

Article

Unity Principle: Quantum Dipole & Subject-Object Relation (Part I)

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ABSTRACT

The reality seems to have disintegrated into many different and independent spheres, but we feel intuitively that a great variety of existing forms should have a common basis. Deeper truth of our existence might have evaded detection by the materialistic science. How can we come to the true knowledge about our existence? A great desire of man is to find a true meaning of our life and the essence of being. Many philosophers and scientists have expressed the Unity Principle by saying “everything is connected to everything else”, but few have detected its essence. On the base of dialectical logic, the Unity Principle is discovered which illustrate not only the exact mechanism how the physical universe may work, but also the essence of consciousness and subsequently personal God representing the whole self-aware and self-creating reality of the highest complexity.

Part I of this series of articles includes: Introduction; Space and Time; Photon as Elementary Quantum of Existence; Dialectical Relations “Whole-Part, Continuity-Discreteness”; Dialectics of “One-Many”: Cosmic Expansion.

Key Words: truth, theoretical physics, mystery, crisis, unity principle, dialectical logic, quantum dipole, God, consciousness, syntropy, evolution.

Introduction

Stephen Hawking said that we cannot ask if a model corresponds to reality, because we have no independent test of what reality is and all we can ask is whether the predictions of the model are confirmed by observation. It is a typical positivistic and post-positivistic attitude leading to the wrong conclusion that the reality is unknowable and meaningless. But people searching for the truth cannot accept such a post-positivistic ignorance and nihilism. We will disclose the real meaning of reality and truth of our existence in detail as only the knowledge of truth can help to save our endangered civilisation and guarantee the future successful development of science.

Can we know the truth and the nature of our Universe? Yes, we can. Already G.W.F. Hegel showed in his rational philosophy that there are no hidden secrets or realities inaccessible by our critical rational thinking. His philosophy was optimistic and his dialectical logic - very effective and promising instrument. Hegel disclosed brilliantly that the world is rational and dialectical and therefore accessible by our rational thinking and dialectical logic. It is possible to come to the knowledge of truth if we apply critical thinking and logical reasoning as well as knowledge

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from quantum mechanics which shows a quantum character and mutual interconnectedness of reality.

It is very sad that dialectical logic, as the most effective instrument of search for correct answers to ontological questions, had been diminished, thanks to philosophy of positivism, from the scene already in the 19th century and replaced by formal logic. Consequently the development of dialectical logic was abruptly stopped. Needless to say, formal logic is necessary for scientific research, but insufficient with respect to ontological questions. Positivism with its pragmatism and empiricism became a basis of scientific methodology. It has limited scientific research to only what is accessible by our senses and instruments. Positivism replaced Hegelian dialectical rationalism in which classical philosophy had achieved its apex. Positivism tried to create scientific principles based on the rules of formal logic and experiment, where axiomatic approach became a starting point.

However, the whole reality (universe) is dialectical, so it is accessible by our rational dialectical thinking. Dialectical logic achieved a high level in Hegelian rational philosophy at the first half of the 19-th century. The basic rules and categories of Hegelian logic were presented in his publication "Science of Logic". It is very sad that its future development was abruptly stopped. Because of insufficient scientific knowledge in his period, Hegel could not develop a dialectical logic to its final level and so detect the basic mechanism of reality - its Unity Principle, but his deep insight into the dialectical nature of reality was very promising. He had made profound analysis of such philosophical categories like the relations "something-other", "unity of opposites", "one-many", "whole-part", "repulsion-attraction", "continuity-discontinuity", "quantum-quantity-quality-measure", "negation of negation", "unity-diversity", "finitude-infinity", "essence-phenomenon", "subject-object", etc.

If quantum physicists were familiar with Hegelian dialectical logic, they could solve all interpretational problems and seeming mysteries of quantum physics as well as made the greatest contribution to rational philosophy detecting the essence of existence. Certainly, quantum mechanics represents a great achievement of theoretical physics in the 20-th century with many practical and useful results, but it could also represent the greatest achievement of human mind, if theorists knew dialectical logic and were not limited by philosophical positivism.

Truth = spiritual freedom and power = happiness = light = love = social, spiritual progress

People desire and wait impatiently for the true knowledge of our existence because contemporary darkness is very frustrating.

Space and Time

Space remains a mystery so far. It is very strange, because simple but critical thinking and reasoning is sufficient to disclose all mysteries of our existence. The Universe is rational and knowable. We can apply correctly the rules of formal logic by our deductions, but we have a big problem to think, contemplate, ruminare and study the things in their significant mutual relations. Therefore my main aim now is to demonstrate the truth by many ways and from various

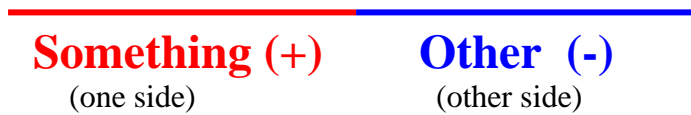
viewpoints, step by step, as simply as possible and so give a basic lesson of critical dialectical thinking. Truth must appear with its beauty if attacked by correct logic.

Now philosophical and theoretical problems are not grasped at the fundamental level, but replaced by inappropriate idealisations, illogical assumptions and consequent deductions following from the rules of formal logic and mathematics. As assumptions and axioms represent incorrect idealisations, the results must be also incorrect, even irrational and mysterious like the Standard Model of particle physics, where elementary particles are interpreted mistakenly as point-like entities. String theories have replaced these zero dimensional entities by one dimensional strings vibrating through hypothetical eleven-dimensional space-time and this nonsense is presented as a great achievement of human thinking. But they know neither why do strings vibrate nor what are the basic structural constituents of space-time. Their realities are hidden within Planck's scales. If they knew that Planck's scales just indicate that the whole reality is quantized and structured and therefore consists of elementary quanta they would understand there is no way to hide something there. The question is: what are the basic elementary quanta of reality? How is the reality built of these elementary structural constituents?

