

Some words about fundamental problems of physics

Part 5: The Nature of Gravity

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In this Part of the article I will tell, like in previous Parts as briefly as possible, about a universal phenomenon of gravity, to influence of which each one of us is subject all the time, but unfortunately, which is still not comprehensible. Our bodies are adapted to an existence in the Earth's gravitational field and we must ultimately understand the cause of attraction. You know how much speculations about gravitation were made till now. Therefore, in order not to be repeated, I present only our vision of the problem resolved by us in the framework of the Dynamic Model (DM) of elementary particles [1, 2]. About the latter it has been already mentioned in previous Parts of the article. The DM essentially differs by its fundamental notions from the basic theories of the Standard Model (SM) of modern physics.

Therefore, under realisation of our approach to the solution of unsolved problems of physics, including the gravity problem, we use about a dozen of new physical notions and respective parameters hitherto unknown for official physics, but which form the basis of the DM, and also use some till now unknown formulas of laws applicable in the DM.

Currently the gravitational interaction is described, in part, by Newton's theory of "universal gravitation", but in a general case, by the general theory of relativity, and, in the so-called quantum limit, by quantum theory of gravity till unfinished.

However, it should be stressed that, in the first place, none of these theories can explain the nature of gravity; they are all focused only on the description of experimental facts related to gravity. Newton wrote in his commentary (General Scholium, 1713) to the 2nd edition of his Principia (translation of 1999 from Latin): "*I have not as yet been able to discover the reason for these properties of gravity from phenomena, and I do not feign hypotheses*" (*'hypotheses non fingo'*, in Latin).

Second, everything in nature is interrelated and is in natural harmony. Therefore, if a theory is correct, the aforementioned harmony and interrelation must be reflected in the description by a given theory of various fundamental interactions as well. This means that the description should be single, universal for all types of the interactions. However, all attempts undertaken by official physics to construct a unified theory of physics were ended in failure despite the enormous efforts of many groups of theoreticians. In particular, modern physics in no way can find the relation between gravitational interaction described by the theory of general relativity and the remaining three types of fundamental interactions, which modern physics distinguishes presently (strong, electromagnetic and weak).

This suggests an unambiguous conclusion that the main reason for the failure of official physics is the inadequacy of its fundamental theories in the framework of the Standard Model (SM), including the theory of general relativity, reality.

Theorists in their search for a unified theory stubbornly adhere to the SM. They are trying to improve it somehow (for example, using different versions of string theories and their derivatives) without changing the fundamental concepts of the SM, but it does not bring the desired result [3]. Facing the difficulties they nevertheless do not want to see and hear about other approaches that go beyond the SM. They are afraid to overstep the framework of solutions accepted currently in the official theoretical physics to the problems of gravity and a unified theory. As a result, gravity is still the official dogma of science, one of a series of inexplicable phenomena.

Let's get back to basics and begin, as they say, "dance from the stove." What we do know from experience?

- (I) Newton's law of universal gravitation (1686) and similar, in form,
- (II) Coulomb's law for interacting point electric charges (1785-1788):

$$F = G \frac{m_1 m_2}{r^2}, \quad F = k \frac{q_1 q_2}{r^2}. \quad (1)$$

The proportionality factor in Newton's formula, called the gravitational constant, $G = 6.67384(80) \times 10^{-8} \text{ cm}^3 \text{ g}^{-1} \text{ s}^{-2}$, is the factor obtained from the experience. Whereas the magnitude and dimensionality of the proportionality factor, k , in Coulomb's law are unknown. In the objective system of units, CGS (cm , g , s), the factor k was accepted arbitrarily for a unit, $k = 1$, which led to the absurd dimensionality of the charge q (see Part 4).

Identical functional dependence – the subordination of the gravitational and electrostatic interactions to the inverse square law – led us to believe that both of the laws, apparently, are particular cases of a general inverse square law, which must describe both these interactions from a single point of view. In order to find its form, obviously, it was necessary to examine all 4 vague notions (parameters) in both Newton's and Coulomb's formulas (1), namely, we need to establish the following.

- 1) What is the mass m , what is its nature?
- 2) What is the charge q , what is its true nature and, hence, the correct dimensionality expressed by integer powers of objective units (cm , g , and s)?
- 3) From which parameters the gravitational constant G depends?
- 4) From which parameters the proportionality factor k in Coulomb's law depends, and what are its absolute value and dimensionality?
- 5) How do the parameters, m and q , interrelate?

6) How do the parameters, G and k , interrelate?

