

## **The forces dark tunnel or light magic of Mach's Principle.**

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According to the Principle of Mach inert properties of the physical body are determined by all the physical bodies in the universe, which means that among all the bodies in the universe there is an instant and continuous exchange of information about their condition and body influence each other's instant action.

The complex objection about the impossibility of superluminal communication usually involves a number of concepts and case studies, namely, the phase velocity, the ray of sunlight, shadows, scissors, and a number of others.

But in all of these examples, the phase velocity is directed along the path of quant to quant formation of any angle with the wave vector.

In other words, the wave moves, the ends of the scissors away from each other, flashlight makes turns, but along, that is a carrier of information from one quant is trying all the time to catch up with the other quant with superluminal speed.

But what if you do not want to expand the ends of scissors, and you're ready to use the scissors with pre-expanded ends (wave front), and these scissors have been extended before to you took them in hand. And you use the spaced ends of the scissors for simultaneously pushing the two quanta.

The ends of the scissor (wave front moment) exerting pressure simultaneously in the transverse direction relative to the two quanta.

We then take into their own hands, some scissors with more spread apart the ends. Then the pressure is produced from the opposite side. Keep changing the scissors and act more spread apart with scissors, again and again, from different directions. Do not use extension of scissors and use the have previously expanded scissors. Every time a new front electromagnetic, has long guide rests against the quant, the actions of their associates.

Electromagnetic background of the universe, in particular, cosmic microwave background radiation, gives us that opportunity. We use the fronts, which have already reached the two quanta transversely, and not only those who are moving from partner to partner along.

Yet another objection against the possibility of transmission of information with superluminal velocity is that in contrast the orbital angular momentum that is generated by the particle motion in the space, spin, for example, an electron is not associated with the movement in space.

If we represent the electrons in the form of a ball and spin as the time associated with their rotation, the transverse velocity of the particle shell should be higher than the speed of light. To resolve this contradiction allows The Theorem Combing Hedgehog or The Hairy Ball Theorem.

Theorem on combing Hedgehog considers not rotation the shell, and allows you to use offset "all at once" for the field vectors that are tangent to the shell, and which form the electron or an equipotential surface. In accordance with the theorem of zeros sum of the tangent vector field must be equal to 2, so there must be at least one zero vector and will twist around this point in the continuity, because it cannot be directed into or from this point it (Fig. A).

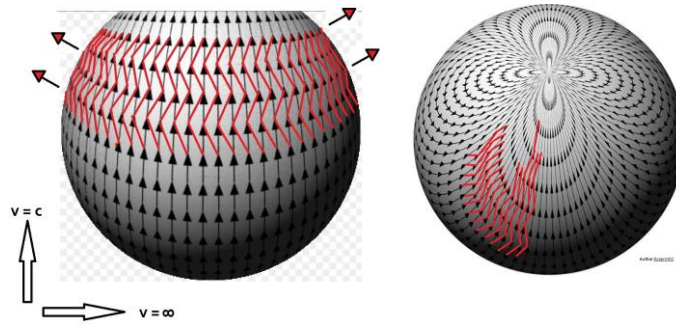


Fig. A. The instantaneous transmission of information between the surface points of the forming quantum leads to an self-measurement of the quant and provides its stable condition as a whole, in other words, there exists a continuous self-collapse of the quantum (\* Note: a) in a unique point.

The behavior of the tangent vectors to the surface of the sphere is not fundamentally different from the plane of the shear wave (Fig. B). The transverse motion of the photon, which as a result of the movement emerged dynamically mass, is realized in the form transverse oscillations of an ensemble of harmonic oscillators or in the transverse wave vector, and thus does not work relay mechanism and use the mechanism of "All At Once" (Fig. A).

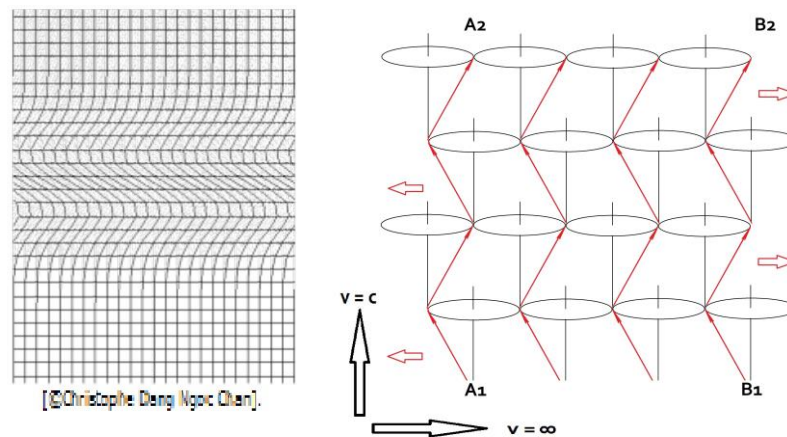


Fig. B. Time intervals between action "transverse" at points A and B,  $t_{A1B1}$  and  $t_{A2B2}$ , are equal to 0, and "along"  $t_{A1A2}$  and  $t_{B1B2}$  is 4. Speed "transverse"  $v = \infty$  and the speed "along"  $v = c$ .

