From Stable Boundaries of Inner Cosmos to Inertia

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Abstract: During the inflation, the superluminal non-gravitating Higgs field partially transformed into the luminal Einstein spacetime composed of the neutrino-antineutrino pairs (the Einstein spacetime is the scene for the quantum effects). The quantum effects appeared at the end of the inflation because of the partial collapse of the Einstein spacetime. The succeeding phase transitions of the Higgs field and strictly determined radius of the inner Cosmos composed of universes with the same laws of physics and physical constants, lead to the origin of inertia. We showed that the excited states of the Einstein spacetime (the particles, bodies) never can change the properties of the ground state of the Higgs field and, in cosmic scale, cannot change properties of the ground state of the Einstein spacetime (the mean mass density and the mean luminal speed of the components are practically invariant). It causes that classical bodies "slide" without resistance in the two-component spacetime whereas the bare quantum particles disappear in one region of spacetime and appear in another one, and so on (the quantum waves "slide" without resistance as well). Such is the origin of the inertia.

1. Introduction

The General Relativity leads to the non-gravitating Higgs field composed of tachyons [1A]. On the other hand, the Scale-Symmetric Theory (SST) shows that the succeeding phase transitions of such Higgs field lead to the different scales of sizes [1A]. Due to the saturation of interactions via the Higgs field and due to the law of conservation of the half-integral spin that is obligatory for all scales, there consequently appear the superluminal binary systems of closed strings (entanglons) responsible for the quantum entanglement, stable neutrinos and luminal neutrino-antineutrino pairs which are the components of the luminal Einstein spacetime (it is the Planck scale), cores of baryons, and the cosmic structures (protoworlds) that evolution leads to the dark matter, dark energy and expanding universes [1A], [1B]. The non-gravitating tachyons have infinitesimal spin so all listed structures have internal helicity (helicities) which distinguishes particles from their antiparticles [1A]. SST shows that a fundamental theory should start from infinite nothingness and pieces of space [1A]. Sizes of pieces of space depend on their velocities [1A]. The inflation field started as the liquid-like field composed of non-gravitating pieces of space [1A]. Cosmoses composed of universes are created because of collisions of big pieces of space [1A], [1B]. During the inflation, the

liquid-like inflation field (the non-gravitating superluminal Higgs field) transformed partially into the luminal Einstein spacetime [1A]. In our Cosmos, the two-component spacetime is surrounded by two boundaries – there is the timeless wall composed of pieces of space that is the boundary for the Higgs field and there is the boundary composed of the entangled neutrino-antineutrino pairs (there is the two shortest-distance quantum entanglement so it is non-transparent for the neutrino-antineutrino pairs) for the luminal gravitating Einstein spacetime – it causes that the fundamental constants are invariant [1A], [1B].

Due to the symmetrical decays of bosons on the equator of the core of baryons, there appears the atom-like structure of baryons described by the Titius-Bode orbits for the nuclear strong interactions [1A].

The two first phase transitions are associated with the Higgs mechanism that leads from the superluminal non-gravitating Higgs field to the Principle of Equivalence.

The complete and mathematically coherent theory of the phase transitions leads to the foundations of the quantum physics i.e. leads to both the confinement (it follows from the Mexican-hat mechanism that concerns neutrinos and the Einstein-spacetime components) and superluminal entanglement that concerns the Einstein-spacetime components and neutrinos as well [2].

Due to the interactions of the Higgs field with the Einstein-spacetime components, the Einstein-spacetime components acquire their gravitational mass [1A], [2].

What stopped the inflation? When there appeared the Einstein spacetime then there was an abstract sphere outside which the gravitational pressure forced on an Einstein-spacetime component by the matter inside the sphere was higher than the dynamic pressure of this spacetime [3]. This means that outside the sphere, the Einstein spacetime had collapsed so there appeared a boundary. It stopped the inflation and fixed the initial conditions.

Description of the stationary states during the inflation we can find here [4].

