquire their gravitational masses due to their interactions with the Higgs field [1A]; as for electrons, we can define two different masses of a neutrino i.e. particle mass and wave mass [2]), cores of baryons (it is the proton/electric-charge scale), and the cosmic-structure/Protoworld (it is the cosmological scale) that evolution leads to the dark-matter (DM) structures (they are built of entangled non-rotating-spin NAPs), dark energy (it consists of the additional non-rotating-spin NAPs interacting gravitationally only i.e. they are not entangled) and the expanding Universe (the "soft" big bang due to the inflows of the dark energy into the Protoworld which created the early Universe) [1A], [1B]. The proton scale leads to the atom-like structure of baryons [1A].

2. The first dimensionless large number

First of the two large numbers relates ratio of the fine-structure constant and the coupling constant of gravitational interaction of the components of the electron-positron pairs to ratio of densities of the gravitating Einstein spacetime and the non-gravitating Higgs field which has inertial mass only

$$N = \alpha_{em} / \alpha_{g[e(+)e(-)]} = c^2 e^2 / (10^7 G m_{electron}^2) = \rho_{ES} / \rho_{HF,inertial} = 4.1658 \cdot 10^{42}, \quad (1)$$

where $\alpha_{em} = 1 / 137.036$ is the fine-structure constant, $\alpha_{g[e(+)e(-)]}$ is the coupling constant of gravitational interaction of the components of the electron-positron pairs, c is the speed of light in "vacuum", e is elementary electric charge, G is gravitational constant, $m_{electron}$ is mass of electron/positron, $\rho_{ES} = 1.1022055 \cdot 10^{28}$ kg/m^3 is the density of Einstein spacetime and $\rho_{HF,inertial} = 2.645834 \cdot 10^{-15}$ kg/m^3 is the inertial-mass-only density of the Higgs field [1A].

SST shows that gravitational constant, G, is directly proportional to density of the Higgs field whereas electromagnetic constant G_{em} (the G_{em} is defined by following formula: $\alpha_{em} = G_{em} m_{electron} m_{positron} / (\hbar c)$ whereas G is defined by following formula: $\alpha_{g[e(+)e(-)]} = G m_{electron} m_{positron} / (\hbar c)$), i.e. some analog to G (it is not the fine-structure constant), is directly proportional to density of the Einstein spacetime. The density of the ES that is associated with the field of the virtual electron-positron pairs, which is responsible for the electromagnetic interactions of electric charges, is $4.1658 \cdot 10^{42}$ times higher than the HF which is associated with gravitational fields. It is the reason that gravity is much, much weaker than electromagnetic interactions.

Most important is the fact that in SST the ratio of the coupling constants, $\alpha_{em} / \alpha_{g[e(+)e(-)]}$, is equal to the ratio of mass densities of ES and HF, $\rho_{ES} / \rho_{HF,inertial}$ – it is the dimensionless large number.

3. The second dimensionless large number

SST shows that each closed string in the entanglons consists of following number of tachyons [1A]

$$K^2 = 0.62358 \cdot 10^{20}. \quad (2)$$

The mean radius of the global torus that is in the bare fermion characteristic for defined scale of sizes we can calculate from following formula [1A]

$$r_d = r_1 K^{d-1}, \tag{3}$$

where $d=1$ is for closed strings ($r_1 = 0.94424\cdot10^{-45}$ m [1A]), $d=2$ is for lightest neutrinos which consist of the entanglons, $d=4$ is for the cores of baryons which consist of the entangled neutrino-antineutrino pairs (it is the short-distance quantum entanglement that results from shape and size of the torus of the neutrino [1A]), and $d=8$ is for the Protoworld.

On the other hand, the rest masses of the global tori are

$$m_d = m_1 K^{2(d-1)}, \tag{4}$$

where $m_1 = 2.34008\cdot10^{-87}$ kg is for the closed string [1A].

From (3) and (4) we obtain

$$r_2 / r_1 = K, \tag{5a}$$
$$r_4 / r_2 = K^2, \tag{5b}$$
$$r_8 / r_4 = K^4, \tag{5c}$$

$$m_2 / m_1 = K^2, \tag{6a}$$
$$m_4 / m_2 = K^4, \tag{6b}$$
$$m_8 / m_4 = K^8. \tag{6c}$$

Now we can calculate some ratios of the ratios of mass/energy scales to that of size scales

$$m_2 r_1 / (m_1 r_2) = K, \tag{7a}$$
$$m_4 r_2 / (m_2 r_4) = K^2, \tag{7b}$$
$$R = m_8 r_4 / (m_4 r_8) = K^4 = 0.38885\cdot10^{40}. \tag{7c}$$

From formula (7c) results that for the cosmological scale to the proton scale we obtain $R = K^4 \approx 0.39\cdot10^{40}$.

4. Summary

Contrary to the mainstream theories, within SST the dimensionless physical-constants/numbers/large-numbers are calculated. Here we show that two large physical-constants/numbers are very important.

Most important is the fact that in SST the ratio of the coupling constants, $\alpha_{em} / \alpha_{g[e(+)e(-)]}$, is equal to the ratio of mass densities of ES and HF: $N = \rho_{ES} / \rho_{HF,inertial} = 4.1658\cdot10^{42}$. It is the reason that gravity is much, much weaker than electromagnetic interactions.

We calculated some ratios of the ratios of mass/energy scales to that of size scales. From formula (7c) results that for the cosmological scale to the proton scale we obtain $R = K^4 \approx 0.38885\cdot10^{40}$.

The two large numbers derived within SST relate the gravitational interactions (associated with HF) and the electromagnetic interactions via the virtual electron-positron pairs produced in ES, and relate scales in physics that appeared due to the phase transitions of the HF during its inflation.

SST shows that since the end of the inflation the gravitational constant is invariant [1A], [1B].

Gravity and quantum entanglement emerged during the inflation as a result of phase transitions of large part of the Higgs field [1A]. Due to the properties of the quantum entanglement, controlling or removing quantum decoherence is impossible. The Cosmos built the boundary for the Higgs field and entanglons from the non-transparent pieces of space [1B]. There is no possibility to build such boundary after the inflation. Moreover, the superluminality of the entanglons and the fact that they produce a jet, not a volumetric field, cause that we cannot control quantum decoherence. Just quantum computers cannot act correctly. SST shows that we cannot control the mind processes as well [3], [4].

SST shows that we cannot explain correctly both gravity and quantum entanglement neglecting the two size scales below the Planck scale i.e. the Higgs-field scale and the quantum-entanglement scale.

References

[1] Sylwester Kornowski (2015). *Scale-Symmetric Theory*
[1A]: http://vixra.org/abs/1511.0188 (Particle Physics)
[1B]: http://vixra.org/abs/1511.0223 (Cosmology)

[2] Sylwester Kornowski (27 August 2016). “The PMNS Neutrino-Mixing Matrix in the Scale-Symmetric Theory”
http://vixra.org/abs/1608.0145

[3] Sylwester Kornowski (10 November 2016). ”Will It Be Possible to Copy Minds?”
http://vixra.org/abs/1611.0144

[4] Sylwester Kornowski (27 January 2016). ”Mental Computers and the Origin of DNA”
http://vixra.org/abs/1510.0508

[5] Dirac, P. A. M. (February 1937). “The Cosmological Constants”
Nature, Volume 139, Issue3512, pp. 323 (1937), (Nature Homepage)