Certainly, no physical entity can be zero-dimensional or one-dimensional, as no physical object can exist without its spatial manifestation having zero volume. Such idealisations are inappropriate at the quantum level. If we do not understand how space and time are quantized and structured at the basic quantum level, we cannot explain their essence as well as the essence of gravity and other interactions. Why do theorists, unknowing the essence of space, try to put together Einstein's theories with quantum mechanics? Einstein theory of gravity is local while quantum mechanics is non-local, it means, non-locality is its basic feature confirmed by experiments. Why don't they try to find the essence of non-locality? Having found it they could see the fundamental defectiveness of Einstein's theory of gravity. Even, his theory denies the existence of gravitational force replacing it by mathematical space-time curvature. The attempts to unite Einstein's gravity (general relativity) and quantum theory result in mysteries where solutions are searched at the level of absent mysterious black holes.

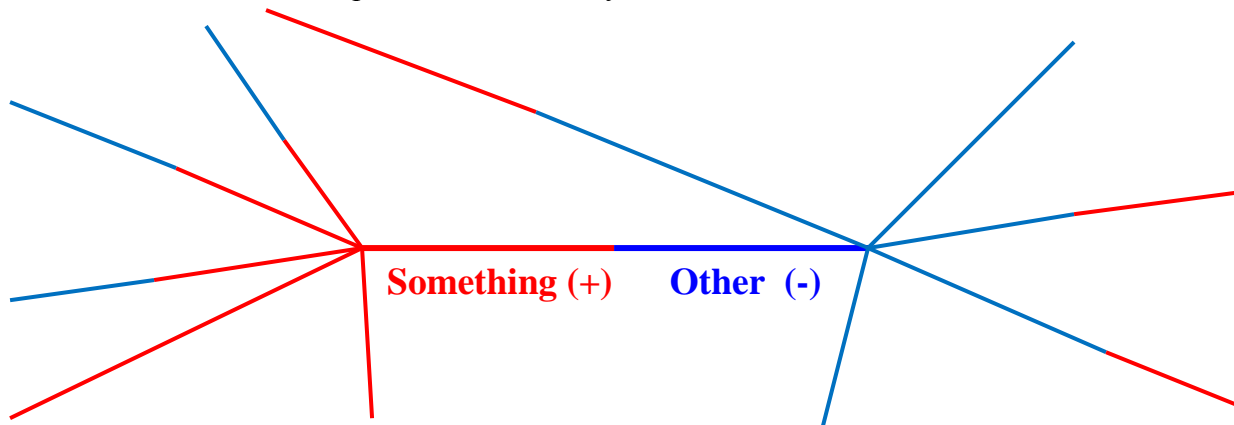
Let us apply a simple logic by our reasoning regarding space. If we look at the reality (existence) or the Universe as a whole, we can see that it is not a pure continuum, but it is structured. A pure unstructured continuum is nothing. So the whole Universe as space is structured and, at the same time, represents the unity in its internal structuration - diversity. As the Universe is structured, it must be built of its basic structural constituents. That is the reason why the Universe is quantized. But at the same time it represents the Unity. It means that its basic structural constituents must be interconnected. But connections are also structural constituents of reality (Universe). Does the Universe have many different basic building constituents or not? If we say yes, we must explain – why, what are these different constituents and what is the reason of their difference? If we say that only one basic elementary structural constituent is sufficient, we need only to find it and explain its essence. As connections are also structural constituents, they represent just what we are searching for. Connection is something that connects two aspects of reality, it means, it connects “something (one side)” to the “other (other side)” and at the same time, it is created of that both sides. In dialectical logic they are named opposites and their mutual relation - the unity of opposites.

Schematically it looks like:



Even if we start our consideration at the highest level of abstraction we can see that something exists. But this something is nothing without its relation to the other. “Something” cannot relate to itself (self-relation, self-reflection) without its relation to the “other”, otherwise it is nothing. The other (-) represents the limit of something (+), through which it determines itself as a difference. “Something” and its “other side” are not two independent entities but only two sides (opposites) of the same “one”. It is irrelevant what side is “something” or “other” as both they relate to each other in order to relate to themselves. The whole “one” is a self-relation (self-reflection) only because it is a mutual relation of its two opposite sides. Any of these two opposites reflects itself into itself through its other side as through its own limit (mirror). “Something” and “other” create a mutual positive and negative relationship, which cannot be static, but only dynamic in the sense that “something” repels from itself its “other” side by repulsion (negation), but at the same time holds and attracts it to itself by attraction (negation of negation). Repulsion and attraction are two opposite forces through which both opposite sides of the same “one” are in a mutual dynamic relation manifesting by motion – vibration, oscillation. Motion is energy as a result of mutual attraction and repulsion of opposites. Thus we have a clear definition of energy as a measure of mutual attraction and repulsion of opposites. This dynamic bipolar relation (+/-) represents the elementary structural constituent of which the whole reality (Universe) is made. We can name it an elementary quantum dipole or elementary quantum connection. Known particles as well as space including vacuum are made of these quantum dipoles. The Universe is physical - spatial and material (energetic). Matter is spatial and space is material. The unity of the Universe means that all its aspects are made of the same constituents – quantum connections (dipoles). Elementary quantum dipole (connections) is an elementary quantum of space thereby the volume of space is given by the number of elementary quantum connections.

The whole reality is spatial and represents a network of elementary quantum connections where every something (+) is connected to all others (-) and reciprocally, which results naturally from dialectic relations “whole-part” and “one-many” as will be shown later.



There is no space and no energy outside quantum connections (dipoles) as only they create the whole reality. Quantum connections are not placed in space, but create it.

Contemporary theories separate matter from space, supposing space to be only an empty or unstructured surrounding in which material objects (entities) move. Space and time in Einstein's relativity theories is a pure mathematical "space-time" continuum. Before, space was as an empty continuum in which all material bodies moved. In Einstein's special relativity it was replaced by empty unstructured four-dimensional space-time continuum which was curved in general relativity thanks to presence of matter and energy.