Thus, on the surface there are two quantum information transfer rate between the points of the surface: the speed transverse  $v = \infty$ , and the speed along  $v = c$ .

We can say that surface of quantum is formed by ring tachyon that alternately changing its transverse direction of action, progressively moving along.

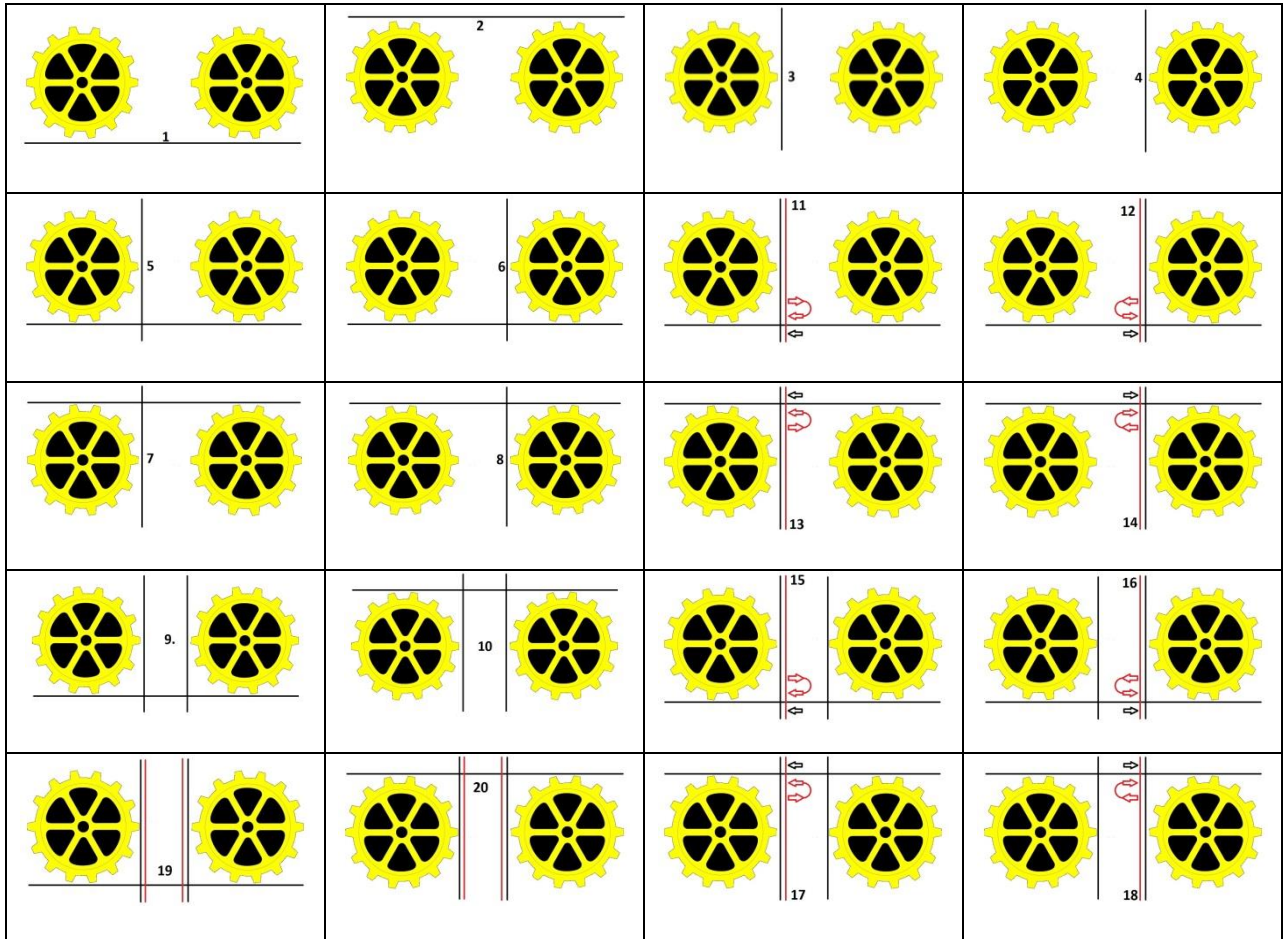
In this case, electromagnetic wave is transverse, and therefore does not describe an ideal spherically symmetric wave function and form at least one fixed point.

