

Unified Theory of Interactions

(short recitals)*

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ABSTRACT

The unified theory of interactions is a main problem of General Physics and Physics of Elementary Particles. Using few basic principles we could solve some problems in the experimental physics and in the astronomic and astrophysical observations and try to unify all known interactions into the one.

I. Introduction

There are four kinds of interactions in our Universe, their names: electromagnetic, strong, weak and gravitational. In the standard model electromagnetic and weak forces was combined and represented as unified electroweak force in the Grand Unification of three called interactions except for gravitational.

The main problem of Physics is a building of Unified Theory of Everything, so-called Super Unification theory, or the theory of matter (field).

It is now known that the classic mechanics and the quantum field theory, which is consistent with quantum mechanics and special relativity, cannot to unite four known interactions by single unified one. It was main aim in the 30 last years in the Einstein's life. At present we have a crisis in particle physics [1] and problems in high energy astrophysics [2], such as unexplained energy and sources of ultrarelativistic charged particles (ultra-high-energy cosmic rays) [2, 3], the problems of the "dark matter" [4] and "dark energy" [4, 5] in the Universe, and the problem in the Cosmology, such as acceleration models of the Universe [4] which cannot be admitted by the philosophic principles, and by this cause cannot be understood by most of peoples.

Trying to resolve some of these problems, we can consider new theory based on philosophic principles and on the geometric one. It is the Unified Theory of Interactions (UTI).

II. Philosophy of the Unified theory of Interactions

The matter is continuous and infrangible, because nothing exists except of matter.

The matter cannot to be split by absolutely different kind of objects, for example by means of "absolute emptiness".

The matter has two kinds: tenuous – field (ether, material space, physical vacuum) and compacted – energy substance. And the matter has its unified subpart.

The material objects exist in the time because they are changeable and can detect other material objects and can affect them.

In chime with this we have a following.

III. Basic principles

There are two main principles in the base of "Unified theory of interactions":

1) The "Principle of Absolute Transitions":

The absolute transitions, is momentary transitions between absolutely differentiated conditions of the matter, and they are do not exist in the time.

Or, by other words:

The transitions between two physical values, that realize only stepwise (in a trice), without intermediate values, do not exist in the nature.

- 2) The geometrical principle:

The character of interactions between subparts of matter is defined only by their geometry.

IV. Postulates

For the “Unified theory of interactions” we have three basic postulates:

- 1) The velocity of forces of the interactions is always constant and equal to velocity of electromagnetic waves in the vacuum.
- 2) The changes of the interactions always come with intermediate physical values. This postulate correlate with the “Principle of Absolute Transitions” of theory (see above).
- 3) The conversion between two kinds of the matter have place only through “Resonance Transition”.
“Resonance Transition” is such transition, which happens only when the velocity of interactions aspire to exceed the velocity of electromagnetic waves in the vacuum. That condition should escapes via power resonance that will cause the “Resonance Transition” of one kind of matter to other one.

Therefore, we have few basic important conclusions:

- 1) The “absolute quiescence” and “absolute emptiness” (Absolute Nothing) are impossible and they do not exist.
Explanation: The “absolute emptiness” (“Absolute Nothing”) and the matter cannot detect and affect each other. We cannot to adopt that the “absolute emptiness” (Absolute Nothing), which can be described by property of “absolute quiescence” in its parts, can be transited to the perpetually dynamic matter, by reason of restrictions of the Postulate no.2.
- 2) The particles cannot to be absolutely dense and absolutely solid.
Explanation: We cannot to adopt that the absolutely dense and absolutely solid matter, which can be described by property of “absolute quiescence” in its part, can be transited to the perpetually dynamic matter (ether, electromagnetic field), by reason of restrictions of the Postulate no.2.
- 3) The motion in the “absolute emptiness” (Absolute Nothing) is impossible. Theoretically, the object which was placed to the “absolute emptiness” (Absolute Nothing) and got the impulse will not move by means of inertia, i.e. will not keep in moving. Accordingly with this, the “absolute emptiness” (Absolute Nothing) looks like absolutely tenacious liquid. So, Aristotle’s conclusion about “absolute emptiness” (Absolute Nothing) was partly incorrect.
It is a pursuance of philosophic principle of minimal action: “if nothing does affect to the body, then nothing does occur with them”.

V. The “Spheromod” model of the elementary particles

To unify all interactions in the single unified one, we have to declare new model of elementary particles, called as “Spheromod”.

“Spheromod” is a model of particle in form of sphere which have some “mod” – the complex of physical characteristics that can be described by physical values (it maybe few known constants), which probably contains velocity of light, frequency, power, radius of particles, etc. In fact, it is possible, to describe those values, only using experimental data.

