Planck's constants, YRA-concept

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In the present article the unique, universal, cosmological constant of the Universe is determined. On the basis of this constant the problem of build-up of unique, natural, universal, axiomatic system of the Planck's constants is solved. According to the concept of the author the Universe space is considered as a three-dimensional, discrete, Euclidean spatial lattice with knots and a motion of the material carriers (elementary particles or the particles transmitting interaction) is considered as a transferring between the neighbouring knots of a lattice on the loopback trajectories. The author in article presents the solution of a question on sense of a fine-structure constant. The solution of a problem of a dark matter and dark energy is presented.

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INTRODUCTION

In the present article the author represents the concept of structure of space of the Universe. How it seems to the author within the limits of this concept the solution of some problems of a modern physics [1] lies.A position of the author is the following. The Universe space is discrete, Euclidean, a three-dimensional spatial lattice with the material knots and communications between them, being in vacuum. The elementary spatial motion is a transferring of elementary particles or the particles transmitting interaction, from a knot to the neighbouring knot. The motion is sequence of the elementary spatial motions. Transferring between knots is carried out on loopback trajectories (communications). This is the reality, the loopback reality. We consider (by default) that the motion is carried out on rectilinear trajectories from a knot to the next neighbouring knot. This is our error, illusion. Our reality is a loopback reality. All in the world are material. The Universe space, a spatial lattice, spatial knots and communications between knots, vacuum are material. All in the world is in a motion. All in the world is in a changing. All in the world is in dependence on the time. There are no other constants in the Nature, except a unique, universal, cosmological constant of the Universe (UUCCU), cosmological frequency. This cosmological constant underlies build-up of unique, natural, universal, axiomatic system of the Planck's constants (UNUASPC). The standard system of the Planck's constants (SSPC) is presented in [2] and on site NIST [3]. In article the standard system is designated as $\{m_P, l_P, t_P\}$. System UNUASPC is designated as $\{m_Y, l_Y, t_Y\}$. In article the author uses international system of units (SI). Accuracy of the calculations made the author is based on accuracy of data NIST. In the present article following effects are presented:

1. Computation of a unique, universal, cosmological constant of the Universe (UUCCU),
2. Evaluation basic of the Plancks' constants for unique, natural, universal, axiomatic system (UNUASPC), YRA-system,
3. Evaluation of geometrical parameter of a spatial lattice of the Universe (distance between the next neighbouring knots),
4. Closer definition of the fine-structure constant in the YRA-system of the Planck's constants and its sense,
5. Closer definition of the formula of the Coulomb's law (the law of interaction of electric charges) in the YRA-system of the Planck's constants.

THE UNIVERSAL, AXIOMATIC SYSTEM OF THE PLANCK'S CONSTANTS

The basic central nexus for axiomatic build-up of system of the Planck's constants is calculation the unique, universal, cosmological constant. Leaning against this constant, also the axiomatic system of the Planck's constants is under construction. In the searches of this constant the author has touched some variants. So the variant, where the applicant was very encouraging on Cosmological constant value was considered $(2/G)^4$, where G is the Newtonian constant of gravitation. Value was other suitable candidate for a role of a cosmological constant $(c/\alpha)^4$, where α is a fine-structure constant. But all of them have been rejected for the reason not conformity (contradiction) to experimental data. There is a set of the universal systems of the Planck's constants at the heart of which build-up the axiomatic principle lies. There is the unique, natural, universal, axiomatic system of the Planck's constants (UNUASPC) at the heart of which build-up the axiomatic principle and conformity to experimental data lie. By the author this unique, universal, cosmological constant of the Universe (UUCCU)

has been defined and has been calculated. For it the label is used f_U. For a label of the Planck's constants UNUASPC the standard labels with one difference are used, they are marked by the interlinear letter Y. Some relations for of the Planck's constants UNUASPC are entered by the author as postulates. Basic of the Plancks' constants are entered on the basis of following equalities:

1. $m_Y = 1/\sqrt[4]{f_U}$ Planck mass,
2. $e_Y = 1/\sqrt{f_U}$ elementary charge (*postulate* of the author),
3. $l_Y = 1/\sqrt[4]{f_U^3}$ Planck length (loopback),
4. $t_Y = 1/f_U$ Planck time,
5. $f_Y = f_U$ Planck frequency.
   The others Planck's constants are computed on their bottom. We will specify some of them:
6. $c_Y = \sqrt[4]{f_U}$ speed along a loopback trajectory (loopback speed of light),
7. $T_Y = 1/l_Y = \sqrt[4]{f_U^3}$ Planck temperature (*postulate* of the author).