Based on these considerations, in [1-3] demonstrated the possibility of superluminal information exchange and the proposed use of the electromagnetic background of the universe, in particular, of the microwave background to the organization of instant communication in the Universe.

Using the logic of the model [1-3] to describe the possibility of transverse wave fronts as external to the quantum and its own wave front to provide instantaneous quantum gravity.

Fig. 1-4 are diagrams of the action on the two quanta of the two wave fronts moving in space, the first (Fig. 3, 4) - front moving from the quantum to the quantum of the speed of light and the second one (Fig. 1, 2) - front, the direction of which cross the line connecting quanta and which exerts its effect on both the quantum time. The asymmetry of the reception of the "upper" and "lower" transverse of fronts and organizes superluminal communication between the quanta [1-3].

Fig. 5-10 illustrate embodiments of the combined action of the two fronts, and Fig. 11-20 are added to the front (in red) emitted by one of the photons that have reached of the opposite and then were reflected from it, and again have returned to give off a their quantum.



Thus, two embodiment is gravity (fig. 1, 2) which moves the front transverse connecting lines quanta and applies to both the quantum time.

Additionally there are 16 options (Fig. 5 ... 20), wherein the front moving from the quantum to quantum to the speed of light exerts its action together with the momentary upper or lower transverse front.

Subject to the oncoming traffic of quanta when the displacement of each of the two quantum in the  $\Delta x$ , for each of the 16 variants to associate a whole set of cases Fig. 5-20, i.e.  $2 \times 16 \times 16 = 512$ .

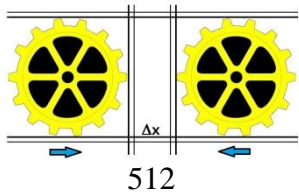


Fig. 21. Iterates through all variants of acts of gravity for each quantum pair.

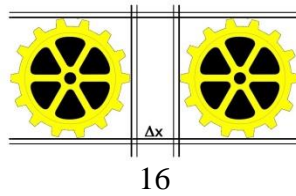


Fig. 22. For fixed quantum shift of Δ x is absent.

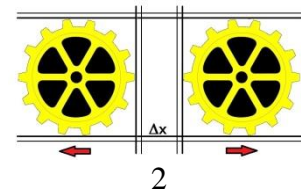
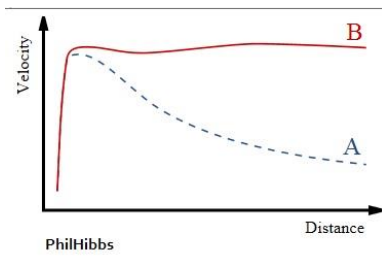


Fig. 23. For receding from one another quantum shift of in the Δ x can not participate in the interaction catch-up longitudinal fronts.

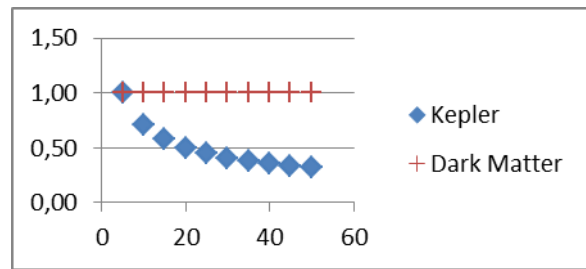
Described forms correspond to the classical gravitational attraction (Fig. 21); gravitation at a time when quanta are moving relative to each other but do not shift (Fig. 22), repulsion and flying quanta (Figure 23).

Variant Fig. 22 corresponds to a well-known observational results of registration rotation velocities of galaxies. The constancy of the observed rates of the source of the hypothesis of dark matter (Fig. 24). If present (Fig. 26), the distance between the quanta in the form  $r=N*\Delta x$  (equivalent rate of gravity «along»  $v=c$  and «across»  $v=N*c$ ), then (1) (Fig. 24) can be represented in the form (2) (Fig. 25), and  $v = (1/\sqrt{N})*\sqrt{M} = 1$ , which corresponds to the constancy of the observed rates.



$$v(r) = \sqrt{\frac{GM(r)}{r}} \quad (1)$$

Fig. 24. Description of the dependence of the velocity of rotation of galaxies on the distance from the center on the hypothesis of dark matter.



$$\frac{v * \sqrt{N}}{\sqrt{G} * \sqrt{M}} * \frac{1}{\sqrt{N}} = 1 \quad (2)$$

Fig. 25. The introduction of the transmission velocity of gravity "along»  $v = c$  and "across»  $v=N*c$  can describe the attraction of "dark matter."

