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New Theory Of Space And Time - Structure And Functioning Of The World

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ABSTRACT:
Introduction/purpose: The paper is dedicated to the new theory of space and time, the new model of spacetime and the three-part world in that spacetime.
Methods: Consistent application of mathematics and the laws of physics and celestial mechanics.
Results: Geometric interpretation of time (arctime); Proof that time is changeable, that it has a metric structure and a beginning; Spacetime of Minkowsky; Euclidian Spacetime; Relativistic space R_t^3 *and relativistic time τ; Bio Spacetime* R^4 *and a living world in it; Mortuus Spacetime and a non-living world in it; Celestial Spacetime and world of souls in it; Relativistic Bio Spacetime; Relativistic Mortuus Spacetime; Relativistic Celestial Spacetime; Flat-Spherical interpretation* R^{3+} *of ordinary space* R^3 *and of time t; Flat-Spherical Bio Spacetime* R^{4+}*; Flat-Spherical Mortuus Spacetime; Flat-Spherical Celestial Spacetime; Relativistic flat-spherical space* R_t^{3+}*; Relativistic Flat-Spherical Bio Spacetime* R_t^{4+}*; Relativistic Flat-Spherical Mortuus Spacetime; Relativistic Flat-Spherical Celestial Spacetime; New Theory of Gravity.*

Conclusions: *Space and time are at the same time flat and curved (distorted) around each of their points; Space and time as separate entities are changeable, and in symbiosis they are unchangeable; Time has a beginning and a metrical structure; Newton's and Einstein's views on space and time are characterized by one-sidedness and incompleteness, and there is no contradiction between those views; The world was created and has a beginning in time; The results are based on mathephysics (symbiosis of mathematics and physics), which, like science in general, we do not create but we reveal the secrets of the world; The results are compatible and complementary with theological views on the creation, structure and functioning of the world.*

Key words: *Arctime, virtual planets* Q_{rt} *, function* 1_t*, Bio Spacetime, living world, Mortuus Spacetime, non-living world, Celestial Spacetime, world of souls, gravitational waves, gravitational law, Relativistic Flat-Spherical Bio Spacetime, Relativistic Flat-Spherical Mortuus Spacetime, Relativistic Flat-Spherical Celestial Spacetime.*

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I. INTRODUCTION

In the article new features of space and time, i.e. a three-part spacetime and a three-part world in that spacetime, have been considered.

In paragraph 1. we have obtained a geometric interpretation of time, i.e. arctime, which is a backbone of the whole work. By arctime we got a new proof of extensibility of time which is simpler and more elegant than any other known proof of that extensibility. We have obtained that arctime is a unity of time *t* and arc ζ on a trigonometric circle, then we got that time *t* has the beginning and metric structure in arctime like arc ζ has it, and finally we got that time *t* and arc ζ are non-extendible in arctime. Along with arctime we got the virtual planets Q_{rt}, $r>0$ and the function 1_t.

In paragraph 2., using arctime, virtual planets Q_{rt} and function 1_t, we get the existence of relativistic space R_t^3 (which periodically expands and constricts in regard to space R^3) and we get relativistic time τ. Also, we consider about the gravitational waves and we prove that space R_t^3 and Universe periodically expand and constrict as one entity.

Paragraph 3. has been dedicated to a three-part spacetime composed by *Bio* Spacetime in which *living world* has been located, *Mortuus* Spacetime in which *non-living world* has been located and Celestial Spacetime in which *world of souls* has been located.
Paragraph 4. has been dedicated to a relativistic three-part spacetime composed of Relativistic *Bio* Spacetime, Relativistic *Mortuus* Spacetime and Relativistic *Celestial* Spacetime. Also, we consider about a new formula for transformation of a mass into energy, which is formally the same as the corresponding Einstein's formula, but the physics behind the two formulas is different.
In paragraph 5. we consider about a flat-spherical interpretation of space, time and three-part spacetime.
In paragraph 6. we have obtained that the gravitation is really a distorted space and that Newton's gravitational law holds for that gravitation. Also, we have obtained the law of gravitation in a relativistic space.
In paragraph 7. a summary of the obtained results has been given.
In paragraph 8. we discuss the actual problems in the physics and mathematics from the perspective of the new results.
In paragraph 9. some conclusions based upon the new results have been given.

ARCTIME

Let C_1,C_2,C_3 are the trigonometric circles on the middle unitary sphere $S(0,1)$ respectively in the planes $z=0$, $x=0$, $y=0$ (Fig.1). Let us denote the arcs on these circles by ξ, η, ζ. Let the beginnings of these arcs are respectively in the points $(1,0,0)$, $(0,1,0)$, $(0,0,1)$ and let a positive orientation on these circles is reverse to the rotation of the mantissas of a clock for the observers on the semi-axes $z\geq 0$, $x\geq 0$, $y\geq 0$.

Then on the sphere $S(0,1)$ an arbitrary point is unambiguously determined by the arcs ξ and η, but arc ζ is ''surplus''. So it was for centuries. Circle C_3 and arc ζ on it were both given not any significance. However, recent discoveries about connection between geometry and time enforced us to check a relation of arc ζ with arcs ξ and η, and a possibility to make an interpretation of time by using that arc.

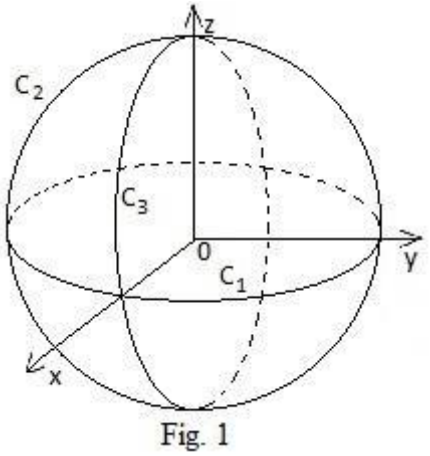

Fig. 1

So, to an arbitrary value of arc ξ corresponds y such that $y=\sin\xi$ holds, while the relation $y=\cos\eta$ for certain η also holds; this η has a corresponding z such that the relation $z=\sin\eta$ holds, while the relation $z=\cos\zeta$ for certain ζ also holds. Finally, this ζ has a corresponding x such that $x=\sin\zeta$ holds. Therefore, the following equations hold simultaneously

$$\left.\begin{array}{lll} y=\sin\xi & y=\cos\eta & z=\cos\zeta \\ & z=\sin\eta & x=\sin\zeta \end{array}\right\} \qquad (1.1)$$

Relation $\eta=\pi/2-\zeta$ holds, so equations (1.1) are to be amounted to the equations

$$\left.\begin{array}{ll} y=\sin\xi & z=\cos\zeta \\ y=\sin\zeta & x=\sin\zeta \end{array}\right\} \qquad (1.2)$$

These equations hold for

$\xi=\zeta$ and/or $\xi=\pi-\zeta$ (1.3)

By relations (1.3) equations (1.2) are amounted to

$$\left.\begin{array}{l} x=y=\sin\zeta \\ z=\cos\zeta \end{array}\right\} \qquad (1.4)$$

These equations determine a point, let us say Q_ζ, which moves in plane $y=x$ when ζ asscends and which has a radius vector with a length, let us say 1_ζ, given by

$$1_\zeta=\sqrt{1+\sin^2\zeta} \qquad (1.5)$$

Function 1_ζ is periodic with a period π, it has the extremes 1(0)=1 (minimum), $1(\pi/2)=\sqrt{2}$ (maximum) and it has the bending points $\zeta_1 \approx \pi/4$ and $\zeta_2 \approx 3\pi/4$ (Fig. 2). Also, while $r>0$, a point $Q_{r\zeta}$ is defined by the equations

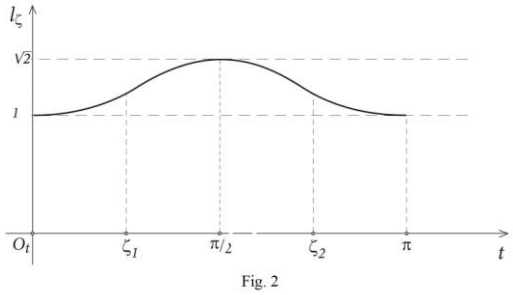

Fig. 2

$$\left.\begin{aligned} x = y &= r\sin\zeta \\ z &= r\cos\zeta \end{aligned}\right\} \qquad (1.6)$$

Point $Q_{r\zeta}$ has a radius vector with a length $1_\zeta r$ and it moves in plane $y=x$ along the orbit L_r (Fig. 3).

So, the arcs ξ,η,ζ are mutually dependent: each two arcs can be expressed by the third remaining arc, for example, ξ and η by ζ. We shall talk about it more detailed in paragraph 5.

Let us assume that a and b are the semiaxes of E_{ab} eliptic orbit of any planet in the Sun system and O is the center of that orbit. Let us put Descartes's coordinate system in such a way that the coordinate origin is in point O, that E_{ab} orbit is in plane $y=x$ and that semi-axis b is on semi-axis $z \geq 0$.