DEFINITION OF A UNIQUE, UNIVERSAL, COSMOLOGICAL CONSTANT OF THE UNIVERSE (UUCCU) f_U

Value of a cosmological constant should be such that the quantities calculated on its bottom did not contradict experimental data. It is the Newtonian constant of gravitation $G = 6.67384 * 10^{-11}$ and speed of light in the vacuum $c = 299792458$. These are the experimental values. Lets enter a label l_k for distance between the next neighbouring knots of a spatial lattice. Then we have system of two equations:

$$\begin{cases} G = \frac{l_k^3}{m_Y * t_Y^3} = 6.67384 * 10^{-11} \\ c = \frac{l_k}{t_Y} = 299792458. \end{cases} \qquad (***\text{YRA}***)$$

From this system of the equations the unique, universal, cosmological constant of the Universe (UUCCU) is calculated

$$f_U = 2.983882776 * 10^{47}.$$

It proves existence and uniqueness of the unique, universal, cosmological constant of the Universe (UUCCU), satisfying to the experimental values c and G. From uniqueness of a cosmological constant uniqueness of natural, universal, axiomatic system of the Planck's constants, YRA-system follows.

UNIQUE, NATURAL, UNIVERSAL, AXIOMATIC SYSTEM OF THE PLANCK'S CONSTANTS (UNUASPC), YRA-SYSTEM

Let's give the list of formulas expressions for the YRA-system of the Plancks constants as functions of two experimental values the Newtonian constant of gravitation and speed of light in the vacuum.

1. $m_Y = \sqrt[3]{G}/c$ Planck mass,
2. $e_Y = \sqrt[3]{G^2}/c^2$ elementary charge,,
3. $l_Y = G/c^3$ Planck length,
4. $t_Y = G * \sqrt[3]{G}/c^4$ Planck time,
5. $f_Y = c^4/(G * \sqrt[3]{G})$ Planck frequency,
6. $T_Y = c^3/G$ Planck temperature,
7. $c_Y = c/\sqrt[3]{G}$ speed along a loopback trajectory (loopback speed of light).

There is below the calculated values of YRA-system Plancks' constants:

1. $m_Y = 1.353021073 * 10^{-12}$ kg Planck mass,
2. $l_Y = 2.476929707 * 10^{-36}$ m Planck length (loopback),
3. $t_Y = 3.351338089 * 10^{-48}$ s Planck time,
4. $f_Y = 2.983882776 * 10^{47}$ s^{-1} , Planck frequency,
5. $e_Y = 1.830666023 * 10^{-24}$ C elementary charge,
6. $T_Y = 4.037256275 * 10^{35}$ K Planck temperature,
7. $c_Y = 7.390867889 * 10^{11}$ ms^{-1} speed along a loopback trajectory (loopback speed of light)
8. $l_k = 1.004705883 * 10^{-39}$ m distance between the neighbouring knots of a spatial lattice,
9. $E_Y = m_Y * c_Y^2 = c_Y = 7.390867889 * 10^{11}$ J Planck energy,
10. $\hbar = 1/c_Y^3 = l_Y = 2.476929707 * 10^{-36}$ J s Planck constant (reduced),
11. $k = 1/c_Y^2 = 1.830666023 * 10^{-24}$ $J K^{-1}$ Boltzmann constant,
12. $G_Y = l_Y^3/(m_Y * t_Y^2) = 1$ $m^3 kg^{-1} s^{-2}$ coefficient of gravitation along a loopback trajectory.

From the second equation of the system of equations (***YRA***) after some computations it follows

$$c_Y/c = l_Y/l_k = 1/\sqrt[3]{G} = 2.465328160 * 10^3.$$

Definition: Coefficient of torsion of space is value k_G difined by equality:

$k_G = 1/k_G^3$.

From this definition the next equalities follow:

$G = 1/k_G^3 = c^3/c_Y^3 = l_k^3/l_Y^3$.