But this mathematical idealisation says nothing about the real quantum essence of space and time. Einstein's space-time is not structured and quantized. It is a pure mathematical continuum. As Einstein's theories have no idea about internal structuration and quantization of physical reality (space and time), they cannot lead to the true knowledge. It is very strange and absurd that theorists having not found how space and time are quantized try to unite Einstein's local theories with quantum non-local theory. It is like trying to put together water and fire. One excludes the other. As a result string theories become the greatest accumulator of illogical nonsenses ever.

Space is a basic attribute of every physical entity with its quantitative measure – volume. There are no entities without spatial volume. Point-like particles or one-dimensional strings are nonsenses inappropriate at the quantum level even as mathematical idealisations, because they deform the reality fatally. Space is not only a basic feature of everything, but at the same time it separates things from each other in the sense that it connects them together. Things can be mutually separated only if they are mutually interconnected. The internal structure of any thing is made of the same basic constituents as are connections through which things are interconnected. All things and their mutual connections are made of the same constituents – elementary quantum connections (dipoles). They are elementary quanta of space.

The Standard Model presents huge number of different point-like particles (fermions and bosons) placed in the vacuum, which essence is unknown. How are point-like particles connected to the vacuum? Vacuum is a mystery that can be arbitrarily used to solve all miracles of the Standard Model. For example, it gives enormous energy for very massive virtual gauge bosons in order to mediate a weak interaction in electroweak theory. All these virtual mysteries are undetectable and hidden under the Plank scale. If we do not know the essence of the vacuum we can use it as a magic wand to solve all our theoretical problems. We will show later that the vacuum is made of long and weak quantum connections comparing to the short and strong connections of which particles are made. So the vacuum cannot be a source of enormous energy needed for nonsensical electroweak theory. In cosmological theories space is only a surrounding where bodies move, while in particle physics it is a fluctuating vacuum with undetectable virtual fluctuations.

As elementary quantum dipoles (connections) represent elementary quanta of space of which every object is made and through which it is connected to the whole reality, it is impossible for any object to become a singularity like a black hole. Black holes represent nonsense which, in order to exist, must destroy the whole internal structure of previous star and change it into pure

singularity without any internal structure, but with infinite density. Black hole dreamers do not see the force that can stop the gravitational collapse as they do not know elementary constituents of which every object is made. As every elementary structural constituent represents an elementary quantum of space, its space cannot be destroyed. Analysing the dialectical relations “continuity-discontinuity and locality-non-locality” we will show that elementary quanta of space act not only non-locally but also push locally each other by their spaces.

The stronger they are pressed together by gravity the bigger are their mutual repulsive pressures that stop gravitational collapse so that the Schwarzschild radius cannot be attained [4]. Black holes are mysterious not only from the viewpoint of space, but also time which, hidden under the Schwarzschild sphere, represents an imaginary mathematical value (square root of a negative number) having no real sense. The real physical meaning of time is to be a measure for speeds of processes or motions measured through given standard cyclical processes like Earth rotation or atomic oscillations. At the Schwarzschild sphere time must stop, it means all processes must stop and freeze.

Can black hole theorists explain the physical meaning of imaginary time in relation to physical processes or motions? Of course they cannot, so they say it is a mystery that we must accept as it follows from their mathematical models where imaginary time flows perpendicularly to our ordinary time. Thus, time in their models is not a real physical phenomenon but only pure mathematical coordinate. Neither space nor time has real physical meaning, both they are only mathematical symbols.

The question is - does the elementary motion exist as universal measure of all processes? We will show later that the whole Universe transits from its one quantum state to the following by elementary quantum jumps which define cosmic time for the whole Universe as a basic measure to which all local physical processes can be related.

Photon as Elementary Quantum of Existence

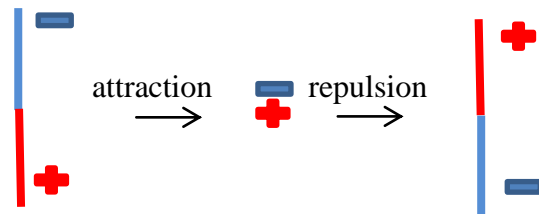
It is very strange that even a photon as an elementary quantum of light represents a mystery known as “wave-particle” dualism. Photon is a particle as well as a wave. How is it possible? What is the solution? Photon as an elementary quantum of free energy is a direct to the essence of whole reality. All we know that the motion of a classical harmonic spring oscillator creates a sinusoidal wave as a result of two forces with opposite orientation - attraction and repulsion. Sinusoidal wave is thus a consequence of both forces acting through harmonic oscillator. Photon creates sinusoidal wave during its flight. It means it must be a quantum oscillator which oscillations result from internal bipolarity of two opposite forces – attraction and repulsion.

Photon is a quintessence of dialectical bipolar nature of reality.

The greatest mistake of theoretical physics is the idea that elementary particles must be point-like entities without any internal structure and with zero volume. Even a photon as the simplest particle cannot be a point-like entity without internal structure. The photon is a simple quantum dipole consisting of two opposites (opposite poles) and consequently a holder of elementary

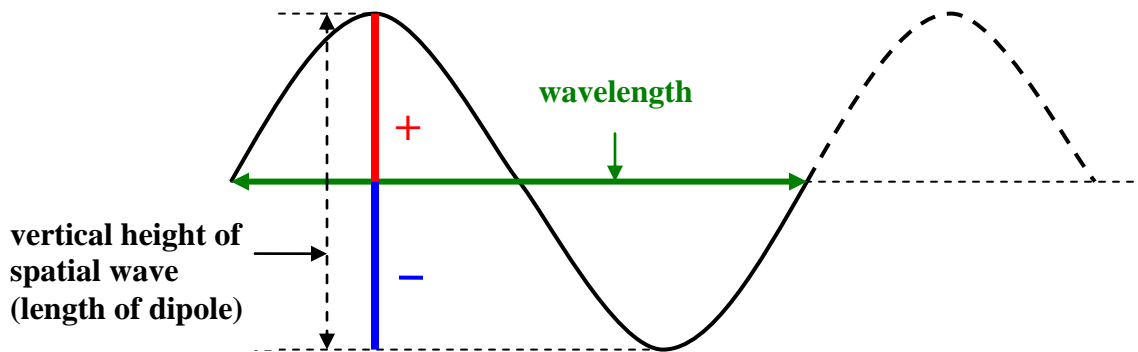
quantum of space and energy. It is an elementary particle which, thanks to attraction and repulsion of its opposites, oscillates creating perpetually the sinusoidal wave during its flight which is manifested outside as an electromagnetic wave in relation to a measuring apparatus.