For $r=b$ point $Q_{r\zeta}$ amounts onto point $Q_{b\zeta}$ determined by equations

$$\left.\begin{aligned} y = x &= b\sin\zeta \\ z &= b\cos\zeta \end{aligned}\right\} \qquad (1.7)$$

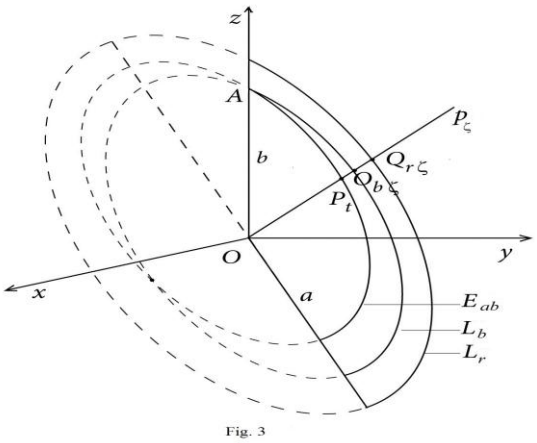

Fig. 3

Let us denote by P_t a position of any planet on its orbit E_{ab} in an arbitrary moment of time t. Then for some value ζ the points O, P_t, $Q_{r\zeta}$ are collinear (Fig. 3). By other words, the points P_t and $Q_{r\zeta}$ in the pair perform a revolution around the Sun on its orbits E_{ab} and L_r. Thereby, arc ζ grows (runs) constantly like uninteruptible course of time. Here, in fact, arc ζ is a geometric interpretation of time or time in geometry. We call it arctime and denote it by t (Hajduković, 2010). Also, arctime is the symbiosis of arc ζ and time t. Now, the equations (1.3) - (1.7) read respectively

$\xi = t$ and/or $\xi = \pi - t$ (1.8)

$$\left.\begin{aligned} y = x &= \sin t \\ z &= \cos t \end{aligned}\right\} \qquad (1.9)$$

$$1_t = \sqrt{1+\sin^2 t} \qquad (1.10)$$

$$\left.\begin{aligned} y = x &= r\sin t \\ z &= r\cos t \end{aligned}\right\} \qquad (1.11)$$

$$\left.\begin{aligned} y = x &= b\sin t \\ z &= b\cos t \end{aligned}\right\} \qquad (1.12)$$

Points Q_ζ, $Q_{r\zeta}$ and $Q_{b\zeta}$ now are denoted by Q_t, Q_{rt} and Q_{bt} and we call them the virtual planets. By the equations (1.8) points B_t and B_t' are defined respectively, which with a course of time t delineate on the middle unitary sphere $S(0,1)$ a double spiral coil shaped as a backbone of a DNA-structure of the molecules of the smallest living creatures, i.e. bacteria and viruses (Fig. 4). According to Fig. 3. time t and arc ζ grow (run) with the same speed. Thereby, for an observer on Earth, which does not move in regard to Earth, planet Venus passes once around the Sun in a shorter period of time than planet Mars does, and during a motion of both planets arc ζ grows up to 2π. It means that during a motion of Venus time t runs faster than during a motion of Mars. By other words, a speed of course of time t changes from one planet to the another, what means that time t is changeable. This is the simplest and the most elegant proof of the changeability (extensibility) of time among known proofs of that extensibility (Arsenijević, 2003). However, all those proofs rely on the incomplete knowledge of the unity of time and space and those proofs refer to time which is in the incomplete unity with space. Below we shall reveal a new type of the unity of time and space, in which (unity) time t runs with the constant speed c=1, which does not depend on mutual motion of the observers.

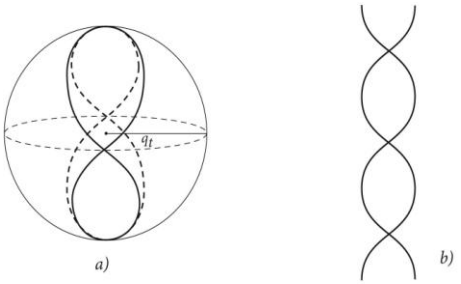

Fig. 4

According to Fig. 3. time t and arc ζ grow (run) with the same speed, let us say v. Thereby, the equal distances appear, i.e. $vt = v\zeta$ holds. By other words, arctime t is the unity of time t and arc ζ. Let us put $c = v\zeta / vt = \zeta / t = 1$ and $x = c\zeta = \zeta$, and we have

$c = x/t$ and/or $ct = x$ (1.13)

Then, c=1 is the speed by which time t and arc ζ grow (run) in the arctime, and ct and x are distances in time t and on arc ζ in arctime. We interpret a growth of the distance ct, i.e. a growth of the distance x as a motion through time, i.e. as a motion through space R^3 along arc ζ. Thereby, $t=x$ holds, what means that time t has the same metric structure as arc ζ has.

Let O is the coordinate beginning in time t. The position of an arbitrary point A in time t is determined in regard to point O, what means that point A follows to point O in the sense of a flow of time t. Hence it follows that all points in time t follow to point O. By other words, point O is the beginning of time t. Now we interpret time t by non-negative part of arc ζ, which (part) we interpret by non-negative part of a numeric line and that part we call a time semi-axis. We apply the distances x onto a numeric line which we call an arc semi-axis, and we apply the distances ct onto a time semi-axis. Let us put a time semi-axis vertical to arc semi-axis so that the beginning O of the semi-axis is at the same time a coordinate beginning on arc semi-axis (Fig. 5). By those distances an arbitrary point A is defined in arctime t, what we write as $A = (ct, x)$. With a flow of time t the points $A = (ct, x)$ move in arctime t at universal speed c=1 through time t and along arc ζ.

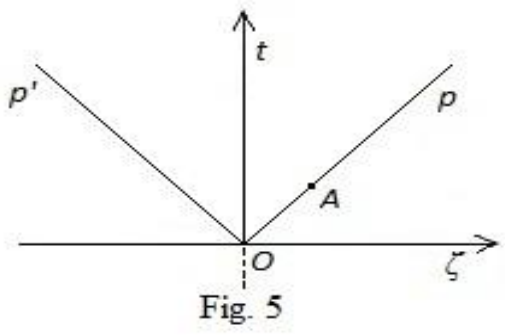

Fig. 5

The distance s in arctime t we define by Pythagora's equation with a minus sign, and according to (1.13) we have

$s^2 = (ct)^2 - x^2 = 0$, (1.14)

what gives s=0. Arctime t with the distance s defined in this way we call Arctime of Minkowski, and the points A in that Arctime we call the events. The event $A=(ct,x)$ satisfies the equation (1.14) if and only if it holds

$ct = \pm x$ (1.15)

These are the half-lines p and p' under the angle of 45^0 in regard to an arc axis and in regard to a time semi-axis. The events $A=(ct,x)$ lay on p and p' and they are immobile, and the half-lines p and p' represent the Arctime of Minkowski.

The distance within the symbiosis of time t and arc ζ we define, also, by Pythagora's equation with a plus sign and we denote that distance by d and, according to (1.13), we have $d^2 = (ct)^2 + x^2 = 2(ct)^2$, what gives

$d = ct\sqrt{2}$ (1.16)

The symbiosis of time t and arc ζ with the distance d defined in such a way is called Euclidian arctime, and the points A in that arctime are called the events. In Arctime of Minkowski the distance is equal to zero, so there is no motion of the events through that Arctime. According to (1.16) the events A in Euclidian arctime move through that Arctime at universal speed $\bar{c}$ given with $\bar{c} = \frac{d}{t}$, i.e. they move at speed

$\bar{c} = c\sqrt{2}$ (1.17)

II. RELATIVISTIC SPACE R_t^3

In paragraph 1. we have uncovered the virtual planets Q_{rt}, $r>0$ and the function 1_t, which is a length of a radius vector of a virtual planet, while r=1. Those objects directly lead to the construction of space which periodically expands and constricts in regard to space R^3, and which we call the relativistic space and denote it with R_t^3.

Indeed, let $A=(x,y,z)$ is an arbitrary point of space R^3. Let us put

$$\left.\begin{aligned} &x_t = 1_t x,\ y_t = 1_t y,\ z_t = 1_t z \\ &A_t = 1_t A = (x_t, y_t, z_t) \\ &R_t^3 = \left\{ A_t \,\middle|\, A \in R^3 \right\} \\ &\partial(A_t, B_t) = 1_t \cdot d(A,B) \end{aligned}\right\} \qquad (2.1)$$

where d is the metrix of space R^3. It is easy to check that ∂ is the metrix in set R_t^3, i.e. that the pair (R_t^3, ∂) is the metric space which we shortly denote by R_t^3 or by $R^3(t)$.

Function 1_t grows from 1 till $\sqrt{2}$, and descends from $\sqrt{2}$ till 1 when t grows from *0* till *π/2*, and when t grows from *π/2* till *π*. Hence, according to the last equation in (2.1), it follows that space R_t^3 expands when t grows from *0* do *π/2*, and respectively, it follows that space R_t^3 constricts when t grows from *π/2* till *π*. When t runs further unlimitedly, the expansion and constriction of space R_t^3 periodically repeat with a period of *π*. Specially, for $t=k\pi$ (k=0,1,2,...) space R_t^3 reduces to space R^3. More exactly, space R_t^3 expands and constricts in regard to space R^3, whereby space R^3 behaves, on one side, as integral part of space R_t^3, while, on the other side, it behaves as a separate entity. Such a junction of spaces R^3 and R_t^3 is necessary and sufficient condition for the understanding of the existence and functioning of those spaces.