In the “Spheromod” model the particles represented as spherical formed material substance in structure where substance is electromagnetic field. All known forces, by means of which any two particles make their interactions, are only the resulting of unified forces between

components of four conditional pairs of front and rear semi-spheres – parts (sides) of those particles, relatively oriented in the space:

1. a pair of front semi-sphere of the first particle and of front semi-sphere of the second particle, or simply the “front-front” pair;
2. a pair of front semi-sphere of the first particle and of rear semi-sphere of the second particle, or simply the “front-rear” pair;
3. a pair of rear semi-sphere of the first particle and of front semi-sphere of the second particle, or simply the “rear-front” pair;
4. a pair of rear semi-sphere of the first particle and of rear semi-sphere of the second particle, or simply the “rear-rear” pair.

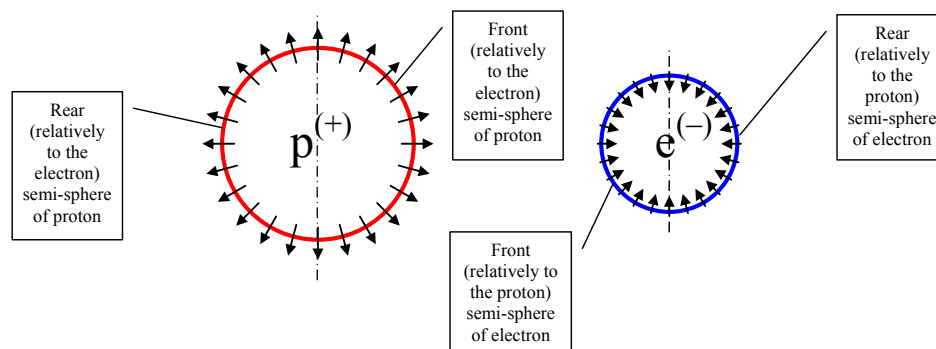
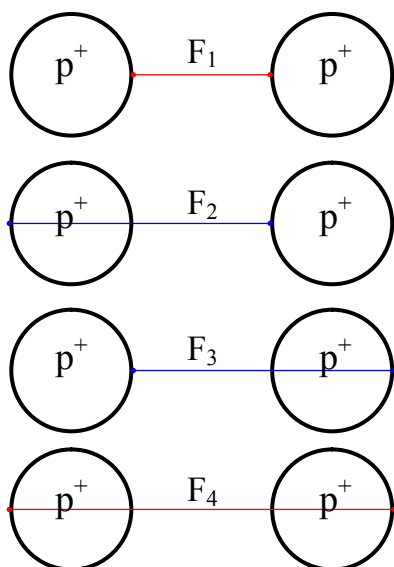


FIG. 1: The “Sheromod” model of the elementary particles. The particles look as a spheroid, formed from electromagnetic field. The different electrically charged particles have adversatively acting surfaces. And these surfaces have its opposite sides (semi-spheres) actions adversatively to other any one side of other particle.

The forces of the first and fourth entitled pairs of semi-spheres have identical actions, and for similar particles with same electric sign they are attractive forces. And for the pair of particles with mutually opposite electric sign they are repulsive forces.

Similarly, but vice versa, the forces in the second and third pairs of semi-spheres have identical actions, and for the pair of particles with similar electric sign they are the repulsive forces. And for the pair of particles with opposite electric sign they are the attractive forces.

proton-proton (similarly electrically charged particles) interactions



The summary static interaction is:

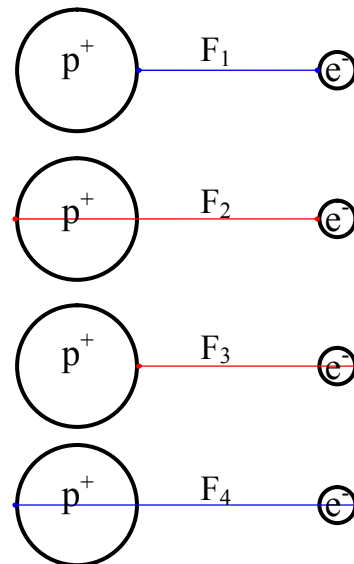
$$F = |F_1| - |F_2| - |F_3| + |F_4|,$$

where:

F_1 and F_4 – attractive forces,

F_2 and F_3 – repulsive forces

proton-electron (adversatively electrically charged particles) interactions



The summary static interaction is:

$$F = -|F_1| + |F_2| + |F_3| - |F_4|,$$

where:

F_1 and F_4 – repulsive forces,

F_2 and F_3 – attractive forces

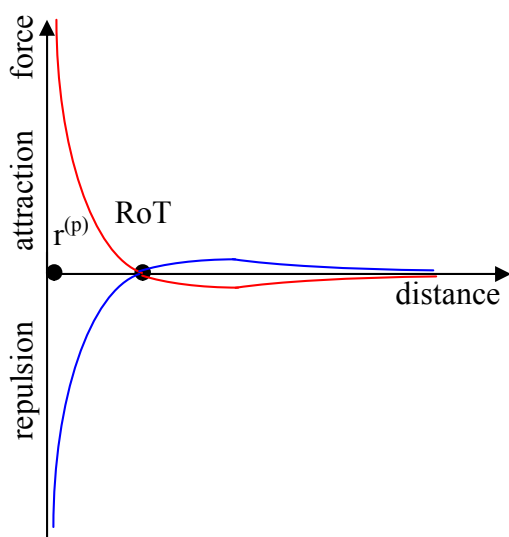
FIG.2: Two kinds of unified interactions in the “Spheromod” model of the elementary particles, in its four pair of interacting semi-spheres.

Here,

red color lines – forces of the mutual attraction;

blue color lines – forces of the mutual repulsion.

Beforehand, without experimental confirmation, for the resulting interaction of four forces that have places between semi-spheres of two particles in the entitled pairs, in the statics, we have next function:



Here,

red line – for two identically particles with similar electric sign;

blue line – for two particles with different electric sign.

Both lines are drawn approximately, in inverse-square law.

FIG.3: Function for interactions on a distance for the two particles.

Where:

RoT – Radius of Transition of forces from attraction to repulsion;

$r^{(p)}$ – Radius of biggest of interacting particles.

As shown on the FIG.2 and FIG.3, the sum of attractive forces have effect between component parts of “front-front” and “rear-rear” pairs of semi-spheres of two protons have advantages over the sum of repulsive forces between components of “front-rear” and “rear-front” pairs of semi-spheres of two protons while the distance between protons is smaller than RoT.

According with “Spheromod” model the particles forms out from the power (force) lines of electromagnetic field which are base of material substance, and destroys into them.

According with rule of “Transitional resonance” and with “Principle of absolute transitions” the particles can converted into the lines or quanta of electromagnetic field (photons) and converted back only when power resonance is happens. The power resonance generally have place only when the velocity of interactions have tendency to exceed the velocity of light.

VI. Modified theory of electromagnetic interactions

Let’s look on the interactions between any two particles as shown on FIG. 2.

Accordingly with “Spheromod” model, the electromagnetic force represents as dominance of sum of interactions between front semi-sphere of the first particle and rear semi-sphere of the second particle, and between rear semi-sphere of the first particle and front semi-sphere of the second particle over the sum of interactions between front semi-sphere of the first particle and front semi-sphere of the second particle, and between rear semi-sphere of the first particle and rear semi-sphere of the second particle.

Therefore, we have a summary force for the resulting interaction of two particles which differs on two side of RoT and differs for different two pairs of particles, where first one is pair of similar identically electrically charged particles, i.e. proton-proton, and second one is pair of mutually adversatively electrically charged particles, i.e. proton-electron.

On the distance, larger than RoT, the full interaction have a very big forces as its source, but the summary (or resulting) interaction represents very small part of full interaction, which we calls an electromagnetic attraction or repulsion.

For the electrically opposite particles this interaction is mutually attractive.

For the electrically identical particles this interaction is mutually repulsive.

The main function of interactions between any pair of entitled semi-spheres of the particles is inverse-square dependency of force from distance as shown in the graphics on FIG.3.

VII. The theory of the strong (“nuclear”) interactions

Accordingly with “Spheromod” model, the nuclear and other strong forces represents as dominance of sum of interactions between front semi-sphere of the first particle and front semi-sphere of the second particle, and between rear semi-sphere of the first particle and rear semi-sphere of the second particle over the sum of interactions between front semi-sphere of the first particle and rear semi-sphere of the second particle, and between rear semi-sphere of the first particle and front semi-sphere of the second particle.

On the distance, smaller than RoT, the full and the summary (or resulting) interaction have a very big forces as its source, which represented basically by entitled force which have place in the first (front to front) pair of semi-spheres:

- 1) for the electrically identical particles this interaction is mutually attractive, and we know them as nuclear forces;

- 2) for the electrically opposite particles this interaction is mutually repulsive, and it does cause the springy repulse of electrons on the protons and keep electron away from atom nuclear on its discrete orbit.

The summary attraction in two (front-front and rear-rear) pairs of semi-spheres near to “Radius of Transition” very predominated over the summary repulsion in other two pairs (front-rear and rear-front) of semi-spheres of two particles.