Official physics, unfortunately, cannot answer these questions. In the framework of the accepted theories of modern physics, these questions are unsolvable, and therefore, remain as a white spot that hinders the development of physics.

Recognition of the wave nature of the Universe, all phenomena and objects in it, and therefore, reliance on the universal (classical) wave equation led us to the Dynamic Model of elementary particles (DM) [1, 2] and the Shell-Wave Model of the atom (SWM) [4]. On the basis of these models the answers to all 5 questions mentioned above were obtained by natural way. Moreover, as in a domino effect, like a chain reaction, relatively simple and logically consistent solutions were found for other phenomena, which to this day were incorrectly (or not convincingly) interpreted in modern physics. I would remind that the matter is about the phenomena that are not adequately described by modern theories built on the basis of fictional abstract postulates and virtual parameters [5].

So, here are the answers obtained from the DM to the questions above:

1) The mass m of elementary particles has a wave associated character. The rest mass of the particles does not exist.

2) The electric, magnetic and gravitational charges are the charges of mass exchange. That means that the charges determine the rate of the wave mass exchange (interaction); their dimensionality is $g \times s^{-1}$. At the level of gravitational exchange (interaction), we deal with the gravitational charge, and denote it (for distinction) as q_g . At the atomic and subatomic levels, the "electric" and "magnetic" charges are denoted, respectively, as q_e and q_m .

3) The gravitational constant G relates to the fundamental frequency of elementary particles at the mega-level, ω_g , by the relation:

$$\omega_g = \sqrt{4\pi\varepsilon_0 G}, \quad (2)$$

where $\varepsilon_0 = 1 g \times cm^{-3}$ is the absolute density unit. This frequency determines the gravitational interaction of particles. Since, as follows from experience, $G = 6.67384(80) \times 10^{-8} cm^3 g^{-1} s^{-2}$, hence, the fundamental frequency of the gravitational field and gravitational interaction is

$$\omega_g = 9.158082264 \times 10^{-4} s^{-1}.$$

4) The proportionality factor in Coulomb's law is equal in absolute magnitude to $1/4\pi$, and its dimensionality is as for the inverse density,

$$k = \frac{1}{4\pi\varepsilon_0} cm^3 \times g^{-1}, \quad (3)$$

5) The parameters, m and q , respectively, in Newton's and Coulomb's laws (1), interrelate as follows:

a) at the gravitational level, by the relation,

$$\omega_g = q_g / m; \quad (4)$$

б) at the atomic and subatomic levels, similarly,

$$\omega_e = q_e / m, \quad (5)$$

where

$$\omega_e = e / m_e = 1.869162559 \times 10^{18} \text{ s}^{-1} \quad (6)$$

is the fundamental frequency of the atomic and subatomic levels,

$$e = m_e \omega_e = 1.702691627 \times 10^{-9} \text{ g} \cdot \text{s}^{-1} \quad (7)$$

is an elementary quantum of the rate of mass exchange (interaction) – an electron “charge”, m_e is the associated electron mass.

6) The parameters G and k , as seen from (2) and (3), are related by

$$G = k \omega_g^2 \quad (8)$$

The Universal Law of Exchange (interaction) originating from the DM, which describes three types of fundamental interactions: strong, electromagnetic and gravitational, has the following form:

$$F = \omega_x^2 \frac{(Z_1 m_x)(Z_2 m_x)}{4\pi \epsilon_0 r^2}, \quad (12)$$

where Z_1 and Z_2 are relative masses of interacting objects, m_x is the associated mass of elementary particles – basic constituents of the atom (an electron, m_e , or a nucleon, m_n), $\epsilon_0 = 1 \text{ g} \times \text{cm}^{-3}$ is the absolute density unit, ω_x is one of the fundamental frequencies (either ω_e or ω_g).

Coulomb's law that describes the electrical attraction or repulsion between two charged point objects and Newton's law of universal gravity are particular cases of the Universal Law of Exchange (12) [6]. Here is an explicit form of the both laws:

$$F_{elec} = \omega_e^2 \frac{(Z_1 m_e)(Z_2 m_e)}{4\pi \epsilon_0 r^2}, \quad (13)$$

$$F_{grav} = \omega_g^2 \frac{(Z_1 m_n)(Z_2 m_n)}{4\pi\epsilon_0 r^2}. \quad (14)$$

On the language of the wave exchange, these laws describe, respectively, the exchange (interaction) at the level of "electric" wave field (13) (molecular interaction) on the basis of an electron with the associated mass m_e and the exchange ("electric") charge $e = m_e \omega_e$; and exchange (interaction) at the level of the gravitational wave field (14) on the basis of the graviton-nucleon with the associated mass m_n and the exchange gravitational charge $q_g = m_n \omega_g$.