Therefore, space R_t^3 expands and constricts in regard to space R^3, what means that space R_t^3 is characterised by the relativity in the sense of relativity induced by the flow of arctime. Hence it comes the name - relativistic space R_t^3.

The objects of space R_t^3 are obtained in such a way that the points of corresponding object of space R^3 are multiplied by 1_t. For example, when points of the numeric line R are multiplied by 1_t then the relativistic points which form relativistic line R_t are obtained. With a flow of arctime t in 1_t the points of relativistic line R_t periodically depart (digress) and approach in accordance with the expansion and constriction of space R_t^3. Also, when the points of circle C_3 (Fig. 1) are multiplied by 1_t, we get relativistic circle $C_3(t)$ which has a radius 1_t.

We have put that, by definition, $u_t = 1_t \cdot u$ holds. Analogically, $u_t \cdot v_t = 1_t \cdot (u \cdot v)$ holds, by definition. Specially, $1_t \cdot 1_t = 1_t \cdot (1 \cdot 1) = 1_t \cdot 1 = 1_t$ holds. Also, it holds that $u_t \cdot v = (1_t \cdot u) \cdot v = 1_t \cdot (uv) = u_t \cdot v_t$. Therefore, the following equations hold

$$\left.\begin{array}{l} 1_t \cdot 1_t = 1_t \\ u_t \cdot v_t = u_t \cdot v \end{array}\right\} \quad (2.2)$$

2.1 RELATIVISTIC TIME

From space R^3 we have derived relativistic space R_t^3. Analogically, from time *t* we shall derive relativistic time *τ*. Indeed, by definition it holds

$\tau = 1_t \cdot t$ (2.3)

Hence it follows that time *τ* is periodic with a period of π like space R_t^3 is. Function 1_t periodically grows and declines with a period of *π*, inducing that time *τ* elongates and shortens with a period of *π*. The elongating and shortening of time *τ* is in regard to time *t*. Hence it comes name - relativistic time *τ*.

2.2 MOTION OF CELESTIAL BODIES GRAVITATIONAL WAVES

For an arbitrary *r> 0* the equations (1.11) determine point Q_{rt} in space R^3 which we call a virtual planet, which has a radius vector of a length 1_t *r* and which move in space R^3 along the orbit L_r (Fig. 3). Virtual planet Q_{rt} directly leads to the construction of space R_t^3, which periodically expands and constricts with a period of π in accordance with a periodic raise and decline of the function 1_t. To the point Q_{rt} in space R_t^3 corresponds point $Q_{r_t\tau} = 1_t \cdot Q_{rt}$ for which, according to (2.2), it holds $Q_{r_t\tau} = Q_{r_t t}$. For $t = k\pi$ (k = 0, 1,2,...) in 1_t, point $Q_{r_t t}$ amounts to point Q_{rt}.

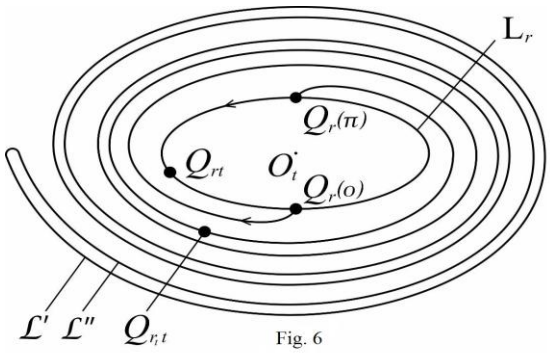

Fig. 6

According to that, we call point $Q_{r_t t}$ a relativistic virtual planet. When *t* in 1_t grows unlimitedly, relativistic virtual planet $Q_{r_t t}$ in space R^3 moves along the orbit L_r (Fig. 3), and in space R_t^3 it delineates the spiral turns which make a curve, let us say $\mathcal{L}'$ (Fig. 6). More precisely, when *t* in 1_t grows from *0* till *π/2*, i.e. in the first phase of expansion of space R_t^3, virtual planet $Q_{r_t t}$ delineates the spiral turns in such a way that every next turn is longer then a turn which preceeds to it and those turns make a spiral curve $\mathcal{L}'$.

When *t* in 1_t grows from *π/2* till *π*, i.e. in the first phase of constriction of space R_t^3, virtual planet $Q_{r_t t}$ delineates curve $\mathcal{L}''$ moving in the opposite direction and, thereby, it delineates the spiral turns in such a way that every next turn is shorter then a turn which preceeds to it. For $t=\pi$ virtual planet $Q_{r_t t}$ moves along curve L_r (Fig. 3) in space R^3. When *t* in 1_t grows from *π* till *3π/2*, virtual planet $Q_{r_t t}$ delineates the spiral turns in such a way that every next turn is longer then a turn which preceeds to it and those turns make spiral curve $\mathcal{L}'$. When *t* in 1_t grows from *3π/2* till *2π*, i.e. in the second phase of constriction of space R_t^3, virtual planet $Q_{r_t t}$ delineates curve $\mathcal{L}''$ again, moving in the opposite direction and, thereby, it delineates the spiral turns in such a way that every next turn is shorter then a turn which preceeds to it. When *t* in 1_t flows further unlimitedly starting from *2π*, virtual planet $Q_{r_t t}$ delineates the curves $\mathcal{L}'$ and $\mathcal{L}''$ in order again. The orbit L_r and the spirals $\mathcal{L}'$and $\mathcal{L}''$ form a curve $\mathcal{L}$ (Fig. 6) which represents the orbit of virtual planet $Q_{r_t t}$ in space R_t^3 whose constituent is space R^3. Thereby, the orbit $\mathcal{L}$ of virtual planet $Q_{r_t t}$ is, also, a starting orbit of a corresponding planet. In paragraph 5. we shall see that for the shape of orbit $\mathcal{L}$ the responsibility is of the

ordinary flat-spherical space which is distorted by itself around each of its points. In the presence of a larger mass a flat-spherical ordinary space distorts itself additionally, and orbit $\mathcal{L}$ of virtual planet $Q_{r_t t}$ and of a corresponding planet, respectively, of a corresponding celestial body, gets its final shape in space R_t^3. In paragraph 4. we shall see that space R_t^3 and time τ are in the symbiosis and that we call them a relativistic bio space and a relativistic bio time, and their symbiosis we call Relativistic Bio Spacetime. In that space and in that time all moves at universal speed $c_t=1_t$, what means that the virtual planets and the corresponding celestial bodies in space R_t^3 move along the spiral orbits at universal speed which is constant in relativistic space R_t^3 and which periodically grows and declines in regard to the speed $c=1$ in space R^3. It means that the celestial bodies in space R_t^3 periodically move away from a center of their spiral orbits and approach to that center. Specially, the Moon periodically moves away from Earth and it approaches to Earth, what is in accordance with the proof that the Moon now moves away for *4 cm* from Earth in a period of one year.

In paragraph 6. we shall see that the gravitation is a distorted ordinary space which is spherically distorted by itself around each of its points and which is additionally distorted by the influence of the masses of the corresponding bodies. From the other side, a distorted ordinary space is responsible for the shape of orbit $\mathcal{L}$ of the virtual planets and of the celestial bodies. More exactly, the spiral turns on orbit $\mathcal{L}$ are the gravitational waves which now expand in accordance with actual expansion of space. By other words, the gravitation and the gravitational waves are the manifestations of a distorted space which is distorted by itself and which is additionally distorted by the influence of the masses of the corresponding bodies. Thereby, the expansion and constriction of space R_t^3 in small proportions is slightly, and that is why we do not remark the gravitational waves. But in a presence of some huge mass, for example a black hole, it comes to the additional incurvation of space R_t^3, whereby it comes to the enlargement (augmentation) of the gravitational waves and it comes to the acceleration of their expansion. It enables that the gravitational waves can be notified even if they are on enormous distances in a cosmic sense.

The figure 6. about the gravitational waves is compatible with the recently obtained graphic interpretation of the gravitational waves. Thereby, Fig. 6. explains a nature of the gravitational waves more completely, yet it eliminates the misapprehensions about the gravitational waves and it directly brings the gravitation into a connection with the gravitational waves.

2.3 SPACE R_t^3 AND UNIVERSE

Space R_t^3 periodially expands and constricts in regard to space R^3 when t in 1_t grows. On the other side, the galaxies mutually move away, i.e. the Universe expands. We are now able to prove by the virtual planets that the Universe periodically expands and constricts in the same way as space R_t^3 does it. More exactly, we shall prove that space R_t^3 and the Universe periodically expand and constrict as one entity.

Indeed, let G and G'' are any two galaxies in space R_t^3. In the galaxies G and G'' the planets P and P'' circle, respectively. Side by side with the planets P and P'', the relativistic virtual planets Q and Q'' circle, respectively. Virtual planets Q and Q'' are the objects of space R_t^3, and the distance between them is, let us say, x_t. With a flow of arctime t in 1_t the distance x_t periodically grows and declines, and the virtual planets Q and Q'' mutually periodically move away and approach, what means that planets P and P' mutually periodically move away and approach. Hence it follows that galaxies G and G', also, mutually periodically move away and approach in accordance with a periodic growth and decline of the distance x_t. And that is just another way to say that the Universe periodically expands and constricts in accordance with a periodic expansion and constriction of space R_t^3. In fact, space R_t^3 and the Universe periodically expand and constrict as an unique entity.