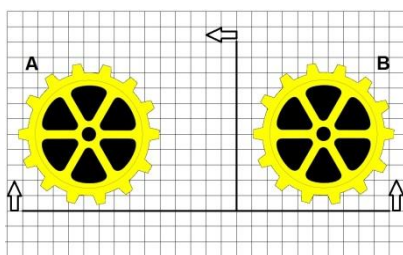
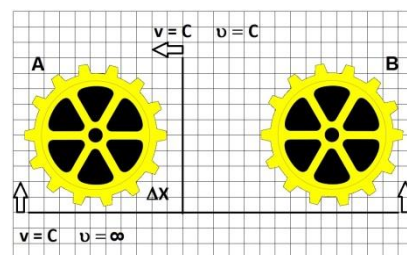


Fig. 26. The ratio of the speed of of fronts  $v = c$  and rate of gravity "along»  $v = c$  and "across»  $v = \infty$ .



We use the second factor of equation (2) to represent all the connectivity options (2, 16, 512 acts) in one single act of gravity in the form of equation (3) to get quite satisfactory

approximation to the observed relations for ordinary matter (M), dark matter (DM ) and dark energy (DE).

$$\frac{1}{\sqrt{512}} + \frac{1}{\sqrt{16}} + \frac{1}{\sqrt{2}} = 1,001 \quad (3)$$

$$0,044 + 0,250 + 0,707 = 1,001 \quad (4)$$

$$4,6 + 25,4 + 70,0 = 100 \quad (5)$$

$$M + DM + DE = 1 \quad (6)$$

Sum (5) and (6) correspond to the latest experimental results collaborations WMAP and Plank.

Let us consider the results in a more traditional presentation (Table 1) of the carriers and their interactions. For a photon orthogonal transformation can be represented as a member of the matrix  $\sin \alpha$ .

Table 1.

Group	Gauge field	Number of matrices	Mass		Quota	
U(1)	photon $\gamma$	1	$2 \cdot 2^{\sin(0)}$	2	$1/\sqrt{2}$	0,707
SU(2)	bosons $W_{\pm} Z$	3	$2 \cdot 2^3$	16	$1/\sqrt{16}$	0,250
SU(3)	gluons $g$	8	$2 \cdot 2^8$	512	$1/\sqrt{512}$	0,044
					Sum	1,001

The results presented in Table 1 allow us to conclude that the mass of a dynamic effect of the simultaneous action of a gauge field at  $v = c$ , and a speed  $v = \infty$ , and descriptions M, DM and DE not need additional elementary particle and the interaction carriers. This conclusion is supported by the complete absence of particles DM, has, at least at the level of our planetary system [4].

The question of the relationship between gravity and inertial masses becomes a question of the relation between the observed mass of dark matter and dark energy, and the question of the contribution to the gravitational pull of gravity propagates at the same time  $v = c$  and  $v = \infty$ .

Transmission speed of gravity "across"  $v = N \cdot c \rightarrow \infty$  leads to the conclusion that the graininess of space is not only below the Planck length  $l_p 10^{-35}$  meters or less  $l_{Laurent} 10^{-48}$  meters [5], and  $l \rightarrow 0$ , i.e. "transverse" graininess space (as well as quantum Fig. B) does not exist.

This result can be interpreted as the cause of the observed differences between the known theoretical and experimental values of the cosmological constant for more than 120 orders, as well as the existence of local and global gravitational constant [6]. Naturally, at the axis « $v \rightarrow \infty$ » can "emerge" massless particles  $m \rightarrow 0$ , which serve as carriers of the scalar field [7], generating dark energy [8], when mixed with the field of the Standard Model. While this principle of mixing allows to describe the emergence of dark matter is that it is not productive to separate the component from the standard scalar field. Fact all the same, for this hypothetical field to describe the mechanism of long-range non-local, and "seeing" that the field has any standard and the axis « $v = \infty$ », and the axis « $v = c$ », you can only use it to describe the appearance of all the components of the mass and remove the contradiction between the theoretical predictions and experimental observations.

Furthermore, since the state of all points on the ring tachyons varies synchronously and simultaneously, ie  $\Delta t = 0$  on the axis « $v = \infty$ » disappears temporal dimension. While measuring cycles is stored only on the axis « $v = c$ » and  $\Delta t \neq 0 = t_p$ . The number of dimensions is reduced, it remains one of the spatial and one time dimension, the dimension of the space is equal to 2.

Excess masses arising dynamically 1.001 compared to formal numerology 1 may be considered equal to 0.001 as the source of all the elementary mass particles. In this hierarchy of

basic masses 2, 16 and 512 is the hierarchy of the masses of elementary particles and the result can apply for an analytical derivation of the mass spectrum from first principles, when seed weight are the primary constants of physical theories.