Photon γ (+/-) as elementary oscillating quantum dipole is the simplest particle:



Photon as a quantum of radiation (light) is a free elementary quantum dipole +/- which, thanks to mutual attraction and repulsions of its opposite poles, performs a permanent oscillation (vibration, pulsation) manifesting outwards as an electromagnetic wave during a flight. This fact is a consistent and factual explanation of the “wave-particle” duality of the light as only a bipolar dynamic unity of opposites can result in oscillation (motion, energy) of a photon.

Photon = Free Oscillating Quantum Dipole (+/-)



The photon is an elementary quantum oscillator. If we express its oscillation as rotation, its length is given by a diameter of rotating quantum dipole. Rotation projected to the perpendicular plane looks like oscillation. It is irrelevant if talking about rotation or oscillation (pulsation, vibration), as these motions are manifested outwards in the same way. Photon is an elementary quantum of energy. The essence of energy is also unknown for contemporary physics. Energy of a photon as a measure of its motion (frequency of vibrations) can only result from mutual attraction and repulsion of its opposites.

Planck’s equation $e_i = h\nu_i$

shows that energy of a photon is given by the speed of its vibrations (frequency). It is hardly believable that the essence of photon’s vibrations has not been detected until now. It is due to inappropriate idealisation of elementary particle as a point-like entity with its mysterious “particle-wave” dualism resulting in impenetrable and undetectable virtual realities.

Photon performs two types of motion: horizontal and vertical. Horizontal motion represents its flight as a consequence of its dragging by cosmic expansion. Vertical motion is manifested by its oscillation (rotation) thanks to mutual attraction and repulsion of its opposite poles. Photon does not move “in” a free space-like vacuum, but thanks to its external quantum connections, it moves “towards” all other parts of the Universe. Simplicity of a photon allows its perfect oscillation (vibration) in a plane of its flight. As it is the simplest free quantum, it cannot resist its dragging by an expanding Universe, so it has no rest mass and its speed expresses the speed of cosmic expansion. Such is the nature of the speed of light as one of the basic physical constants unknown until now [7].

Photon’s oscillations can be presented as rotations of a quantum dipole with a circumferential velocity \mathbf{v} :

$$\mathbf{v} = 2\pi r_i / T_{ot} = \pi d_i v_i$$

T_{ot} – time of one rotation of a quantum dipole,
 v_i - $1/T_{ot}$ – frequency of quantum dipole oscillation,
 r_i - radius of dipole (half of its length),
 d_i - length of dipole.

$$e_i d_i = h\nu/\pi$$

Later we will show from the viewpoint of dialectical logic that the value $e_i d_i$ is the same (constant) for every quantum dipole (connection) and represents the basic cosmic law from which other very important laws follow, e.g. Newton’s and Coulomb’s laws. It means the shorter the quantum dipole, the higher its energy. The longer it is, the lower its energy. Energy of very long quantum dipoles, connecting celestial bodies mutually and creating the cosmic vacuum, is very small, but their quantity is enormous. The vacuum is a holder of energy of quantum connections (dipoles) connecting physical objects mutually.

Photon represents an elementary quantum dipole. As everything is made of elementary quantum dipoles (connections), we can say that everything is made of light (energy), which can exist in a form of free flying photons, or be bound in a form of basic particles (protons and electrons) as well as the vacuum.

The knowledge of the essence of Light is the way to understanding the essence of existence.

Jesus Christ as the Son of God declares: “*I am the Light of the world*” (John 8:12)

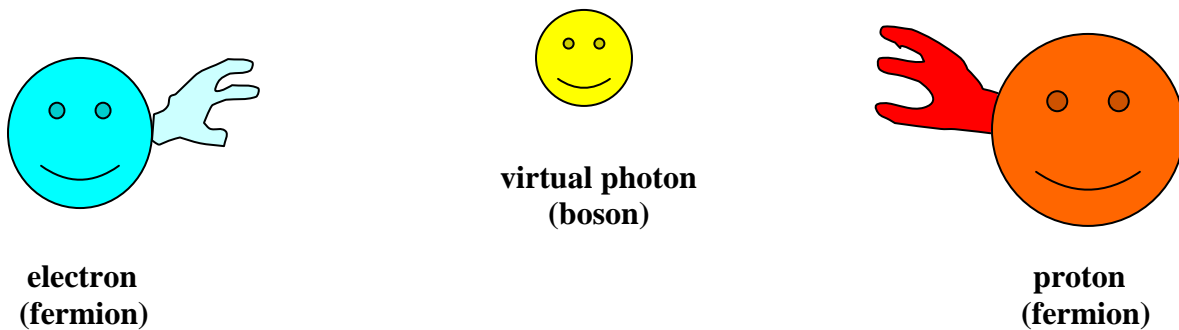
John evangelist defines the essence of Jesus Christ by the words:

“The true light that gives light to everyone was coming into the world. He was in the world, and though the world was made through him, the world did not recognize him. He came to that which was his own, but his own did not receive him. Yet to all who did receive him, to those who believed in his name, he gave the right to become children of God”

Christ is the Light (energy) which the world (Universe) is made of. Everything is made of elementary quanta of energy – Light (photons = quantum dipoles).