III. BIO SPACETIME
MORTUUS SPACETIME
CELESTIAL SPACETIME

Let $M=(u,v,w)$ is an arbitrary point in space R^3. Let us join to the coordinates of that point the temporal coordinate ct, where $c=1$ is a speed by which, side by side, grow both, the distance ct in time t and the distance x on arc ζ and where $c=1$ is the universal speed by which all moves through time t and through space R^3 along arc ζ. That is how we get the quartette $A=(ct,u,v,w)$. Let this time x is the distance of point M from the coordinate beginning O. We apply that distance onto a numeric line which we call a space axis. Now the equation (1.13) leads to the equation

$ct=x$, (3.1)

where x is the distance in space R^3. Let us denote by R^4 a set of all quartettes $A=(ct,u,v,w)$ which we get when point M passes space R^3. Then the equation (3.1) holds in the set R^4. By other words, we have a new type of the unity of space R^3 and time t. Within that unity the distances in time t and in space R^3 grow side by side and all move through time t and through space R^3 at universal speed $c=1$. Let us place time semi-axis vertical onto a space axis in such a way that the coordinate beginning O on a space axis is at the same time the beginning of time semi-axis. We call the area above a space axis (Fig. 7) the future in regard to the event O, and now to the point A it corresponds point $A=(ct,x)$ which with a flow of time moves along a space axis and it moves along time semi-axis at speed $c=1$. In other words, the points $A=(ct,u,v,w)$ in the set R^4 move through time t and through space R^3 at speed $c=1$. Therefore, by the equation (3.1) the unity of space R^3 and time t has been given, which (unity) we call Spacetime and we denote it by R^4 (Sklar, 1977).

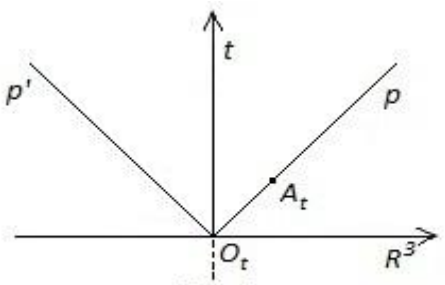

Fig. 7

In Spacetime R^4 the distance ct in time t and the distance x in space R^3 grow (flow) side by side with the universal speed $c=1$, what means that time t and space R^3 are unchangeable in Spacetime R^4. By other side, there exist a number of proofs that time t and space R^3 are changeable as separate objects. By other words, time t and space R^3 are of a dual nature: as separate objects they are changeable, but in Spacetime R^4 they are unchangeable. Below we shall see that space and time are both: flat and, in the same time, curved (distorted) around each of their points. These are the results of epochal importance, the results which change our view of world and they shake the very foundations of science and philosophy.

By the point $M=(u,v,w)$ we interpret the spot of birth of any living being, and yet t is the time of birth of that living being. We obtained that way the point $A=(ct,u,v,w)$ in Spacetime R^4. With a flow of time t point A moves through space and through time by the universal speed $c=1$, and that living being gets old, what presents a complex aspect of motion of that living being through space and through time side by side with point A. Other objects of the living world (plants, planets, stars) also move through space and through time by the universal speed $c=1$ in Spacetime R^4. In other words, the motion of the objects of living world through space and through time in Spacetime R^4 we interpret by the motion of corresponding points A in Spacetime R^4. According to that, Spacetime R^4 we call also Bio Spacetime R^4, and space R^3 and time t in Spacetime R^4 we call in turn: bio space R^3 and bio time t. For example, the motion of planets through space and through time in Bio Spacetime we interpret by the motion of corresponding virtual planets Q_{rt}.

Therefore, each individual object of the living world moves through space R^3 and through time t in Spacetime R^4 by the constant speed $c=1$, whereby space R^3 and time t are unchangeable in Spacetime R^4, and they are changeable as separate objects. It means that to individual objects of the living world in Bio Spacetime R^4, also, it corresponds their own Bio Spacetime, whose duration varies from one to the other living object. By other words, in Bio Spacetime R^4 to each individual object of the living world it corresponds its own Bio Spacetime

which varies from one to the other living object. So, beside Bio Spacetime R^4 in which resides the living world and which is of objective nature, it exists also Bio Spacetime of subjective nature which varies from one to the other living object. By other words, Bio Spacetime is, like space and time, of a dual nature.
In the set R^4 we define the distance s using Pythagora's equation with a minus sign, and according to (3.1) we have
$s^2 = (ct)^2 - x^2 = 0$, (3.2)
what gives $s=0$. Set R^4 with the distance s defined in this way is called Mortuus Spacetime. The distance in that Spacetime is equal to *0*, what means that through that Spacetime there is no motion of the points which we call the events. An arbitrary event A satisfies the equation (3.2) if and only if holds
$ct = \pm x$ (3.3)
These are the equations of the halflines p and p' which with a space axis and with time semi-axis form an angle of 45^0. By the other words, the halflines p and p' represent Mortuus Spacetime (Fig. 7).
In the set R^4 we define also the distance d of the point $A=(ct,x)$ from the coordinate beginning O using Pythagora's equation with a plus sign, and according to (3.1), we have $d^2 = (ct)^2 + x^2 = 2(ct)^2$, what gives
$d = ct\sqrt{2}$ (3.4)
The set R^4 with the distance d defined in such a way we call Celestial Spacetime. Through that Spacetime the points (events) A move at universal speed $\bar{c} = \frac{d}{t} = c\sqrt{2}$.
To the speed $c=1$ in Mortuus Spacetime we join a vector of the length $c=1$, which points in direction of time. That vector we multiply by mass m and then we get a vector of the length mc, $c=1$. That length we can express in the form mc^2 and that represents the energy E by which mass m disposes, i.e. it holds
$E = mc^2$ (3.6)
This equation formally is the same as the famous Einstein's equation of converting of mass into energy, but the physics behind those two equations is different. Namely, in the following section we shall demonstrate that energy E in the equation (3.6) is kinetic energy. Also, if in known Spacetime of Minkowski we replace time by metric time, that Spacetime amounts to Mortuus Spacetime, and the mentioned Einstein's equation amounts to the equation (3.6). By other words, from perspective of our theory, energy E in Einstein's equation is kinetic energy, too.

IV. RELATIVISTIC BIO SPACETIME
RELATIVISTIC MORTUUS SPACETIME
RELATIVISTIC CELESTIAL SPACETIME

In paragraph 2. we have proved that space R_t^3 and the Universe periodically expand and constrict as one entity at speed $c_t=1_t$. Until the same conclusion we come if we multiply the equation (3.1) by 1_t. We get, according to (2.2) and (2.3), the equation
$c_t\, t = x_t$, (4.1)
where x_t is the distance in space R_t^3, and $c_t\, t$ is the distance in time τ. By the equation (4.1) the unity of time τ and space R_t^3 is given, in which (unity) time τ periodically stretches and shortens at speed $c_t=1_t$, and space R_t^3 periodically expands and constricts at speed $c_t=1_t$. More exactly, in that unity all moves through space R_t^3 and through time τ at universal speed $c_t=1_t$. Now to the point (event) $A=(ct, u, v,w)$ in the set R^4 corresponds the quartette $A_t=1_t \cdot A=(c_t t, u_t, v_t, w_t)$, and a set of all possible quartettes A_t we denote by R_t^4. Therefore, in the set R_t^4 the equation (4.1) holds, whereby x_t is the distance of the point $M_t= (u_t, v_t, w_t)$ in space R_t^3 from the relativistic coordinate beginning O_t. By other words, the set R_t^4 is the unity (coupling) of space R_t^3 and time τ. The distances x_t we apply onto a relativistic numeric line, which we call a relativistic space axis. The distances $c_t t$ we apply onto a relativistic time semi-axis. Let us put a relativistic time semi-axis vertical on a relativistic space axis such that the beginning of semi-axis is in the same time the coordinate beginning on that space axis (Fig. 8). Now we have that to the point $A_t = (c_t t, u_t, v_t, w_t)$ corresponds the point $A_t = (c_t t, x_t)$. With a flow of time the point $A_t = (c_t t, x_t)$ moves through space R_t^3

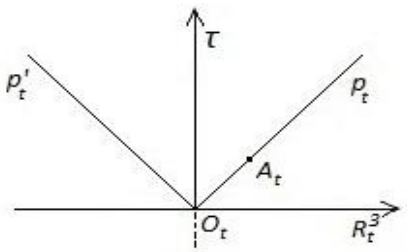

Fig. 8

and through time τ at universal speed $c_t=1_t$. More exactly, in the set R_t^4 all move through space R_t^3 and through time τ at universal speed $c_t=1_t$ and we call the points A_t the relativistic events. As in the set R^4, to each individual living object in the set R_t^4 corresponds the unique event A_t which side by side with that object moves through space R_t^3 and through time τ at universal speed $c_t=1_t$. More exactly, a motion of the events A_t is the interpretation of a motion of corresponding living objects in the set R_t^4. By other words, in the set R_t^4, i.e. in the unity of space R_t^3 and time τ resides the living world which is characterised by a motion of the living objects of that world through space R_t^3 and through time τ at universal speed $c_t=1_t$. According to that, space R_t^3 and time τ, for whom the equation (4.1) holds, we call the relativistic bio space and the relativistic bio time, and their symbiosis we call Relativistic Bio Spacetime. In fact, a motion of the events A_t and corresponding objects of living world side by side through bio space R_t^3 and through bio time τ is the necessary and sufficient condition for the existence of a life in that space and in that time.

