From Discovery by American Astrophysicists to the Unified Law of Physical Dynamics

After many years of observations, in the first half of the 20th century, astronomers discovered a paradoxical physical fact: the velocities of stars in spiral galaxies diverge from the Keplerian regularity of change in velocities inherent in the dynamics of planetary motion round the Sun:

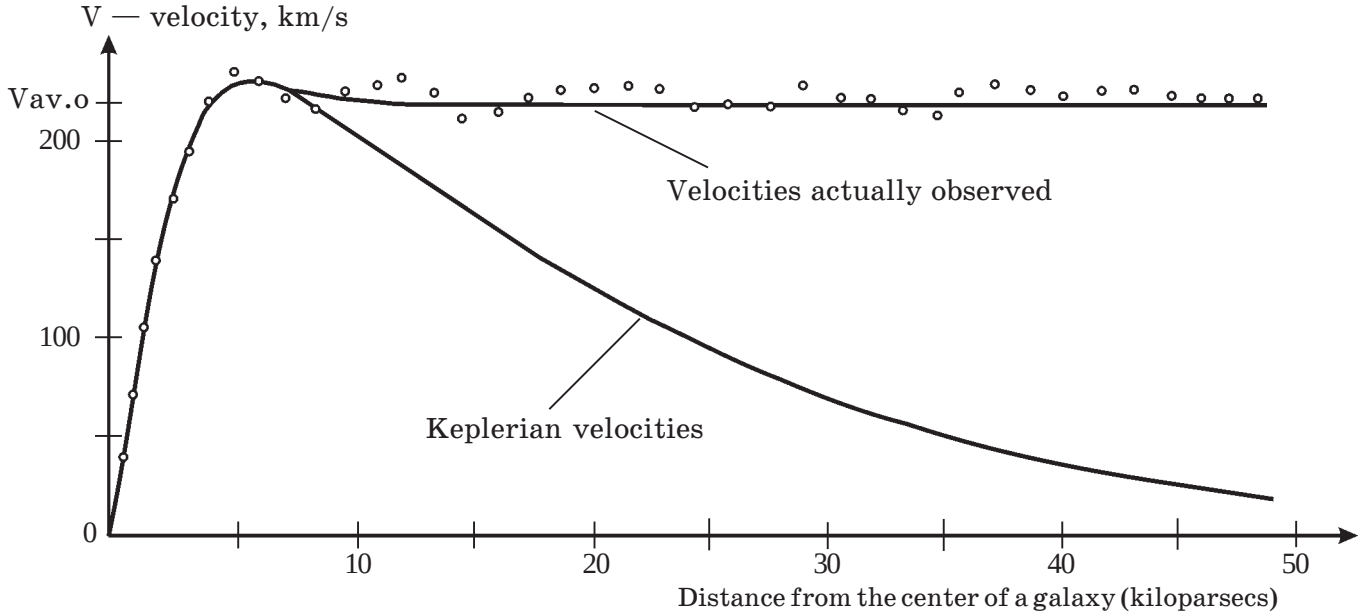


Fig. 1

As a result, there emerged a hypothesis of the existence of dark matter in spaces surrounding a galaxy. The French mathematician Henri Poincarй was the first to use the term «dark matter», when he applied direct and reverse radicals, laying the mathematical foundations of special (STR) and general (GTR) theories of relativity, which led physicists to a hypothetical theory of the existence of «black holes».

In 2016, U.S. astrophysicists Stacy McGaugh, Federico Lelli and James M. Schombert published the results of their long-term observations in the journal *Physical Review Letter*. Studying the motion of stars in the infrared range of radiation, they found that their radial acceleration was in substantial agreement with the gravitational acceleration, formerly believed to characterize bodies with visible mass. Proceeding from this, they argue that the spatio-temporal relations revealed are equivalent to a new law of nature. This is quite logical, if we take into account that throughout the history of physics, contradictory patterns in data, as a rule, have highlighted ways to new discoveries.

Before proceeding to a theoretical justification of their results, we draw the readers' attention to the general dynamics of the motion of stars in spiral galaxies. First of all, there is a spherical star cluster (core) located in the center of each galaxy. The spatial/orbital velocity of the stars inside it increases with linear dependence on the increasing distance from the galactic center (the initial part in Fig. 1), but the radial (angular) rotation velocity remains constant. Rotation of a solid body provides a good example of such a combination of velocities.