Dialectical Relations “Whole-Part, Continuity-Discreteness”

Contemporary physics divides the whole reality into its parts mechanically unknowing how these separated parts are interconnected mutually after their separation. Mechanical separation of parts from the whole means the destruction of their mutual relations, so that these parts can come to mutual interactions only through local touch contacts. Localism dominates in contemporary theoretical physics, where mutual interactions between “point-like” particles are declared to be a result of mutual exchange of virtual point-like bosons moving with a limited speed of light. It is very strange that such a naïve mechanical interpretation of interactions between particles was incorporated into the Standard Model although non-locality results directly from quantum mechanics. This naïve understanding follows from Feynman’s interpretational failure in his QED (quantum electrodynamics), where electromagnetic interaction is interpreted mistakenly as an exchange of virtual photons between charged particles by a limited speed of light as shown:



Electron and proton exchange a virtual photon creating their mutual electromagnetic interaction. This naïve interpretation of electromagnetic interaction meets the following serious problems:

- How do the electron and proton know where is their corresponding partner in order to exchange a virtual photon if there is no direct mutual relation between them? How does the moving virtual photon know where is the target fermion in order to mediate the interaction if it does not carry any information about it? Do virtual photons only fly freely between electrons and protons in empty space, accidentally collide with them and cause an electromagnetic interaction? But if particles are point-like, how can they hit each other in a huge free space? How does the virtual photon know what type of interaction to mediate – attraction or repulsion?

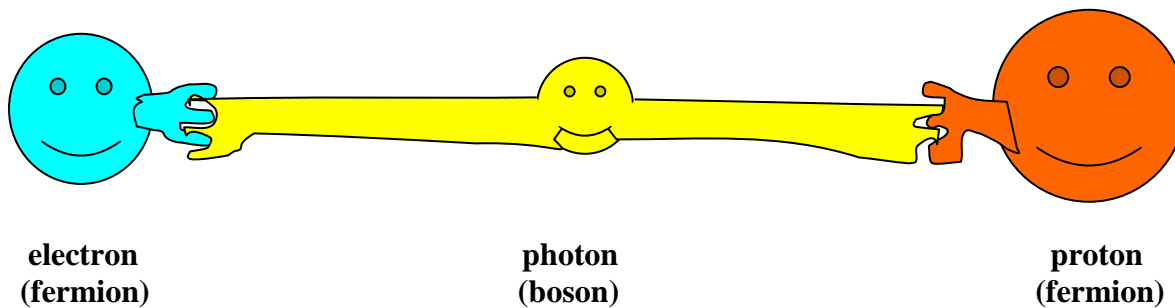
Virtual photon can fulfil its mission only if:

- it is aware of destination and motion of target particle, it means, it must contain the future destination address and be capable to distinguish between target and non-target particles,

or

- charged particles sense each other directly before exchanging virtual photons.

This simple logical analysis leads to the only correct conclusion that the virtual photon is a direct non-local connection between charged particles:



In above interpretation the photon represents a direct connection (relation) between the electron and proton. It is not a virtual photon as an object of mutual exchange between particles, but a real quantum connection (+/-) whose structure is the same as the structure of a free photon.

Einstein's dogma of local action does not allow virtual photon to know where charged particles (electrons, protons) are, but nevertheless, virtual point-like photons come to and go from a concrete point (electron, proton) in order to transfer an electromagnetic interactions to all other electrons and protons in the near and distant surroundings - even in the whole Universe.

Despite experimental evidence of non-locality theorists have a problem to accept it. As electrostatic force is a long distance one, every charged particle has to exchange virtual photons with an enormous number of protons and electrons in the Universe. It is remarkable that this absurd picture is accepted instead of much more logical picture of direct non-local connections (relations) between charged particles. It is because of Einstein's refusal of non-local actions. Non-locality as an instantaneous communication between distant particles is a fundamental consequence of quantum physics known as entanglement or EPR non-locality. If theoretical physics was not blocked by erroneous dogmas, it could detect that the vacuum is not empty space between point-like particles, but made of non-local connections between them. All particles and interactions are space-creating and space-carrying quantum connections.

Feynman represented virtual photons as only mathematical propagators of electromagnetic interaction. As he wanted QED to be relativistic, he preferred virtual photons moving with a limited speed instead of instantaneous connections. Electromagnetic force in QED is a consequence of mathematical existence of virtual photons. Such an approach was also transferred to other field theories like:

- quantum theory of electroweak interaction as an attempt to unify electromagnetic and weak interactions,

- quantum theory of strong interactions – quantum chromodynamics QCD,
- quantum theory of gravity as an attempt to quantize a gravitational field.

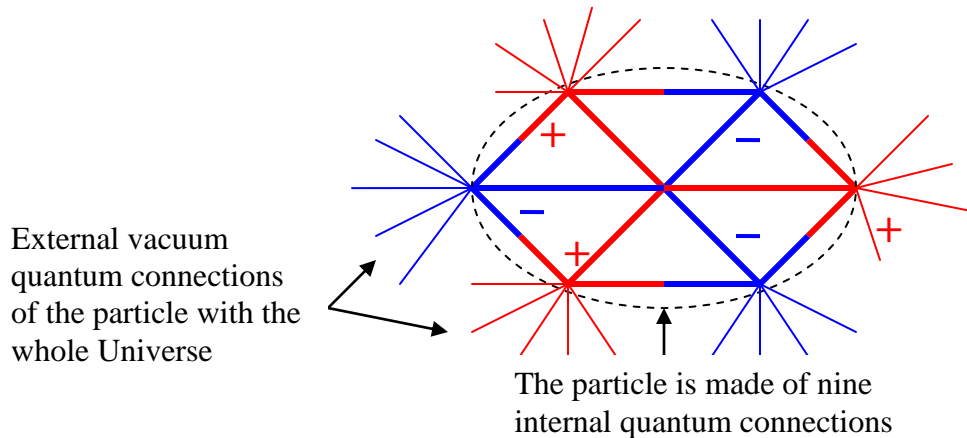
In these theories, the virtual particles – bosons are carriers of force fields. But in reality there are no virtual bosons as mediators of interactions, even they are undetectable. Except of a photon all other bosons as real point-like particles (gluons, inter-medial bosons Z^0 a W^\pm , Higgs boson, gravitons) cannot be detected directly. We will show later the meaning of their indirect detection by analysis of real structure and interactions of known particles.