From this relation it is follows

$$\begin{cases} G * k_G^3 = G * (\frac{l_Y}{l_k})^3 = \frac{l_k^3}{m_Y * t_Y^2} * (\frac{l_Y}{l_k})^3 = \frac{l_Y^3}{m_Y * t_Y^2} = G_Y \\ G = \frac{G_Y}{k_G^3}. \end{cases}$$

Deduction: Newtonian constant of gravitation in k_G^3 times is less than coefficient of gravitation along a loopback trajectory.

Postulate. Magnetic constant μ_0 in the system UEUASPK (YRA-system) is equal to

$\mu_0 = 4\pi * k_G^{-2} = 4\pi * \sqrt[3]{G^2} = 2.067570805 * 10^{-6}$.

Note: We will remind that the magnetic constant μ_0 in standard system of the Plancks constant is equal to:

$\mu_0 = 4\pi * 10^{-7} = 1.256637061 * 10^{-6}$

Consequence 1: Electric constant ϵ_0 in the system UEUASPK (YRA-system) is equal to

$\epsilon_0 = \frac{1}{\mu_0 * c_Y^2} = \frac{1}{4\pi * k_G^{-2} * c_Y^2} = \frac{1}{4\pi * c^2} = 8.854187818 * 10^{-19}$.

Note: Electric constant ϵ_0 in the standard system of the Plancks constant is equal to

$\epsilon_0 = 8.854187818 * 10^{-12}$.

Consequence 2: Fine-structure constant and its inverse value in the system UEUASPK (YRA-system) have following values:

$$\begin{cases} \alpha = \frac{e_Y^2}{4\pi\epsilon_0 \hbar c_Y} = \frac{1}{k_G^2} = \sqrt[3]{G^2} = 1.645320569 * 10^{-7}, \\ \frac{1}{\alpha} = k_G^2 = 6.077842938 * 10^6. \end{cases}$$

Deduction: Fine-structure constant is equal to the inverse value of a square of coefficient of torsion of space. The similar deduction and concerning the Newtonian constant of gravitation arises. *Deduction:* Newtonian constant of gravitation is equal to the inverse value of a cube of coefficient of torsion of space.

GENERALIZATION OF LAWS OF PHYSICS ON A LOOPBACK TRAJECTORY, THE YRA-SOLUTION

Without belittling a generality, we will view activity of these laws on examples with the Planck's constants. We will compare ordinary (usual) our understanding and the loopback understanding (YRA-understanding) of these laws. The inferior letter (symbol) k we will use to underline "rectilinear" character of interaction.

Einstein's law: $E = mc^2$. According to usual understanding of the interaction along a rectilinear trajectory the law will look like $E_k = m_Y c^2$. For a loopback trajectory it will be $E_Y = m_Y c_Y^2$. The relation of these energies is equal to value k_G^2. But this is the fine-structure constant. Here in what an essence and sense of a fine-structure constant. Here where dark energy and a dark matter (on the loopback space) is hidden.

Newton's law: $F = G * (m_1 * m_2)/r^2$. According to usual understanding for interaction along a rectilinear trajectory the law will look like $F = G * (m_Y^2/l_k^2)$. For a loopback trajectory it will be $F_Y = G_Y * (m_Y^2/l_Y^2)$. As $G_Y = 1$, that occurs following equality:

$F_Y = m_Y^2/l_Y^2 = c_Y^4$.

On the other hand for the Planck force along a loopback trajectory (the loopback Planck force) the following relation takes place:

$F_Y = G_Y * \frac{m_Y^2}{l_Y^2} = G_Y * \frac{m_Y^2}{k_G^2 * l_k^2} = k_G * \frac{G_Y}{k_G^3} * \frac{m_Y^2}{l_k^2} =$
$k_G * G * \frac{m_Y^2}{l_k^2} = k_G * F_k$.

Here F_k - the Planck force or force of a gravitational interaction along a rectilinear trajectory between the neighbouring knots of a spatial lattice. *Deduction:* the Planck force along a rectilinear trajectory in k_G times is less then the Planck force along a loopback trajectory.