Let us consider the example of the phenomenon of leptons and quarks, using the formula (7) in [9] developed the theory of the field [10]. It is not difficult to see that these views can be described as the language of the string models [11], as the action on the two-dimensional boundary of 3-dimensional space.

$$m_e + m_\mu + m_\tau = \frac{2}{3}(\sqrt{m_e} + \sqrt{m_\mu} + \sqrt{m_\tau})^2 \quad (7)$$

Equation (7) is valid for leptons e,  $\mu$ ,  $\tau$ :  $2/3 = 0,666658 \pm 0,000009$ ; heavy quarks, b, t:  $2/3 = 0.6647 \dots 0.6730$ , but does not hold for the light quarks u, d, s:  $2/3 = 0.5696 \dots 0.5740$ , (Equation (7) is valid for mass amounts of combinations of quarks cd, bu, ts:  $2/3 = 0.648 \dots 0.669$ , although whether this is next mesons D, B, T?); and that is important for our analysis is valid for DE, DM, M (8).

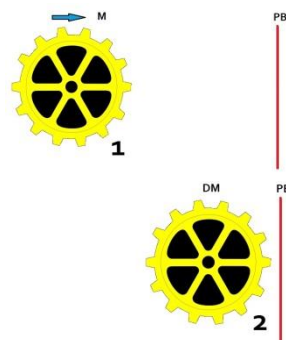
$$\frac{2 + 16 + 512}{(\sqrt{2} + \sqrt{16} + \sqrt{512})^2} = 0,66913 \quad (8)$$

From these relations should be an unexpected conclusion, but the analogy is not evidence, that an electron in range of leptons acts as dark energy; muon - dark matter; taon - mass.

Electron corresponds to the mass of the resulting instant action, and the muon and taon appear under the action of propagating with the speed of light. Observed in normal particle electron and its mass are the result of the dynamic superposition, including latent in the physical vacuum, the muon and taon to instantly communicate with each other a single wavefront. The observable matter, electron, stabilizes the unstable state of the hidden level of the physical vacuum and the corresponding metastable muon & taon. Similar logic of a dark energy and dark matter directly into each slice can be extended to quarks.

The assumption that the observed particle, the electron, can hold a hidden metastable unobservable muon and taon can consider as a result of the action of the quantum Zeno effect. And, true to the opposite assumption, namely, the "environment" in the form of virtual pairs muon/antimuon and/or taon/antitauon produces continuous measurements of the state of the electron wave function, and thus keep it from falling apart in a stable condition.

Consider the motion of quantum in the space of a tunnel transition potential barrier PB without reflection (Fig. 27). Mass is approaching to the barrier and distributes gravity  $M = 512$ , a space as a potential barrier that stops of quantum with generation DM = 16, after overcoming PB quantum characterized DE = 2.



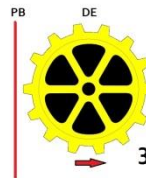


Fig. 27. The act of quantum motion in space consists of three components M, DM and DE.

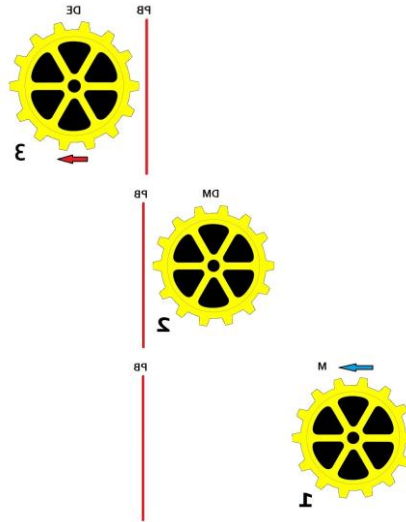


Fig. 28. Inverting the sequence of movement, we come to the state of the fixed quantum.

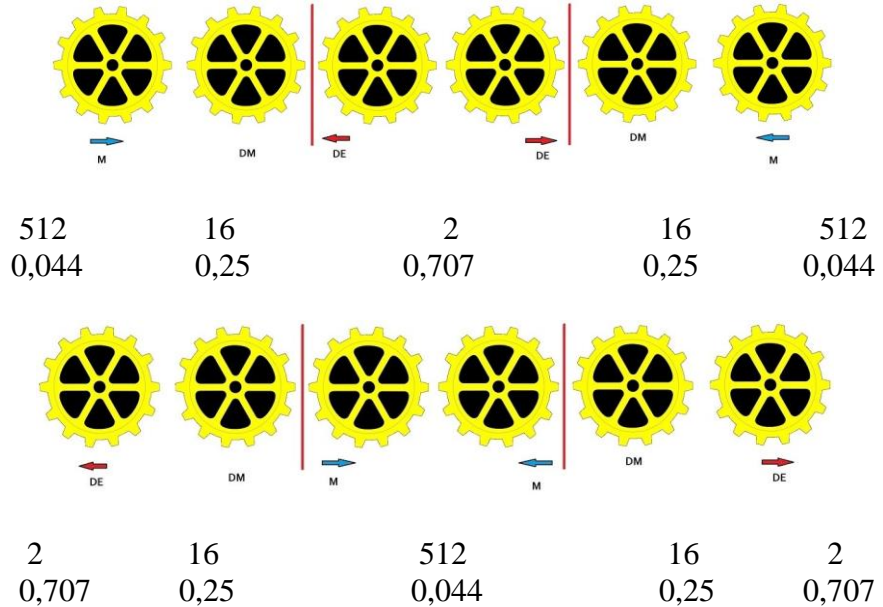


Fig. 29. The mass of the stationary quantum can be represented as a superposition of equal distribution structures M, DM and DE.