At the basic quantum level the relation between the whole (Universe) and its parts can be only dialectical, not mechanical. If some part is separated from the whole, it is separated from all parts of the whole in the sense that this part remains connected to the whole, it means to all rest parts of the whole. As connections are also parts of the whole so all parts must be networks of connections. This is possible only if elementary parts are elementary quantum connections of opposites (quantum dipoles (+/-)). The quantum dipole (+/-) so represents the elementary structural unit of the Universe (space, matter, energy, information, consciousness). Every "+" pole is connected to all "-" poles of the Universe and reciprocally. Everything is connected to everything. Every separated part is connected to all other parts of the Universe.

The principle of universal connection of everything to everything creates the general Unity of the physical Universe. This Unity Principle is a basic principle for the whole Universe following from its dialectics. It discloses the exact mechanism of spatial structuration and quantization and explains how the dialectical relation "continuity - discreteness" looks like.

Space can be continuous and discrete (quantized) at the same time only if its elementary quanta are elementary quantum connections (+/-). In that case elementary quanta of energy are localised in elementary quantum dipoles and can be numbered (structuration, quantization), but at the same time they represent elementary quantum connections (+/-) connecting everything to everything, where every (+) is connected to all (-) and reciprocally. So the answer to the question whether the reality is continuous or discrete is very simple – it is continuous and discrete at the same time. Space consisting of elementary quantum connections is structured and quantized creating the dynamic network of elementary quantum connections in which all its energy is located. There is no space outside elementary quantum connections as just they create it.

Look at the scheme of a particle compound of three '+' and three '-' poles with nine internal connections (quantum dipoles) and indication of external connections:



Any particle or physical object is defined by quantum dipoles creating its internal structure as well as external quantum dipoles connecting the particle (object) to the whole Universe. Some quantum physicists say that it looks like the elementary particle reaches the whole Universe. They are really right, only they cannot say the reason - why?

External quantum connections of any object create its vacuum through which the object is connected (entangled) to all other objects of the Universe. Every object (including our Earth) drags its own vacuum during its motion. We distinguish the vacuum in atoms, molecules and interstellar spaces. External vacuum quantum connections are much longer than inner connections in objects. It depends on the point of view which of them are external and which are internal. In an atom, internal quantum dipoles create particles (proton, neutron and electron) and their mutual quantum connections create the atomic vacuum. In a molecule, internal quantum dipoles create atoms and mutual quantum connections between atoms create the molecule vacuum. Long quantum dipoles connecting celestial bodies create the cosmic vacuum. A considerable part of cosmic energy is concentrated in these vacuum connections (cosmic vacuum). It is the so-called “dark matter”. The vacuum as well as any other form of matter consists of the same quantum dipoles, only their lengths define whether they are constituents of material objects (particles, atoms, molecules, celestial bodies) or the vacuum.

Particles and physical objects do not move “in” a free space-like vacuum, but thanks to their external direct connections, they move “towards” all other parts of the Universe. We do not need any background to allow particles to move. All particles and interactions, as well as the vacuum are created of elementary bipolar quantum connections. As everything is connected to everything else, so every part moves towards all others thanks to their mutual connections. The vacuum consists of elementary quantum connections between particles and physical objects. All interpretational problems of quantum physics follow from its attempt to describe the motions of point-like elementary particles “in” space represented by a coordinate system.

Nothing exists in space as everything creates space! Nothing moves in space as every part moves towards all others thanks to their mutual quantum connections!

Your distance to some object is given by the length of elementary quantum dipoles connecting your body to this object. These quantum dipoles create the vacuum as a mutual connection between material bodies. You do not move in space, you move only in relation to all other parts of the Universe thanks to your direct connections to them. You are connected to the whole

Universe at the elementary quantum level. There is nothing inaccessible as everything is connected to you. Objects are separated through space only because they are interconnected mutually through their vacuum non-local quantum connections (+/-) creating space.

Particle is not a point-like entity and cannot move in free space represented by a mathematical coordinate system. Every elementary particle carries a certain quantum of space and moves only in relation to all other parts of the Universe. Any particle can be studied only in its relation to other objects, but not to a coordinate system. Heisenberg's uncertainty principle is a consequence of incorrect question - how to define a position of moving particle in space represented by a coordinate system. Actually, elementary particles consist of elementary quantum dipoles as holders and carriers of elementary quanta of space, whose energies are inversely proportional to their lengths. They do not move in space but in relation to all other elementary quantum dipoles thanks to their mutual quantum connections.

There is no uncertainty regarding elementary particles, as they have the exact internal structure, motional state and relations to all other entities of the universe at every moment. Heisenberg's uncertainty principle results from inability of physicists to ask Nature correctly, how it works. Nevertheless, this principle has very important consequences showing that reality is non-mechanical and non-local. The EPR paradox as well as quantum entanglement shows that two particles creating one quantum system are mutually interconnected and act instantaneously to each other at a distance. This "spooky" action at a distance indicates that except of local there are also non-local interactions that contradict with Einstein's locality principle.

But, because of Einstein, physicists are afraid of non-locality, so they prefer to accept undetectable virtual bosons to carry the basic physical interactions by a limited speed of light instead of acceptance of non-local quantum connections. It is very strange schizophrenia following from attempts to put together two principally incompatible theories. We need no virtual undetectable realities, but real non-local interactions. It is impossible to include non-localities into Einstein's theories.

According to particle physics there are two types of elementary point-like particles:

- fermions as basic constituents of matter
- bosons as mediators of force interactions between fermions

According to the Standard model elementary particles are dimensionless point-like entities without any internal structure. Such an understanding is very naive. Fermions dispose of many properties (charge, mass, spin, ability to interact with other particles, different energies). Thanks to them they differ from one another and possess various qualities manifested outwards. The reason for this miscellaneous qualitative manifestation of these quasi-elementary particles is hidden in their different internal structure that cannot be detected by contemporary particle accelerators and colliders, but only by a deep logical insight. The essence of the vacuum is also unknown. Force fields are supposed to be continuous but on the other hand they are transmitted by point-like particles – virtual bosons. For example, electromagnetic field is transmitted by virtual photons. Real photons mediate neither electrostatic nor magnetic interactions, so mysterious and undetectable virtual photons are supposed to do it.