In the set R_t^4 we define the distance s_t using the relativistic Pythagora's equation with a minus sign, and according to (4.1) we have

$$s_t^2 = (c_t \cdot t)^2 - x_t^2 = 0_t \quad (4.2)$$

The set R_t^4 in which the distance s_t is given by the equation (4.2) we call the Relativistic Mortuus Spacetime. According to (4.2) $s_{t=}0_t$ holds, what means that in the Relativistic Mortuus Spacetime there is no motion of the events $A_t=(c_t t, x_t)$ through that Spacetime. By other words, in the Relativistic Mortuus Spacetime there are no objects of the living world – there is no life.

In the set R_t^4 we define, also, the distance d_t using the relativistic Pythagora's equation with a plus sign, and according to (4.1) we have $d_t^2 = (c_t t)^2 + x^2 = 2(c_t t)^2$, what gives

$$d_t = c_t\ t\sqrt{2} \qquad (4.3)$$

The set R_t^4 in which a distance is given by (4.3) we call the Relativistic Celestial Spacetime. The events A_t move through the Relativistic Celestial Spacetime at universal speed $\bar{c} = \frac{d_t}{\tau}$, what gives

$$\bar{c} = c_t\sqrt{2} \qquad (4.4)$$

The point (event) $A_t = (c_t t, x_t)$ satisfies the equation (4.2) if and only if the following equations hold

$$c_t\ t = \pm x_t \qquad (4.5)$$

These are the relativistic equations of the relativistic halflines $p_t = 1_t \cdot p$ and $p_t' = 1_t \cdot p'$, which with the relativistic space axis and with the relativistic time semi-axis form the relativistic angle of the relativistic 45^0. By other words, the halflines p_t and p_t' (Fig. 8) represent the Relativistic Mortuus Spacetime.

Therefore, the objects of the living world move through space R_t^3 and through time τ at universal speed $c_t=1_t$. Thereby, it appears the distance $c_t t$ in time τ in which the speed c_t grows from the universal speed c=1 till the universal speed $\bar{c} = c\sqrt{2}$. In fact, the speed c=1 is the smallest speed of a motion of an living object, and the speed $\bar{c} = c\sqrt{2}$ is the largest speed of a motion of the living objects through space R_t^3 and through time τ, whereby $\bar{c} = c\sqrt{2}$ is, also, the universal speed in Celestial Spacetime. Concretely, a man moves through space R_t^3 and through time τ at universal speed $c_t=1_t$. In the moment of death it stops a motion of a man through space, terrestrial remnants of a man continue to move through time τ at universal speed $c_t=1_t$ in Relativistic Mortuus Spacetime, and the soul separates from the body and it continues to live in Relativistic Celestial Spacetime and it moves through that Spacetime at universal speed $\bar{c}_t = c_t\sqrt{2}$.

When in 1_t holds that $t = k\,\pi$ (k = 0, 1, 2,...), Relativistic Bio Spacetime, Relativistic Mortuus Spacetime and Relativistic Celestial Spacetime amount respectively onto Bio Spacetime, Mortuus Spacetime and Celestial Spacetime. By other words, Bio Spacetime is the beginning and integral part of Relativistic Bio Spacetime, Mortuus Spacetime is the beginning and integral part of Relativistic Mortuus Spacetime, Celestial Spacetime is the beginning and integral part of Relativistic Celestial Spacetime. Thereby, Relativistic Celestial Spacetime in

our theory has the same meaning as the Sky has in theology. Therefore, according to our theory the Sky has a beginning, too.

An arbitrary mass m in Relativistic Mortuus Spacetime is in the state of constant motion within the periodic expansion and constriction of the Universe at speed $c_t=1_t$ and, based on that motion, it posseses kinetic energy. On the other side, multiplying the equation (3.6) by 1_t we obtain the formula

$$E_t = mc_t^2 , \qquad (4.6)$$

by which that energy is given. With a flow of time t in 1_t the speed $c_t=1_t$ periodically grows and declines, so the quantity of energy E_t periodically grows and declines. Specially, when $t = k\pi$ (k = 0, 1, 2,...), energy E_t amounts onto energy E which is given by (3.6). It means that energy E is a part of energy E_t, i.e. it means that energy E, also, is kinetic energy. As we have explained in paragraph 3, it means that energy E in the famous Einstein's equation is kinetic energy.

V. FLAT-SPHERICAL INTERPRETATION OF SPACE, TIME AND SPACETIME

We comprehend an ordinary space in such a way that it stretches back-forth, left-right, up-down. On such comprehension of space relies Descartes's coordinate system, by which to an arbitrary point M of space we unambiguously coordinate the triplet (x,y,z) of real numbers (coordinates of the point M), which we equalize with the point M and we write it $M(x,y,z)$ or $M=(x,y,z)$. In set R^3 of all such triplets we define the metrix d by using Pythagora's equation with a plus sign and we call the deuce (R^3, d) Euclidian's three-dimensional space which we shortly denote by R^3. We talk yet that space R^3 is a flat interpretation of ordinary space (Pogorelov, 1963).

Intuitively, also, we see the sphere $S(O, r)$ as a set of points in a space which are equally distant from an arbitrary point of a space. More exactly, we define a sphere by

$$S(O,r) = \{M : M \in R^3, d(O,M) = r\} , \qquad (5.1)$$

where an arbitrary $r> 0$ is a length of a radius of sphere, and O is a centre of sphere. Let's remember that a position of point M on sphere $S(0,1)$ is unambiguously determined by the arcs ξ and η on trigonometric circles C_1 and C_2 (Fig. 1). By other words, arbitrary point M on sphere $S(0,1)$ we interpret as the deuce of arc coordinates (ξ,η) and we define the sphere $S(0,1)$ as two-dimensional space. Let's put

$$S^3(O) = \bigcup_r S(O,r) \qquad (5.2)$$

An arbitrary point M of ordinary space belongs to some of the spheres $S(0,r)$ and it is determined by the triplet (r, ξ, η) which we equalize with the point M and we write it $M(r, \xi, \eta)$ or $M=(r, \xi, \eta)$. In other words, the points of ordinary space we comparatively interpret by the triplet (x,y,z) of rectangular coordinates and by the triplet (r, ξ, η) of spherical coordinates, and ordinary space we interpret comparatively by flat space R^3 and by spherical space $S^3(O)$. Thereby, O is a center of space $S^3(O)$, which can be any point of ordinary space, what means that ordinary space is spherically distorted around each of its points. The spaces R^3 and $S^3(O)$ form a new space which is flat-spherical interpretation of ordinary space and which we denote by R^{3+}. This space arised in such a way that we have added the spherical structure of space $S^3(O)$ to the metric structure of space R^3. Hence it comes the denotement R^{3+} for a space which is flat-spherical interpretation of ordinary space. According to that, space R^{3+} is flat like ordinary space is, and yet, also, it is spherically distorted around each of its points.

In space R^{3+} hold both, flat Euclidian geometry of space R^3 and spherical geometry of space $S^3(O)$, which are compatible and complementary. More exactly, geometry of space R^{3+} is the combination of flat and spherical geometries, and the example of such geometry is the trigonometry. Only now we know which geometry represents the trigonometry, whereby, we didn't create the trigonometry, then we only revealed it. Moreover, our results show we don't create mathematics then we reveal it.

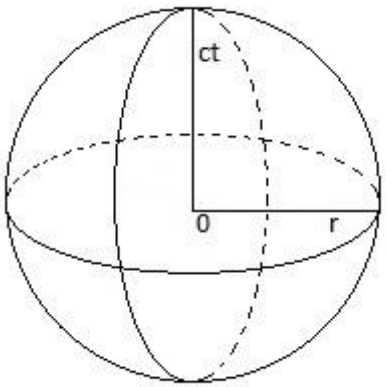

Fig. 9

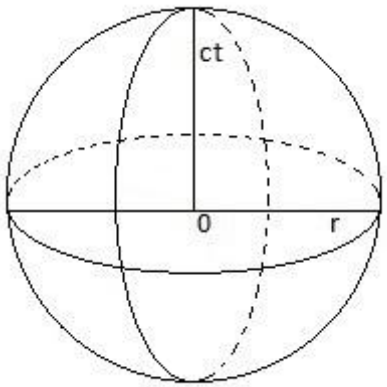

Fig. 10

In paragraph 3. we have seen that space R^3 and time *t* are in the symbiosis which is given by equation (3.1), in which (symbiosis) resides the living world and which we denote by R^4 and which we call Flat Bio Spacetime (Fig. 7). Analogically, space $S^3(O)$ and time *t* are in the symbiosis $S^4(O)$ which is given by $ct=r$, in which the living world resides and in which we call space $S^3(O)$ and time *t* a spherical bio space and a spherical bio time, respectively (Fig. 9). In fact, space R^{3+} and time *t* are in the symbiosis in which the living world resides and which we denote by R^{4+} (Fig. 10). In the symbiosis R^{4+} we call space R^{3+} and time *t* a flat-spherical bio space and a flat-spherical bio time, respectively, and their symbiosis we call Flat-Spherical Bio Spacetime. For example, virtual planets Q_{rt}, $r>0$, determined by the equations (1.11), move along the orbit L_r in space R^3 (Fig. 3) and along the orbit $\mathcal{L}$ in space R_t^3 (Fig. 6). More exactly, they move at speed $c=1$ through space R^3 and through time *t*, and they move at speed $c_t=1_t$ through space R_t^3 and through time τ.