Coulomb's law (the law of interaction of electric charges): $F_C = 1/4\pi\epsilon_0 * q_1 q_2/r^2$. Here $k = 1/4\pi\epsilon_0 = c^2/10^7$ is any far-fetched coefficient somehow to compound among themselves separate parts of standard system of the Planck's constants $\{m_P, l_P, t_P\}$. Such should not be. In unique, natural, universal, axiomatic system of the Planck's constants (UNUASPC) $\{m_Y, l_Y, t_Y\}$ the Coulomb's law looks like:

$F_C = c_Y^2 * \frac{q_1 * q_2}{r_Y^2} = c^2 * \frac{q_1 * q_2}{r_k^2}$ (*postulate* of the author).

Labels are absolutely clear. r_Y loopback distance, r_k rectilinear distance. Coefficient k is equal to c_Y^2 for the first equality and equal to c^2 for the second equality. Note that this postulate is a simple consequence of the previous postulate. For our example the Coulomb's law looks like:

$F_C = c_Y^2 * \frac{e_Y^2}{l_Y^2} = c^2 * \frac{e_Y^2}{l_k^2} = c_Y^4$.

Deduction: Both on the loopback trajectory and on the rectilinear trajectory Coulombs forces are equal among themselves and equal to the Planck force on the loopback trajectory.

CONSEQUENCES

Let's result some equalities that take place in YRA-system of the Planck constants

1. $t_Y = m_Y * l_Y$
2. $m_Y * c_Y = 1$ Planck impulse,
3. $f_Y = c_Y^4$ Planck frequency,
4. $T_Y = c_Y^3$ Planck temperature,
5. $E_Y = m_Y * c_Y^2 = c_Y$ Planck energy J,
6. $E_Y = m_Y * c_Y^2/e_Y = c_Y^3$ Planck energy eV,
7. $m_Y = l_Y * c_Y^2$,
8. $\hbar = 1/c_Y^3 = l_Y$ Planck constant (reduced),
9. $\hbar = m_Y * \sqrt{t_Y}$,
10. $k = 1/c_Y^2$ Boltzmann constant,
11. $k = \hbar * c_Y$,
12. $k = \sqrt{t_Y}$,
13. $c_Y = \hbar/(m_Y * l_Y)$,
14. $c_Y = f_Y/T_Y$,
15. $a_Y = c_Y/t_Y = c_Y^5$ acceleration of loopback speed of light,
16. $F_Y = G_Y * m_Y^2/l_Y^2 = m_Y * c_Y/t_Y = c_Y^4$ Planck force (loopback),
17. $D_Y = c_Y^8$ Planck density,
18. $q_Y = \sqrt{4\pi\epsilon_0\hbar c_Y} = k_G * e_Y = e_Y/\sqrt{\alpha}$ Planck charge,
19. $\alpha = (e_Y/q_Y)^2$ fine-structure constant.

INFERENCE

The author in given article presents effects of the conducted examination for the purpose of the best understanding of the world surrounding us. Ideas of a spatial lattice and the loopback character of a motion have led the author to a problem of the Planck's constants and this problem has been solved. The solution was very simple and natural. The problem of the Planck's constants, one of key problems of modern physics is solved. On the basis of a unique, universal, cosmological constant of the Universe (UUCCU) the unique, natural, universal, axiomatic system of the Planck's constants (UNUASPC), YRA-system is constructed. The fifth problem from L. Smolin's list [1] is solved also. This is problem of dark matter and dark energy. Their site is spotted. Their place is on the loopback space. There is nothing invariable in the world. In the world exists and rules him the unique, universal, cosmological constant of the Universe (UUCCU). The concept of a spatial lattice presented by the author and loopback motion does not contradict available experimental data. This conception explains sense and an essence of already available knowledge of the Nature and its laws is better. It concerns the Newton's law of gravitation. It concerns the Coulomb's law improvement about interaction of electric charges. It concerns an Einstein's law about mass and energy communication. It concerns such concepts as a dark matter and dark energy. YRA-conception corresponds to our reality, than existing models more full and more precisely, than existing models. . Our perception of the validity refracts a loopback reality on straightforwardness. We for some reason consider interaction rectilinear. It is easier for our understanding. But it is our illusion. *Deduction:***Our reality is loopback. In a reality there is only a loopback interaction**. **Thanks:**The author expresses gratitude to his grandson Maxim for joint walks. During these walks it was well thought over those questions which have found reflection in this article.

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[3] NIST - National Institute of Standards and Technology, http://physics.nist.gov/constants