Fields in contemporary theories indicates something monotonous, unlimited and continuous, surrounding all bodies. The question is: do point-like particles-bosons create fields or do fields create particles? What is the mechanism through which a point-like boson is detached from a field? Theorists say that every boson is associated with its force field, but they cannot explain how. How are force fields related to physical space? Do these fields create space or are they only placed in space? Is space (vacuum) made of their different fields like electromagnetic, weak, strong, Higgs and gravitational? How are they interconnected mutually? According to theorists different fields arise as a consequence of spontaneous break of symmetry, but this explanation is very vague and unclear. A statement that a point-like boson is associated with its field says nothing neither about the essence of boson nor the field. If force fields are quantized in such a way that bosons represent quanta of these fields, it means these fields must be made of point-like bosons. But how point-like entities can create a field? Is this field only a set of points? How are they interconnected mutually in order to create a field? “Field-particle” or “wave-particle” complementary dualism is nothing more than sweeping the problem under the rug. The relation between continuity and discontinuity is unknown. Everything is mystical and hidden in a jungle of complicated mathematics.

The contradiction of particle physics is the declaration that although bosons (W^\pm , Z, Higgs) are point-like particles without any internal structure and zero volume, they decay in other particles. In reality, if particles decay into some components, it only means that they must be composed of them as well as of their mutual quantum connections. There are no elementary particles without internal structure and with zero volume. All they are made of elementary quantum dipoles (+/-) being carriers of elementary quanta of space.

The quark model, in which a principal impossibility to detect quarks and gluons is explained by their so-called mysterious “asymptotic freedom”, is an example of absurdity, where one nonsense produces another. It is hard to believe that such a hideous model is accepted in order to explain the structure of some particles like proton, neutron and mesons, although it is well known that particles colliding with their antiparticles can annihilate into pure photons. It means they are made of photons and their mutual quantum connections. If physicists have disclosed the essence of a photon as an elementary structural unit (quantum dipole), they could see the structure of all particles as made of elementary quantum dipoles (photons).

Dialectics of “One-Many”: Cosmic Expansion

“One” is nothing without the other. “One” as a whole can create its relation to itself only if it divides itself into many ones. “One” creates its relation to itself through its relations to others. Through them it reflects itself into itself (self-reflection). “One” as a whole divides itself into many ones in such a way that they create the unity of the “One” in the sense that every “one” is connected to all other “ones”. Through many ones the whole

One is structured and quantized. Internal structuration means that the “One” repels from itself many ones by repulsion and, at the same time, holds them in a unity thanks to attraction. As the

whole “One” represents a bipolar relation “something (+) – other (-)”, its internal differentiation means that it gradually repeals from itself both opposites, one after the other.

One as a whole comes from its unity to its diversity by internal structuration and at the same time it again and again reflects itself into its unity and so performs its self-reflection. “Many” as negation of “One” is overcome by its return to its unity – negation of negation. Negation of negation is a self-reflection, meaning the One represents always the Unity which can exist only in its internal structuration, where everything is reflected in everything else, everything is connected to everything else and everything communicates with everything.

“One-Whole” represents the self-creating and self-reflecting Unity of the highest complexity where everything is reflected in everything else. Self-reflection of self-closed system of high complexity means the Life and Consciousness, therefore the Universe as a whole is a self-closed, self-creating and self-reflecting system of the highest complexity and so represents Consciousness of personal God. The essence of personal GOD as well as human soul is explained in more detail by analysis of dialectical relation “subject-object”.

Looking at the Universe from its external objective side we do not see its internal subjective united side, so we deny the existence of personal God. Not only the whole reality is “subject-object” relation, but all we represent “subject-object” dialectics. We cannot search for the truth limiting our attention to only one side of reality and neglecting the other one, as the external objective side of the whole reality cannot exist without its internal subjective one.

Positivist scientific paradigm is limited and accepts only a certain part of objective reality mediated by local mechanical interactions, so it cannot lead to the true knowledge. It is high time to leave this wrong paradigm and open the door to new one that, except of external objective mechanical side of reality, takes into consideration also non-locality as well as its internal subjective side. A new scientific paradigm must be based on dialectical logic of rational thinking as well as deep spiritual insight into the unity (subjectivity) of existence. Of course, we can study only a physical objective side at its various levels of hierarchy and limit our attention to only separated aspects of reality. Even the Universe as a whole can be studied in cosmology as a physical system per se, but in that case we must be aware that except of its external objective side it possesses also its internal subjective one.

Consciousness of personal God represents the whole reality where the physical Universe is His external objective face.

The physical Universe as a whole divides and differentiates itself in such a way that every new positive pole “+” is expelled from all existing negative poles “-“ and every new “-“ from all existing “+“. It means that every positive pole “+” is connected to all negative ones “-“, and reciprocally, every “-“ is connected to all “+” of the Universe, so that everything is connected to everything else, creating the Unity Principle of existence. Internal differentiation of the Universe, its plurality generation and structuration, means its cosmic expansion. The Universe is an expanding network of quantum dipoles (connections).

i=1

The value $e_i d_i$ represents the **universal law** which gives the energetic and length (geometric) characteristics of the Universe into the mutual relation. The whole energy E of the Universe is given by the sum of energies of its elementary quantum dipoles (+/-). The dialectical relation between energy and length of quantum dipoles allows their quantitative and qualitative differentiation as well as demonstration of their unity. On the contrary, the spatial volume of elementary quantum dipole has no counterbalance in other characteristic. So all quantum dipoles are indistinguishable in this quantitative characteristic and carry the same spatial volume, so that the volume of space is given by the number of elementary quantum dipoles.