In set R^{4+} there is no distances, but that set is the interpretation of unity of space R^{3+} and time *t*, in which (set) the living world resides nd which we call Flat-Spherical Bio Spacetime. In set R^{4+} we define the distance *s* by using Pythagora's equation with a minus sign, and because of $ct=r$, we have

$s^2 = (ct)^2 - r^2 = 0$, (5.3)

what gives $s=0$. Set R^{4+} in which the distance *s* is defined in such a way we call Flat-Spherical Mortuus Spacetime. In that Spacetime the distance is equal to *0*, so there is no motion of points (events) through that Spacetime, what means that there is no life in that Spacetime.

In set R^4, also, we define the distance *d* by using Pythagora's equation with a plus sign, so we have $d^2 = (ct)^2 + r^2 = 2(ct)^2$, what gives

$$d = c\,t\,\sqrt{2} \qquad (5.4)$$

Set R^4 with the distance *d* defined in such a way, i.e. the pair (R^{4+}, d), is a four-dimensional space which we call Flat-Spherical Celestial Spacetime. Through that Spacetime the points (events) move at universal speed $\bar{c} = \frac{d}{t}$, what gives

$$\bar{c} = c\sqrt{2} \qquad (5.5)$$

The motion of the events through Flat-Spherical Celestial Spacetime is the interpretation of a motion of the living entities through that Spacetime. It means that through Flat-Spherical Celestial Spacetime a soul of man moves, and man moves through space R^3 and time *t* in that Spacetime. Also, after death of a man his terrestrial remnants stand still in space, but they move through time at speed $c=1$ in Flat-Spherical Mortuus Spacetime. Thereby, a soul diverges from a body and continues to live in Flat-Spherical Celestial Spacetime, where it moves through that Spacetime at speed $\bar{c} = c\sqrt{2}$. This description of structure and functioning of the

world is incomplete. More exactly, three-part world consisted of the living world, the non-living world and the world of souls is the beginning and integral part of three-part world we talk about later (Sciama, 1978).

Relativistic sphere $S(0_t, r_t)$ in the relativistic space R_t^3 is given by

$$S(O_t, r_t) = \bigcup_{r_t} \left\{ M_t : M_t \in R_t^3, \partial(O_t, M_t) = r_t \right\}, \qquad (5.6)$$

where $u_t = 1_t \cdot u$ holds, and the relativistic spherical space $S_t^3(O_t)$ is given by

$$S_t^3(O_t) = \bigcup_{r_t} S(O_t, r_t) \quad (5.7)$$

With a flow of arctime t in 1_t the points of space $S_t^3(O_t)$ periodically with a period π move away from center O_t of that space and they approach to that center O_t. By other words, space $S_t^3(O_t)$ periodically with a period π expands and constricts as space R_t^3 does, and the geometries in those two spaces are compatible and complementary. In fact, spaces R_t^3 and $S_t^3(O_t)$ form flat-spherical space R_t^{3+}. Thereby, r_t is the mutual distance of the points (events) of space $S_t^3(O_t)$ and the corresponding points of space R_t^3 from the center O_t. That distance is equal to the distance $c_t t$ of the points in time τ from the beginning O_t, i.e. the following equation is valid

$$c_t t = r_t \quad (5.8)$$

With a flow of arctime t in 1_t the distances $c_t t$ and r_t periodically with a period π grow and decline at speed $c_t = 1_t$. Precisely, space R_t^3 and time τ are in the symbiosis R_t^4, in which the living world resides and we call that space and that time relativistic bio space and relativistic bio time, and their symbiosis we call Relativistic Flat Bio Spacetime (Fig. 7). Analogically, space $S_t^3(O_t)$ and time τ are in the symbiosis, let us say $S_t^4(O_t)$, in which the living world resides and we call that space and that time relativistic spherical bio space and relativistic spherical bio time, and symbiosis $S_t^4(O_t)$ we call Relativistic Spherical Bio Spacetime (Fig. 11). Thereby, the symbiosises R_t^4 and $S_t^4(O_t)$ form symbiosis R_t^{4+} of relativistic flat-spherical space R_t^{3+} and time τ, which (symbiosis) we call Relativistic Flat-Spherical Bio Spacetime (Fig. 12).

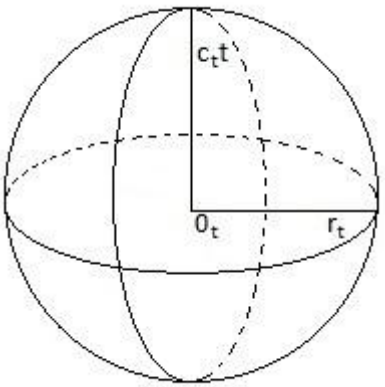

Fig. 11

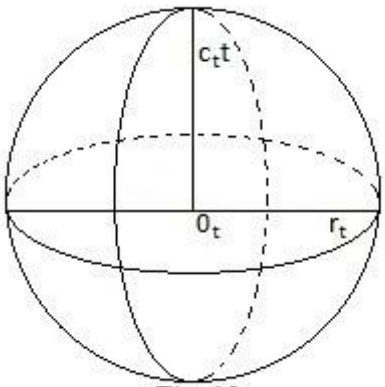

Fig. 12

In set R_t^{4+} we define the distance s_t by using the relativistic Pythagora's equation with a minus sign. That distance is equal to the distance s_t in Relativistic Flat Mortuus Spacetime and the following equation holds

$$s_t^2 = (c_t \cdot t)^2 - r_t^2 = 0_t, \qquad (5.9)$$

what gives $s_t = 0_t$. Set R_t^{4+} with the distance s_t defined in such a way we call Relativistic Flat-Spherical Mortuus Spacetime. In that Spacetime the distance s_t is equal to relativistic zero, what means that there is no motion of the points (events) through that Spacetime. By other words, in Relativistic Flat-Spherical Mortuus Spacetime there is no life.

In set R_t^{4+} we define, also, distance d_t by using relativistic Pythagora's equation with a plus sign, so we have $d_t^2 = (c_t t)^2 + x^2 = 2(c_t t)^2$, what gives

$$d_t = c_t\ t\sqrt{2} \qquad (5.10)$$

Set R_t^{4+} with distance d defined in such a way, i.e. the pair (R_t^{4+}, d_t), is four-dimensional space which we call Relativistic Flat-Spherical Celestial Spacetime. Through that Spacetime the points (events) move at universal speed $\bar{c}_t = \frac{d_t}{\tau}$, what gives

$$\bar{c}_t = c_t\sqrt{2} \qquad (5.11)$$

Thereby, motion of the events is the interpretation of motion of the souls through Relativistic Flat-Spherical Celestial Spacetime.

When in 1_t relation $t = k\pi$ (k = 0, 1, 2,...) holds, Relativistic Flat-Spherical Bio Spacetime amounts to Flat-Spherical Bio Spacetime. In fact, Flat-Spherical Bio Spacetime is the beginning and integral part of Relativistic Flat-Spherical Bio Spacetime, Flat-Spherical Mortuus Spacetime is the beginning and integral part of Relativistic Flat-Spherical Mortuus Spacetime, Flat-Spherical Celestial Spacetime is the beginning and integral part of Relativistic Flat-Spherical Celestial Spacetime and set R^{4+} is the beginning and integral part of set R_t^{4+}. Thereby, in Relativistic Flat-Spherical Mortuus Spacetime are terrestrial remnants of the living beings which (remnants) move through time τ, whereby there is no motion through space R_t^{3+}. In Relativistic Flat-Spherical Celestial Spacetime the souls reside moving through that Spacetime at universal speed $\bar{c}_t = c_t\sqrt{2}$. Finally, in set R_t^{4+} the living world resides.

These are the results of epochal significance, so it is worth to emphasize them once again. We have obtained a model of relativistic flat-spherical spacetime consisted of: Relativistic Flat-Spherical Bio Spacetime, Relativistic Flat-Spherical Mortuus Spacetime and Relativistic Flat-Spherical Celestial Spacetime. In that spacetime the three-part world is located composed by: the living world in Relativistic Flat-Spherical Bio Spacetime, the non-living world in Relativistic Flat-Spherical Mortuus Spacetime and the world of souls in Relativistic Flat-Spherical Celestial Spacetime. Thereby, the living world relies on unity of flat-spherical space R_t^{3+} and flat-distorted time τ, and yet it is characterised by a motion of the objects of the living world through that space and through that time at universal speed $c_t=1_t$. In the non-living world there is no unity of space and time, so there is no motion which is the characteristics of a life. World of souls is characterised by a motion of the souls at universal speed $\bar{c}_t = c_t\sqrt{2}$ through Relativistic Flat-Spherical Celestial Spacetime.