The gravitational fields are the gradients produced by masses in the superluminal non-gravitating Higgs field [1A]. The quantum effects (they concern the electromagnetic, nuclear strong and weak interactions; they are the Standard-Model interactions) are characteristic for the luminal Einstein spacetime – they follow from exchanged superluminal entanglons the Einstein-spacetime components consist of.

The very different properties of the Higgs field and Einstein spacetime cause that unification of gravity and Standard Model within the same methods is impossible. We can only partially unify the listed four interactions via the succeeding phase transitions of the Higgs field.

The inner Cosmos/Multiverse: It is a finite region fully filled with the Higgs field and Einstein spacetime. Due to the fluctuation in the Einstein spacetime, there are created the universes. Their evolution is described in following paper [1B].

The universes: Due to the fluctuations of the Einstein spacetime and, next, the entanglement and confinement of the Einstein-spacetime components, there appear the cosmic-structures/vortices with internal helicity. In left-handed vortices dominates production of proton-electron pairs whereas in right-handed antiproton-positron pairs [1B].

Sean Carroll at the California Institute of Technology and his colleagues assumed that quantum fluctuations were impossible until inflation ended (“Quantum twist could kill off the multiverse” [5]). Such model leads to finite multiverse with expanding universes in which the fixed laws of physics are the same. And it is exactly what we can find in the Scale-Symmetric Theory.

The Scale-Symmetric Theory leads to the finite inner Cosmos containing expanding universes with the same laws of physics and the same physical constants.

SST shows that the quantum effects appear on higher level of Nature. The Higgs field is not some quantum foam.

2. Motivation

We can see that the inner Cosmos never will be dead unless something will destroy the timeless boundary.

The two first phase transitions of the Higgs field are irreversible. It leads to conclusion that the number of the free tachyons, the Higgs field consists of, is constant. The same concerns the properties of entanglons. SST shows that with creation of new expanding universe is associated creation of new neutrino [1B]. But the rate of creations of new universes is very, very slow whereas number of the neutrino-antineutrino pairs is tremendous so we can assume that even in a cosmic scale the mass density of the Einstein spacetime is practically invariant. Moreover, mass density of baryonic matter plus dark matter plus dark energy is very low in comparison with mass density of the Einstein spacetime (tens powers of ten lower) [1B]. It leads to conclusion that in the inner Cosmos with the stable boundaries, the density of the two-component spacetime is practically invariant. It leads to conclusion that the excited energies, which appeared at the end of the inflation due to the partial collapse of the Einstein spacetime, are eternal i.e. the quantum fluctuations are eternal. Of course, with time, due to the quantum entanglement and confinement, distribution of the quantum fluctuations is changing.

The rotational energies of the Einstein-spacetime components (they are the gluons and photons [1A]) cannot transform physically into the pieces of space or Einstein-spacetime components so the excited states of the Einstein-spacetime components will be forever. The loops of the rotational energies locally decrease pressure in the Einstein spacetime so there are the flows in the Einstein spacetime that increase local mass density of the Einstein spacetime – detectors can "see" the additional mass. Such is the origin of the Einstein formula $E = mc^2$. It is not true that the rotational energy can directly transform into gravitational mass or inertial mass/volume.

We showed that the excited states of the Einstein spacetime (the particles, bodies) never can change the properties of the ground state of the Higgs field and, in cosmic scale, cannot change properties of the ground state of the Einstein spacetime (the mean mass density and the mean luminal speed of the components are practically invariant). It causes that classical bodies "slide" without resistance in the two spacetimes whereas the bare quantum particles disappear in one region of spacetime and appear in another one, and so on (the quantum waves "slide" without resistance as well). Such is the origin of the inertia.

3. Summary

During the inflation, the superluminal non-gravitating Higgs field partially transformed into the luminal Einstein spacetime composed of the neutrino-antineutrino pairs (the Einstein spacetime is the scene for the quantum effects). The quantum effects appeared at the end of the inflation because of the partial collapse of the Einstein spacetime.

The succeeding phase transitions of the Higgs field and strictly determined radius of the inner Cosmos composed of universes with the same laws of physics and physical constants, lead to the origin of inertia.

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References

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