In the particular case of the description of the strong interaction (exchange) [7], the Universal Law of Exchange (12) takes the form

$$F_{strong} = \omega_e^2 \frac{(Z_1 m_n)(Z_2 m_n)}{4\pi\epsilon_0 r^2}, \quad (15)$$

Conclusion. According to the DM, elementary particles are both micro and mega pulsating objects of the Universe at the same time, i.e. they are unique dynamic wave formations limited by their wave spherical shells. This means that they are extremely small and infinitely large in size at the same time. Their effective mass has associated (affiliated) wave nature, and therefore, they have no rest mass. Such particles pulsate in 2 fundamental frequencies simultaneously, ω_e and ω_g . Obeying the Law of Universal Exchange (12), their exchange interaction (gravitational, electromagnetic, and strong) with an ambient field and other particles is realised at these frequencies.

The first fundamental (innate) pulsation frequency of particles, the ultimately high frequency, $\omega_e = 1.869162559 \times 10^{18} \text{ s}^{-1}$, is responsible for their electromagnetic and strong interactions. This frequency determines, in particular, the ordering in the arrangement of the interacting atoms (which are the wave formations in accordance with DM) in crystals with an average pitch, an internodal distance (a lattice parameter), of about $3.2 \times 10^{-8} \text{ cm}$, that is equal in accuracy to the wave diameter, $D_{\lambda_e} = 2\tilde{\lambda}_e$, since the wave radius is equal to

$$\tilde{\lambda}_e = c/\omega_e = 1.603886492 \times 10^{-8} \text{ cm}. \quad (16)$$

The second fundamental (innate) pulsation frequency of elementary particles, the extremely low frequency, $\omega_g = 9.158082264 \times 10^{-4} \text{ s}^{-1}$, is responsible for their gravitational interaction. For confirmation of the reality of pulsations of the particles with the frequency of ω_g and their interaction at this frequency, one can serve the mean radii of the orbits of the planets and their satellites [3, 6] derived theoretically for the first time in physics due to the new theory (the DM), which turned out capable of doing this. The correlation between

the calculated data and the data of astronomical observations is quite satisfactory. At a distance from the Sun, in an average, within a gravitational wave radius,

$$\lambda_g = \frac{c}{\omega_g} = 3.274 \times 10^{13} \text{ cm} = 327.4 \times 10^6 \text{ km}, \quad (17)$$

the asteroid belt is located. The gravitational radius is the boundary separating the oscillatory and wave zones of particles, so that it is a transition region, where the big planets could not be formed.

Thus, based on the Dynamic Model, we have come to the unified theory that describes the three fundamental interactions (see equation (12)): strong, electromagnetic, and gravitational.

At the end, I present the following formulation of the gravitational interaction, which was offered at the 19th International Conference on General Relativity and Gravitation in Mexico City (2010) [8]:

Gravitational interaction of bodies is a result of the wave exchange of all elementary particles, constituents of the bodies, individually at the fundamental frequency $\omega_g = 9.158082264 \times 10^{-4} \text{ s}^{-1}$ inherent in every particle.

P.S. Without violating the style taken in the article (beginning from Part 1), I could not resist and decided to add at the end of this Part the following my reflections. Modern official physical schools (research laboratories), led by well-known (credible) scientists, remind closed religious sects that do not let in outsiders-freethinkers to themselves: those who, instead of preaching the same dogma, invites members of the sect to abandon of their dogmas, and to open their doors to new fresh ideas that are beyond an accepted paradigm.

Obviously, this is an abnormally developing system in the science of nature, physics – a system with negative feedback; and it may not exist long, a new era comes. Therefore, official physics must, finally, have the courage to recognize openly about its inability, in principle, ever to resolve the unsolved problems over which it beats by using the SM quite long and unsuccessfully. This situation has long been recognised by many, every feels intuit it. No matter how will correct and improve the SM. Inevitably, this will not give any positive result because at the foundation of the SM is a hopeless dead-end paradigm (see also, e.g., Part 1-4 of this article). Hence, there is only one way out of the stagnation - a change of the basic postulates, or paradigms, in modern physics.

And on my mind, it would be appropriate and democratically to declare, for example, an open international competition (assuming the participation of all physicists without exception) on the best alternative generalized theory for the replacement of the failed SM. What can you say in regard to this idea?

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