This distribution corresponds to the mass of the object observed [12] (Fig. 30).

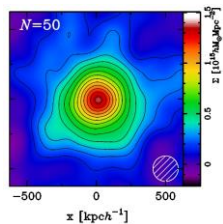


Fig. 30. Allocation of dark matter in clusters of galaxies, the density decreases from the center

to the periphery [12].

The proposed model of instantaneous action at a distance of Mach's principle is valid not only particles, but also for the anti-particles, ie of quanta interacting with the wave front asymmetrical interaction of particles (Fig. 31). ]

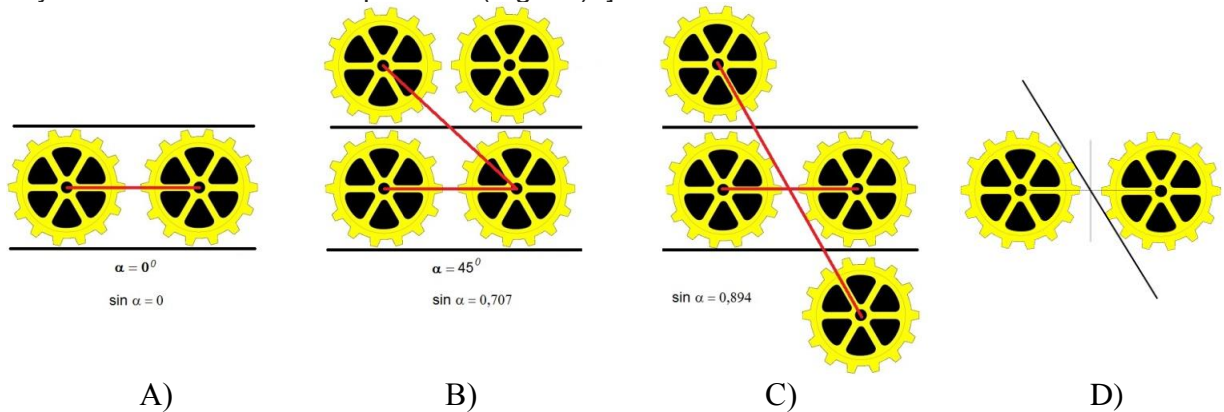


Fig. 31. A). The action of the wave front moves the pair of particle/particle in the direction of its movement,  $\sin \alpha = 0$ , B). Pair antiparticle/antiparticle moves against the direction of movement of the front and the sine of the angle displacement of masses of  $\sin \alpha = 0,707$ ; C). For a pair of particle/antiparticle shift occurs with and against the direction front, respectively, and  $\sin \alpha = 0,894$ .

Because for antimatter and the interaction of matter and antimatter versions Fig. 31. B and C do not correspond to variant A and variant D, then the variants 16 (Fig. 5 ... 20) emerging equivalent circuits can be reduced to eight. Then  $2 \times 8 \times 8 = 128$  and there is a number of other basic masses, characterizing the ratio  $M / DM / DE$ .

Expanding instant long-range front on a combination of particles and antiparticles are presented in Table 2.

Table 2.

particle/particle						
Group	Gauge field	Number of matrices	Mass		Quota	
U(1)	photon $\gamma$	1	$2 \cdot 2^{\sin(0)}$	2	$1/\sqrt{2}$	0,707
SU(2)	bosons $W_{\pm} Z$	3	$2 \cdot 2^3$	16	$1/\sqrt{16}$	0,250
SU(3)	gluons $g$	8	$2 \cdot 2^8$	512	$1/\sqrt{512}$	0,044
					Sum	1,001
antiparticle/antiparticle						
U(1)	photon $\gamma$	1	$2 \cdot 2^{\sin(45)}$	3,3	$1/\sqrt{3,3}$	0,553
SU(2)	bosons $W_{\pm} Z$	3	$2 \cdot 2^{(3-1)}$	8	$1/\sqrt{8}$	0,354
SU(3)	gluons $g$	8	$2 \cdot 2^{(8-2)}$	128	$1/\sqrt{128}$	0,088
					Sum	0,995
particle/antiparticle						
U(1)	photon $\gamma$	1	$2 \cdot 2^{\sin(63,4)}$	3,7	$1/\sqrt{3,7}$	0,519
SU(2)	bosons $W_{\pm} Z$	3	$2 \cdot 2^{(3-1)}$	8	$1/\sqrt{8}$	0,354
SU(3)	gluons $g$	8	$2 \cdot 2^{(8-2)}$	128	$1/\sqrt{128}$	0,088
					Sum	0,961