VIII. Electro-dynamical theory of the gravitation

The essence of gravitation can be easily explained using “Spheromod” model of the particles. The forces of resulting nuclear attraction between similar particles (e.g. protons) on a distance greater than “Radius of Transition” are fully compensated by electromagnetic forces of resulting repulsion. But in case of closer location the first pair of forces which is front-front attractive force, they have dominant increment of dynamically changed value when the distance between protons get decrease. Thus, this increment of resulting force of entitled pairs is a gravitation force.

The increment of resulting force having place between proton and electron (or other pair of electrically adversatively charged particles) looks as kind of anti-gravitation forces. But this one could explain the quantum-mechanical effects in the atom: why electron does not fall down to the proton and it have stable orbit, energy, and magnetic and rotation moments, etc.

With electro-dynamical theory of the gravitation we’ve got the universal triad:

Gravitation \equiv Inertia;

Inertia \equiv Motion;

Therefore,

Gravitation \equiv Motion.

And the principle of equivalence of inertial and gravitational mass is fully validated now.

IX. Few conclusions and effects of the Unified Theory of Interactions:

- 1) The gravitational fields, gravitational waves and gravitational quantumes (gravitons) do not exist.
- 2) The motion in the “absolute emptiness” (Absolute Nothing) is impossible.
- 3) The First Principle of Isaac Newton’s mechanics, which is known as the law of inertia is incorrect.

Consequently, we have to declare new (corrected) principles of mechanics:

The mass, to which do not acted by forces, stays in the quiescence.

Or, if the forces do not act to the mass, the mass will keep in the quiescence.

And,

The inertia is a motion by means of summary gravitational forces of all masses in the Universe.

Therefore,

The mass moves (aspires to moving) on the zero-trajectory, through the points where the summary forces are equal to nil.

Last principle may be called “Principle of zero-trajectory”.

- 4) In principle, it is impossible for the matter to existing in absolute zero condition, which can be called as absolute quiescence. The gravitation (as well as motion) does not exist in that condition.
- 5) The gravitation is a relative property of the material substance. Increasing velocity of motion of particle increases its mass.
- 6) Gravitational waves are not waves of gravitational field, they are possibly the super long waves of electromagnetic field, if they really exists and can be detected.

- 7) The inertial systems of coordinates have not absolute differentials with non-inertial ones because both of them are accelerated systems of coordinates. The bodies in the inertial systems of coordinates move with super-weak acceleration caused by its gravitational interaction with masses of Universe. Only the electromagnetic waves can move without acceleration relative to its source.
- 8) The size of the particles is not absolute, and probably should be changed in condition of ultra high pressure, i.e. in the centers of quasars or in the centers of objects recognized as “black holes” in the centers of galaxies.
Therefore, possibly we have to declare the principle of “metrical adequacy”, in the “Unified theory of interactions” to explain such possibilities.
Generally it sounds as this: “The metrics of the material substances correlates with density of the electromagnetic field which have place around them”.
For particles it might sound as this: “in the stronger density of the electromagnetic field (ether) we have more rigid body of particles, which possible only in smaller size of ones”. So the size of particle correlates with pressure in the centers of massive objects of the Universe. Probably, it can explain the displacement to red in the spectrum of the galaxies and quasars. Also And, in this way, the gravitation force must correlate with size of particle. May be it is one of cause which explains why black holes are impossible. So this question still open in the “Unified theory of interactions”.
- 9) The Big Bang is impossible scenarios of Universe’s birth. Universe’s masses cannot move into the absolutely vacuum space without gravitational force of inertia.
- 10) The free motion – inertia – is accelerated as result of gravitational interaction between probe mass and Universe’s one.
- 11) Black holes probably are impossible condition of existence of gravitated masses. The gravitation depends on masses motion, but in the “dark holes” the motion is ultra slow, because the time is slowed down there. And the quiescence of matter in the stopped time is impossible for the continuous space-time, if the postulate no.2 of the “Unified theory of forces” is declared.
Thereunto, the velocity and acceleration of the inertial motion correlates with gravitation in the center of the “black hole”.
- 12) On the big distance the masses in the galaxies (and objects greater of them) moves around their centers with moving away by means of accelerated inertia. It may explain the various forms of galaxies.
- 13) The cause of high velocity (and energy) of cosmic rays is accelerated inertia.
- 14) The short and serial gamma-bursts possibly are the results of crashing of two and more cosmic objects which moving with ultra high velocity. The cause of their ultra velocity is accelerated inertia.
- 15) The “dark matter” isn’t real material bodies, but the resulting effects of the accelerated inertia.
- 16) The “dark force” probably is an effect of the accelerated inertia.
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* Full version of the manuscript of “Unified theory of interactions” available only in Russian language yet.
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