VI. NEW THEORY OF GRAVITATION

Let M and M' are two arbitrary points of flat-spherical space R^{3+} which is distorted by itself around each of its points and let m and m' are the masses in points M and M', respectively. Let us suppose that point M is center of sphere $S(O, r)$ to which point M' belongs and that, in the same time, point M is the coordinate beginning in space R^{3+}. Then r is the distance of point M' from point M. Let us denote by F_1 the incurvation of sphere $S(O,r)$, i.e. the incurvation of space R^{3+} around point M. Incurvation F_1 depends of mass m and of distance r and it is proportional to mass m, and it is inversely proportional to distance r, i.e. the equation $F_1 = \frac{m}{r}$ holds. Let us suppose now that point M' is a center of sphere $S(O, r)$ to which (sphere) point M belongs. Then by using a simetrical concluding we obtain that incurvation F_2 of sphere $S(O, r)$ is proportional to mass m', and it is inversely proportional to distance r: It means that the equation $F_2 = \frac{m'}{r}$ holds. Let us put $F = F_1 \cdot F_1$ and so we have

$$F = \frac{m \cdot m'}{r^2} \qquad (6.1)$$

We have obtained the known formula for Newton's gravitation law, whereby the gravitation F is a product of the incurvation of space R^{3+} around the masses m and m'. In fact, we have obtained that Einstein's apprehension of gravitation has been correct and that for the gravitation figured (understood) in such a way Newton's gravitation law holds. Thereby, gravitation law (6.1) holds in space R^{3+} which is unchangeable in the symbiosis R^{4+}.

Therefore, Newton has exactly predicted that gravitation law holds in unchangeable space, whereby his apprehension of unchangeability of space was incomplete. Also, Einstein's apprehension of gravitation was incomplete, either. He had a vision that the bodies distort a space around themselves by their masses, what is true, but he did not know that a space is distorted by itself around each of its points, and without that, as our path till the formula (6.1) shows, he could not obtain that for gravitation as a distorted space Newton's gravitation law holds.

Space R^{3+} is the beginning and integral part of relativistic flat-spherical space R_t^{3+} which periodically with the Universe expands and constricts comparatively. By other words, gravitation law (6.1) is incomplete. Indeed, when in (6.1) we replace space R^{3+} by space R_t^{3+} and yet when we replace time t by time τ, then we obtain the formula

$$F_t = \frac{m \cdot m'}{r_t^2} , \quad (6.2)$$

where $u_t = 1_t \cdot u$ holds. By this formula gravitation law in space R_t^{3+} is given, which (space) is unchangeable in the symbiosis R_t^{4+}. In the law (6.2) r_t is the distance of the massses m and m' and, in the same time, it is the distance between two points in space R_t^{3+} which (distance) periodically with a period π elongates and shortens. Hence it follows that gravitation F_t in relativistic space R_t^{3+} and in relativistic Universe periodically grows and declines in accordance with periodic expansion and constriction of space and Universe.

VII. SUMMARY

Guided by mathematical subtlety we have been going forth, and new results have been coming in sequence, whereby every single result has been relying directly to the results which had been preceding to that particular result. Mutual position of circles C_1, C_2, C_3 on Fig. 1, more exactly, dependency of arcs ξ and η on circles C_1 and C_2 from arc ζ on circle C_3, has brought us to the revelation (discovery) of arctime t, virtual bacteria and viruses B_t and B_t', virtual planets Q_{rt} and function 1_t. These objects have determined a further course of our research, and arctime has become a backbone of whole work. Arctime is the interpretation of time t so by using arctime we have elegantly and simply proved that time is expandable if it is considered as a separate entity. From the other side, arctime is the symbiosis of time t and arc ζ, and time t in that symbiosis is non-expandable. Therefore, time t is of a dual nature: as a separate entity it is expandable, and in the symbiosis with arc ζ it is non-expandable.

Unity of arc ζ as a separate object and time t, i.e. arctime directly leads to the unity R^4 of flat space R^3 and time t in which (unity) the living world resides, so we call space R^3 and time t bio space and bio time. In that unity any object of the living world moves through space R^3 and through time t at speed c=1 and it passes the distance x in space R^3 and the distance ct in time t, whereby ct=x holds. Thereby, the distances ct and x vary from one till another living object. By other words, every single object of the living world has its own flat bio space and bio time, and yet that object moves through space R^3 and through time t at speed c=1.
In set R^4 we define the distance s by using Pythagora's equation with a minus sign, so we obtain Flat Mortuus Spacetime in which s=0 holds, in which the non-living world is located and in which bodily remains (remnants) of man move through time t at speed c=1, whereby there is no motion through space R^3.
In set R^4 we define, also, the distance d by using Pythagora's equation with a plus sign, so we obtain Flat Celestial Spacetime in which $d = ct\sqrt{2}$ holds, and in which the souls reside moving through that Spacetime at speed $\bar{c} = c\sqrt{2}$.

Arctime t, virtual planets Q_{rt} and function 1_t directly lead to the discovery of relativistic space R_t^3 and relativistic time τ. When in the symbiosis R^4 we replace space R^3 by space R_t^3, and yet when we replace time t by time τ, we obtain the unity of space R_t^3 and time τ which (unity) we denote by R_t^4 and in which the

living world resides. In set R_t^4 the objects of the living world move through space R_t^3 and through time τ at universal speed $c_t=1_t$. Thereby, any object of the living world passes the distance x_t in space R_t^3 and the distance $c_t t$ in time τ, where $c_t t=x_t$ holds and where the distances $c_t t$ and x_t vary from one to another living object. By other words, in set R_t^4 every single living object has its own relativistic flat bio space and own relativistic flat bio time, and set R_t^4 we call Relativistic Flat Bio Spacetime.

In fact, we obtain set R_t^4 when we multiply the points (events) in set R^4 by 1_t. Analogically, we multiply the points (events) in Flat Mortuus Spacetime by 1_t and so we obtain Relativistic Flat Mortuus Spacetime in which the non-living world is located and in which bodily remains (terrestrial remnants) of a man move through time at universal speed $c_t=1_t$, whereby there is no motion through space R_t^3 . Also, we multiply the points (events) in Flat Celestial Spacetime by 1_t and so we obtain Relativistic Flat Celestial Spacetime in which the souls live and move through that Spacetime at speed $\bar{c} = c\sqrt{2}$.

We interpret time t by non-negative part of arc ζ and by non-negative part of a numeric line, what means that time t is of a dual nature – flat and distorted. Also, time t has a metric structure. All that leads to the conclusion that ordinary space is flat and distorted. Indeed, with (5.2) spherical space $S^3(O)$ is defined, whose points are the triplets (r, ξ, η) of spherical coordinates. The spaces R^3 and $S^3(O)$ form space R^{3+} which is the flat-spherical interpretation of ordinary space. By other words, the points of ordinary space we interpret by the triplets (x, y, z) of flat coordinates and by the triplets (r, ξ, η) of spherical coordinates, and ordinary space we interpret by space R^{3+} which we have obtained when we have added the spherical structure of space $S^3(O)$ to the metric stucture of space R^3. Hence it comes the denotement R^{3+} for space by which we interpret flat-spherical ordinary space. When we multiply the points of space R^{3+} by 1_t , then we obtain relativistic space R_t^{3+} which periodically expands and constricts with a period π and by which we interpret ordinary space. By other words, ordinary space, in which we live, i.e. in which we move, periodically expands and constricts with a period π .

Let us note that r is the distance of the points in space R^3 and in space $S^3(O)$ from the point O, so equation $ct=r$ holds in both of these spaces. It means that space $S^3(O)$ and time t are in the symbiosis in which the living world resides and which we denote by $S^4(O)$ and which we call Spherical Bio Spacetime (Fig. 9). Now set R^4 and set $S^4(O)$ form the symbiosis of space R^{3+} and time t in which the living world resides and which we denote by R^{4+} and which we call Flat-Spherical Bio Spacetime (Fig. 10).

When in set R^{4+} we replace space R^{3+} by space R_t^{3+} , and yet we replace time t by time τ, we obtain set R_t^{4+} in which the living world resides, and which (set) we call Relativistic Flat-Spherical Bio Spacetime (Fig. 11). In set R_t^{4+} we define the distance s_t by using relativistic Pythagora's equation with a minus sign, so we obtain Relativistic Flat-Spherical Mortuus Spacetime in which there is no objects of the living world, in which bodily remains (terrestrial remnants) of a man move through time τ at universal speed $c_t=1_t$, whereby there is no motion through space R_t^{3+} .

Also, in set R_t^{4+} we define the distance d_t by using relativistic Pythagora's equation with a plus sign, so we obtain Relativistic Flat-Spherical Celestial Spacetime in which the souls live and move through that Spacetime at universal speed $\bar{c}_t = c_t\sqrt{2}$.

In paragraph 6. new theory of gravitation is given. We have shown that Einstein's vision of gravitation as a distorted space is correct and that for that gravitation Newton's gravitation law holds. Thereby, Newton has obtained the gravitation law, but he did not have any idea of a distorted space, so he had concluded that mass is a source of gravitation, what, as we can see now, is not correct. Einstein's vision of gravitation is incomplete, too. He has correctly noticed that gravitation is a distorted space, which is additionally distorted by the masses of celestial bodies, but he did not know that space is also distorted by itself around each of its points. Because of that and because of his unilateral comprehension of changeability (variability) of time and space Einstein has wrongly concluded that Newton's gravitation law was not correct.