On the strings language the results of using the Mach principle (Table 2) describe, in particular, the bosonic string tachyon properties with explicit  $2+16+8=26$ ; superstring  $2+8=10$  and



supergravity the  $3+8=11$ , for which the principle of Mach hidden in the space-time supersymmetry, heterotic string with a 10-dimensional and 26-dimensional components.

Analysis capabilities include Mach's principle in a number of models of grand unification [13] leads to the results in Table 3 (selection options for interaction particle / particle).

Table 3.

Group	Gauge field	Number of matrices	Mass		Quota	
U(1)	photon $\gamma$	1	$2 \cdot 2^{\sin(0)}$	2	$1/\sqrt{2}$	0,707
SU(2)	bosons $W_{\pm} Z$	3	$2 \cdot 2^3$	16	$1/\sqrt{16}$	0,250
SU(3)	gluons $g$	8	$2 \cdot 2^8$	512	$1/\sqrt{512}$	0,044
					Sum 3	1,001
SU(5)	bosons $6X, 6Y$	12	$2 \cdot 2^{12}$	8192	$1/\sqrt{8192}$	0,011
					Sum 4	1,01235
SO(10)	45 bosons	21	$2 \cdot 2^{21}$	$4,2 \cdot 10^6$	$1/\sqrt{4,2 \cdot 10^6}$	0,00049
					Sum 5	1,01284
E6	78 bosons	33	$2 \cdot 2^{33}$	$1,7 \cdot 10^{10}$	$1/\sqrt{1,7 \cdot 10^{10}}$	0,00001
					Sum 6	1,01285
E8	248 bosons	170	$2 \cdot 2^{170}$	$3,0 \cdot 10^{51}$	$1/\sqrt{3,0 \cdot 10^{51}}$	$2 \cdot 10^{-26}$
					Sum 7	1,01285

Bosons X and Y like bosons  $W_{\pm}$  and Z may form another kind of dark matter [14], for which already proposed [15] "dark chemistry" is up to 5% of the rest of the dark matter ( $0,011 / 0,250 = 4.4\%$ ). "Chemistry" can create and gauge bosons symmetry SO (10), E6, E8 turning into "exotic garden" [13] with a monstrous mass of dark fruit.

Without adding of number of new and new gauge bosons, while remaining within the limits of the Standard Model, for 4-dimensional continuum can get an upper bound for the mass of the Higgs condensate and boson  $512 \cdot 512 \cdot 512 \cdot 512 \cdot 4 = 2^{36} \cdot 4 = 280 \cdot 10^9$  and  $140 \cdot 10^9$ .

The sum of M, DMi, DE reaches saturation, the contributions of massive DM dramatically reduced [that allows to](#) the strings with the dimension that extends beyond  $10^{51}$  (E8), describe a simple 10-dimensional heterotic string [11], or otherwise, on the landscape of string theory may and the presence of more than  $10^{100}$  false vacuums, but their contribution is negligible, less than  $10^{-26}$ .

The results suggest that although the introduction of a physical model of supersymmetry, special projections and dualities and eliminate the tachyon, but in reality do not eliminate anomalies, and most importantly, does not solve the problem of non-locality.

It can be argued that virtually only the physicality of the theory, which include the structure Mach's principle, but not excessive, and supersymmetry particles superpartner. This is a "modest" statement is supported by the fact that the results obtained from the first principles of Mach's principle, allow to solve problems such as the Standard Model, the mass hierarchy, dark matter, dark energy and the nature of gravity, the asymmetry of matter and antimatter.

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\* Note A.

The author understands the skepticism with regard to the readers followed the conceptual and terminological eclectic summarizing several events in one event. The phenomenon of entanglement, nonlocal correlations directions of spin quanta transferred to the correlation direction of the momentum of quanta and then the presentation projected on the direction of the field vectors on the surface of the wave front. This allowed the model to offer an instant impulse summation of all points at the front of registration and offered back of the Energy, not the probabilistic interpretation of collapse. The mechanism of instant communication allows quantum exist as a unit and move in space in the form of the wave front with no breaks and folds. And, as the author's account of how the game is perceived by the readers of "fingers", finishing The Game [A1] with other players.