The dynamic network of quantum connections (dipoles) represents the unitary field that Einstein was finding unsuccessfully in his theory of unified field. This network can be easily imaged by the matrix in which lines represent positive poles, and columns – negative ones. Points of intersections represent elementary quantum dipoles as connections of opposite poles. Cosmic quantum transition (jump) from one symmetric quantum state to the next during a cosmic expansion can be described by addition of a new line and column (k+1). New points of intersections represent new quantum dipoles created during an elementary quantum cosmic transition (jump):

The table of increasing cosmic network of quantum dipoles during cosmic expansion

| Quantum state | | 1 | 2 | | k-1 | k | k+1 | | n |
|---------------|--------------|-----|-----|-------|-----|-----|-----|-------|---|
| | Poles | - | - | | - | - | - | | - |
| 1 | + | | | | | | +/- | | |
| 2 | + | | | | | | +/- | | |
| | | | | | | | +/- | | |
| k-1 | + | | | | | | +/- | | |
| k | + | | | | | | +/- | | |
| k+1 | + | +/- | +/- | +/- | +/- | +/- | +/- | | |
| | | | | | | | | | |
| n | + | | | | | | | | |

All newly created quantum dipoles (+/-) are weaker and longer than existing ones. They are under the direct control of divine creative activity. The internal structuration of the Universe resulting in its cosmic expansion can be easily described by the following basic quantum equation:

$$V_k = k^2 \quad \text{where:}$$

- V_k - volume of cosmic space given by the number of quantum dipoles,
- k – number of positive (or negative) poles as well as the number of elementary quantum jumps of the Universe from the beginning of its expansion and representing the cosmic time

This basic quantum equation reflects the internal division and structuration of the Universe creating thus its own expanding space and flowing time. The Universe is quantized as its energy and space are localised in its elementary quantum connections and its time is given by its elementary quantum jumps from one quantum state to the following. Elementary quantum jump represents the elementary change of the Universe, its elementary quantum of motion (time) to which all other changes (motions, times) can be related. These elementary quantum jumps define the universal cosmic time. Time is not a mystery, but manifestation of motion of the Universe as a whole as well as motion of its parts. Time is a measure of motion, it is nothing without motion. Imaginary time in black hole theories has no real physical meaning, so it is pure nonsense as well as black holes.

Every local motion can be compared to the universal cosmic motion. As shown in my paper [8], contemporary one second corresponds to $(3/4)/(\pi c^5/2kh\alpha)^{1/2} = 8,144.10^{43}$ elementary quantum jumps of the Universe between two symmetrical quantum states, so we can allocate the time $\Delta t = (4/3)(2kh\alpha / \pi c^5)^{1/2} = 1,128.10^{-44}$ s to one quantum jump. But it does not mean that the quantum jump has its duration. Time does not define the duration of elementary quantum jump, but just contrariwise, time is defined by the number of elementary quantum cosmic jumps. Every process (motion) and its duration can be compared to and expressed by universal time. If some process takes one second, it means that it corresponds to $8,144.10^{43}$ elementary quantum jumps of the Universe. If the same process is dilated to two seconds (time dilation) because of high speed of object towards the vacuum or strong gravity (big gravitational potential), it corresponds to $2 \times 8,144.10^{43}$ elementary quantum jumps of the Universe. This cosmic time so represents a universal base through which all processes (motions, times) can be expressed.

Time is quantized and can be numbered and expressed by integers. It is nonsense to say that something can be hidden under the Planck time. Nothing can be hidden under the Plank scale neither in the sense of time, nor volume, because the Universe is quantized in both its characteristics – space and time. Both they have clear physical meaning. The question, what had happened from the moment of the Big Bang until Planck's time, has no sense. There is no mystery as the Universe did not start its expansion from its undifferentiated singularity but just from its initial state as a sole quantum dipole (+/-). The Universe has the source of its motion (energy) in mutual attraction and repulsion of its opposites. Contemporary cosmological theories do not see the dialectical essence of existence, so they cannot explain the origin of cosmic expansion – Big Bang, and the way out of singularity.

Singularity as undifferentiated totality is nothing. Anything cannot appear from nothing. Singularity does not have its own source for plurality generation. It is only “one” and nothing more. Quantum cosmological theories suggest the fluctuation of a previous vacuum as a source of cosmic expansion and mention some fluctuation of energy density. But the source of energy is unknown. The so-called false vacuum should contain a contradiction between the huge gravitational effect of its energy and repulsive effect of its pressure, but the intrinsic bipolarity as a reason is not detected. Neither the source of energy nor essence of cosmic expansion and gravity is explained. Therefore the reason for spontaneous super-symmetry breaking remains unknown. Such vague notions like accident, uncertainty, spontaneity and fluctuation cannot explanation the real source of cosmic expansion.

If we allocate Δt sec to one quantum jump, then the time of cosmic expansion is:

$$t = k \cdot \Delta t$$

and the basic space-time equation of the Universe where the volume V is expressed by m^3 , obtains the following form:

$$V = z \cdot t^2, \text{ where } z = (d^2V/dt^2)/2$$

This is the basic equation of spatial dynamics of the Universe, expressed in real dimensional units, in accordance with which the spatial volume of the Universe is directly proportional to the square of time of cosmic expansion.

In that form space and time are continuous values, but we must remember, they are quantized in reality and can be truly expressed only by integers. Thus, if we want to study space and time from the viewpoint of cosmology, we can use them as continuous values, but it is inappropriate at the quantum level. The detail analysis of the basic quantum equation with its interesting and important consequences for cosmology is made in my papers [7], [8] and partially in the Appendix of this paper.

Above equation shows only how three-dimensional space of the physical Universe is evolving in time, but says nothing about how a divine Idea (Mind) is implemented into the physical structure of the Universe. The newest quantum dipoles, being longest end weakest at the same time, represent the threads through which God manipulates, managing the evolution of expanding Universe. As this action is now, in contemporary phase of cosmic expansion, very gentle, it seems it does not exist. The evolving physical Universe is managed according to divine Idea (Word) and subsequently reflected in a divine Mind. At every consecutive cosmic quantum jump the divine Idea (intention) determines where, meaning to what distance from every existing quantum pole, a new opposite pole is to be expelled. The enormous number of possibilities for conscious decisions at every stage creates unbelievably reach field for a free will. Every conscious subject has a free will to decide what reality he will reflect and create in his imaginations and how he will interact with the world.

(Continued on Part II; List of References at end of Part II)