VIII. ACTUAL PROBLEMS IN PHYSICS AND IN MATHEMATICS

Newton has considered that space and time are unchangeable and separate one from the another. In accordance with that he has developed his theory of gravitation. More exactly, he set the fundaments of his physics, by which our civilisation has accomplished the industrial revolution and has progressed to this very day. And then Einstein revealed the changeability of time and space, foreseen that bodies distort space and time by their masses, elaborated his theory of gravitation and discovered the formula for transformation of mass into energy. These results have been the heresy in regard to Newton's physics. They have caused the concussion in physics, and they have made Einstein the revolutionist in science. However, the mentioned Einstein's results are characterized by the incompleteness and unilaterality (one-sidedness). In fact, the assumptions from which Einstein started when funding his theories of relativity, more exactly, the achievements of physics before Einstein have substantially limited his contribution to the development of physics. Einstein did not know that space and time are in the symbiosis, whereby space and time are distorted by themselves, and yet celestial bodies distort them additionally by their masses. Therefore, Einstein could not know that bodies move through space and through time at speed c=1, yet that they pass the equal distances in space and time and that time is unchangeable in Bio Spacetime. So, he did not know about a dual nature of space and time. Also, he did not know that time has the beginning and metric structure. He did not know about relativistic space R_t^3 and about relativistic time τ, and so he could not offer acceptable explanation why the balls of unequal masses fall to the ground at the same speed from the top of University in Piza, the same as he could not explain that energy obtained from mass m according to his famous equation is kinetic energy. In fact, the way by which Einstein has come to his results was not the most appropriate path to reach the enlightenment. Repercussion of that was a stagnation in theory of space and time and in all physics as a whole from the time of Einstein to the present day: there is no answer what will happen with the Universe which is now in the phase of expansion; there is no acceptable explanation of free fall; there is no acceptable explanation why the Moon moves away from Earth; there is no acceptable explanation of the nature of gravitational waves. This stagnation is now over: Einstein's results represent the beginning of a revolution in science, and our new results deepen, expand and complete that revolution. Our results provide the answers to the questions mentioned above: the current expansion of the Universe at speed c_t=1_t which grows will go into the constriction of the Universe at speed c_t=1_t which declines; constriction of the Universe will go again into the expansion of the Universe at speed c_t=1_t etc; in unity of space R_t^{3+} and time τ, i.e. in set R_t^{4+} all moves through space R_t^{3+} at universal speed c_t=1_t, what means that the balls have to fall from the top of University in Piza at the same speed c_t=1_t; in set R_t^{4+} celestial bodies move now through space R_t^{3+} in spiral turns of which every turn is longer then a turn that precedes to that particular turn. It means that the Moon now in space R_t^{3+} moves away from Earth, and the confirmation of that explanation is the existing proof that the Moon moves away from Earth *4cm* in a period of the year; spiral turns along which virtual planets and corresponding planets move through space R_t^{3+} at speed c_t=1_t represent gravitational waves. Our results represent the progress in mathematics, too. Revelation of arctime t, virtual planets Q_{rt}, function 1_t, relativistic space R_t^3 and relativistic time τ has marked a new direction of development of mathematics, and yet that direction represents the symbiosis of mathematics and physics which we call relativistic mathematics or mathephysics. Revelation of flat-spherical space R^{3+}, which is flat-spherical interpretation of ordinary space, has removed the veil from some discoveries in mathematics which so far prevented us from seeing the true nature of those discoveries and to take a deeper and broader look at the foundations of mathematics we know. For example, non-negative part of a numeric line is a flat interpretation of time t in space R^3, and non-negative part of arc ζ on circle C_3 (Fig. 1) is interpretation of time t in spherical space $S^3(O)$. It means that circle C_3 is not the object of flat Euclidian geometry. Also, trigonometry is not geometry in flat Euclidian space, so it is not clear in which space trigonometry represents geometry. We know now that trigonometry is geometry in flat-spherical space R^{3+} and it represents a combination of flat Euclidian geometry in flat space R^3 and of spherical geometry in spherical space $S^3(O)$.

In fact, new results broaden and deepen the comprehension of existing results in mathematics, provide the answers on actual problems in physics, determine a new common direction for development of mathematics and physics and they explain the structure and functioning of three-part world more precisely.

IX. CONCLUSIONS

1. FEATURES OF SPACE AND TIME: Ordinary space is of flat-spherical nature. Also, we interpret space by space R_t^{3+} which periodically expands and constricts with a period π. At $t = k\,\pi$ ($k = 0, 1, 2,...$) space R_t^{3+} amounts on flat-spherical space R^{3+} which is the beginning and integral part of space R_t^{3+}. Every point of space can be a center O_t of spherical space $S_t^{3+}(O_t)$, what means that ordinary space is spherically distorted around each of its points. Consequence of that is a spherical shape of stars, planets and some other celestial bodies. Consequence of that is, also, that bodies in the vicinity of the body with a larger mass fall towards the body with a larger mass along the direction which leads to the center of that body. Finally, a consequence of spherical incurvation of space around each of its points is the orbiting of celestial bodies in space R^{3+} on eliptical orbits and a motion of celestial bodies in space R_t^{3+} along spiral orbits. Thereby, spiral turns which form that spiral orbit represent the gravitational waves.

2. NEWTON AND EINSTEIN ABOUT SPACE AND TIME: Newton has predicted that space and time are separate from one another and that they are non-extendable (unchangeable). Einstein has predicted that space and time are changeable, and that was proved later. We have proved that space and time are extendable (changeable) by themselves, i.e. as separate entities, but in the symbiosis of those entities R^4 i.e. in Bio Spacetime, time and space are extendable (unchangeable). Hence it follows that there is no contradiction between Newton's and Einstein's attitudes about space and time and it follows that the attitudes of both about space and time are characterized by incompleteness and unilaterality (one-sidedness). Those attitudes have to be complemented and united in accordance with our new discoveries, and we shall obtain a dual nature of space and time, i.e. that space and time as separate entities are extendable, but in the symbiosis they are non-extendable. In fact, the state of affairs in all physics is about to be rearanged and settled again, and not only in theory of space and time, whereby it should be started from the very beginning.

3. WORLD AND MATHE-PHYSICS: It is visible that the results, what we have obtained them, is a testimony of construction and functioning ot the world, according to our experience. These results also constitute an introduction to the symbiosis of mathematics and physics, which (symbiosis) we call relativistic mathematics or mathe-physics. Also, those results indicate that we do not create the objects of mathe-physics, then we discover them. For example, we didn't create the initial objects (arctime, virtual planets Q_{rt}, function 1_t, Bio Spacetime, Mortuus Spacetime and Celestial Spacetime), then we discovered them. In other words, mathe-physics has been given as a testimony of construction, structure and functioning of the world. Also, the results we obtained are presented in this paper strictly in the order in which they were generated. This is extremely important for the further development of mathematics, i.e., for continuation of the research which we begun in this paper.

4. BEGINNING AND CONSTRUCTION OF THE WORLD: Time has a beginning that is also the beginning of a world in time. The world has a beginning made up of the living world in Bio Spacetime, the non-living world in Mortuus Spacetime and the world of souls in Celestial Spacetime. The building blocks of the beginning of the world are flat-spherical space R^{3+}, flat-distorted time t and matter (including energy), that are a priori given. Space R^{3+} is three-dimensional and non-expandable in the symbiosis with time, what means that the beginning of the world was not a singularity of the Big Bang type. The world is built in three complementary parts as when a man builds a house in several complementary rooms which suggests that in both cases the hand of the Creator is present. More exactly, the world and the man in it are created.

5. MORTUUS SPACETIME AND TIME CRYSTALS: We have discovered that in Mortuus Spacetime the bodily remains of the living world move through time, whereby there is no motion through space. On other side, it is experimentally confirmed the idea of Norman Jao from University in Berkeley about the state of matter which exists in time, but which does not exist in space – the idea about time crystals. More exactly, they found on Berkeley that it exists matter which moves through time, but which does not also move through space, and they concluded from that that that matter does not exist in space, what is not correct, because that matter exists also in space but it does not move.

6. MORTUUS SPACETIME AND DARK MATTER: According to our results the Universe is consisted of the living world in Bio Spacetime and of the non-living world in Mortuus Spacetime. Thereby, the matter in

Relativistic Mortuus Spacetime is in a state of constant motion within the expansion and constriction of Relativistic Flat-Spherical Space R_t^{3+} and the Universe as one single entity. By other words, for a motion of matter in space R_t^{3+} the responsibility belongs to the periodic expansion and constriction of that space and the Universe. Also, the quantity of matter in Mortuus Spacetime is uncomparable larger than the quantity of matter in Bio Spacetime. These results lead to the conclusion that matter in Mortuus Spacetime represents a dark matter whose existence is predicted by the physics which we know. It remains to be seen whether there is a connection between the matter in Mortuus Spacetime and a dark matter whose existence predicts the physics we know.

7. COMPATIBILITY OF SCIENCE AND THEOLOGY: It is visible that our results describe construction, structure and functioning of the world in accordance with our experience and in accordance with theological attitudes about construction and functioning of the world. That is an epochal achievement of science which sets the relationships between science and theology on a new basis: instead of mutual suspicion and confrontation, which was the case in the past, we are facing a time of mutual trust and cooperation in explaining the world to which we belong. It is a time in which, besides faith in theological sense, we have our own belief that the world and the man in it are God's work and creation.

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