In The Game, this phenomenon is described as "compulsory setting up in the same direction, which is regularly and automatically happens to all the granules space, the shake-up on the membrane." Home games are based on the presence of at least two correlation lengths for Lifshitz's points, the fluctuations are correlated only along the axis of the "long-range" [A2].

The emerging theory of quantum gravity in the Lifshitz point [A3] leads to the dependence of the number of measurements on the scale of distances and spectral dimension of the space is reduced to 4 at a large scale to 2 at the Planck distances of  $10^{-35}$  m. Equivalent course of the game is [A4] and quantum Einstein gravitation space-time distance is the smallest scale fractal, and the number of measurements is compressed from four to two. The model extended in time and space of the quantum universe [A5] also concludes that as the length of the measurement dimension is reduced from 4 to about 2. Further analysis of the gravity in the Lifshitz's point made [A6] leads to the conclusion that the universe did not explode, but rebounded and created ripples bounce corresponds to the cosmic background radiation.

Thus, there are several equivalent string-brane gravity models based on different assumptions, and their superposition takes the name of the causal dynamical triangulation CDT [A5].

CDT feature - saving causal relationships in the formation of layers of space-time of bonded with each other simplices. In Game [A1] for each full oscillation cycle membrane entirely shifted along the time axis that moves simultaneously and synchronously in the same direction of all of its cells.

Membranes not only oscillate but also form a world of constantly converging / diverging membranes. In this case, [A7] there is a particle with a spin 2, graviton, but having a longitudinal mode. At each step of dyad particles emits to one side of the graviton, which for each of the two

membranes is the photon, and in the other side of the emitted tachyons. The authors of [A7] focused on the question, where does the mass of matter in their Universe.

Search the mass continued [A8], showing the quantization of two-dimensional surface with a fluctuating geometry and finding critical points of the spherical surface - ZZ-branes, in which there is a topology change.

Multi-layer membrane array becomes a tachyon crystal forming a unified global structure encompassing all the space [A9]. This structure has a causal properties and forms a spin networks [A10] and forming quantum causal histories [A11]. The mathematical apparatus of [A12] on the basis of the state graph shows how the geometry of space without introducing formed quantum theory, which describes our universe.

Causal global structure becomes a theory of quantum information in a physical field, experiencing coherent excitation [A13], then Game plaits braids of tapes preons model, and any physical information contained in the braids at the evolution of the system will be extended coherently [A14], and it is possible to create braids on a topological quantum computer [A15]. Topological computer based on the operator generated by the state of the two widely separated particles associated string.

This "right" operator allows you to build a model of the strings network, which has the exact analytical solvability, which is linked to a string fermions are generated exclusively in pairs [A16], and the deformation of the strings network corresponds to a wave described by Maxwell's equations for the electromagnetic field.

In a formal sense, a photon as a quantum of electromagnetic field has three spin states, and five of them graviton has, in practice can only be detected by the two states, ie transverse spin states not exist for them. But these ideas on the field does not contradict the fact that the phase of the field should move uniformly everywhere in the same moment of time - "all at once", and that the field must have an infinite range of [A17].

The movement "all at once" matches the behavior of a set of N rigidly rotators [A18] describing the phase of the ideal rigidity for which there is a long-range phase interaction Dirac-Aharonov-Bohm effect. The equation of the excitation spectrum of the solid,  $E = L^2 / 2I$ , including the angular momentum  $L = \sum ly$  and the moment of inertia  $I \sim N$ , is essentially a description of summation in the space of a distributed energy at the point of detecting the photon in the collapse of its wave function.

For readers who are sickened by the explanation on the fingers, proposed a rigorous mathematical formalization as an algebra [A19], this "game" includes 14 "sets" and it participates superluminal robot Shayda-Maxwellian [20].

Thus, the circle is closed, and a win in the Game was the ability to use conventional electromagnetic field for superluminal communication.

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From a practical point of view, the observation of B-mode CMB with statistical significance is not better than  $7,7 \sigma$  [A21], now makes it extremely difficult to identify significant lacunae in the signal component of the cosmic microwave background. The latest results of cooperation Plank although evidence of the presence of anomalies in the distribution of the characteristics of the cosmological background, but their statistical significance is also on the limit and the completion of data processing will occur no earlier than one year.

In the above background intensities of electromagnetic radiation of the Universe, in particular, in the radio frequency range, there is a working classical model of quantum correlations [A22], but the taste preferences of the authors of their commitment to the cause of the probabilistic interpretation of quantum mechanics and deprive the model of experimental development.

In the near and foreseeable future superluminal communication can go to the category of reality only in the experiment, the proposed group [A23], where the screen / absorber creates an asymmetry in conditions of the modulating effects of the transverse wave front at points A and B will perform a variable magnetic field, and experiment group [A24] as a single-quantum-channel Sputnik-Earth, when injected into experimental scheme modulator.

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