Previously, astrophysicists had found that the branches of spiral galaxies consist of low-density gaseous and dust matter, illuminated by the stars within the galaxies. They spin in the same direction of rotation as the galaxy's core, which eliminates any dominant influence of a centrifugal force. In this case, the gaseous and dust matter in their spiral arms rotates at a constant angular velocity, independent of the distance to their respective nuclei.

Note: Figure 1 shows a graphic image taken from the university website www.astronomy.ohio-state.edu

Stars that are distant from the spherical nucleus of the galaxy (horizontal section in Fig. 1) move in the same direction as their gaseous and dust matter. Located at various distances from it, they rotate at the same angular velocity as the spiral arm in which they were born. As a result of this, they spend their entire lives within the inner field. The stars that are located closer move with a greater angular velocity. So, they enter and exit the gas and dust arms of their galaxy. And vice versa, stars that are located at a greater distance rotate at a lower angular velocity. Gradually, the gas-dust arms of a galaxy do not only catch up with them, but also overtake them. As a result, the angular velocity of a star's rotation decreases as it travels away from the galactic nucleus with a linear regularity, and the orbital velocity of motion remains nearly constant, demonstrating a discrepancy with the Keplerian regularity of velocity change.

In this regard, first of all, attention is drawn to the mirror-like character of changes in orbital velocity and radial velocity of rotation of stars in the nuclei of galaxies, and in the region of their spiral gas-dust arms.

In order to establish the physical root cause of the event, we first examine the movement of one point along the circumference of a circle in the two-dimensional plane of a sheet of paper. The horizontal and vertical axes of symmetry divide the circle into four ninety-degree sectors, and the line of its circumference, into four equal parts:

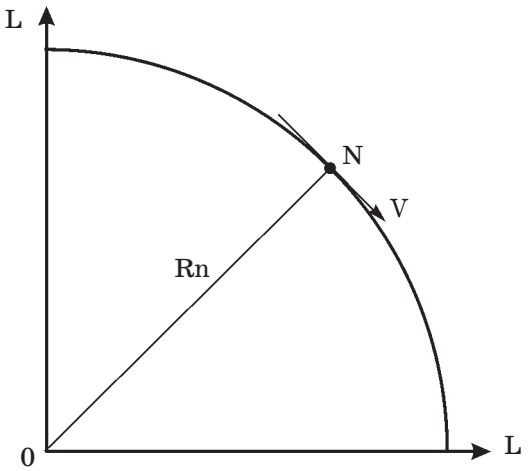


Fig. 2

If the velocity of movement of point N remains constant along the quarter line of the circumference in Fig. 2, all the points on the circle radius line (ON) rotate with the same angular (radial) velocity, and their spatial velocity of movement, based on the formula: $L = 2\pi R$, increases with a linear regularity with growing distance from the center of the circle. Such a combination of velocities is characteristic of the motion of stars located in the central region of galaxies (core).

Let us combine the horizontal and vertical axes of symmetry of the circle with a space-time coordinate system where $V = L/T$:

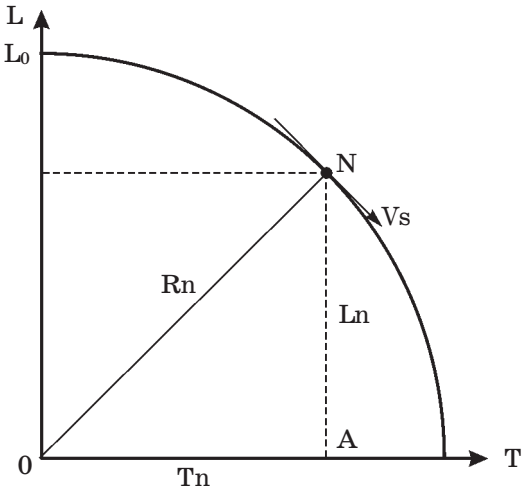


Fig. 3

In Fig. 3, the Ln/Tn ratio predetermines the numerical value of the velocity of point (N) in a two-dimensional space. In this case, Ln is equal to the height, and Tn is equal to the base of the right-hand triangle ONA. A change in the location of its vertex on the quarter-circumference of the circle changes the slope angle of its hypotenuse (ON), and accordingly, the numerical values of the speed of movement of point N. Based on this, in the classical two-dimensional coordinate system of L depending on T, it is theoretically impossible to describe the motion of point N along the quarter-circumference at a constant velocity.

We take one second (1 s) as a unit for measuring the time of the velocity of stars. The Sun, traveling in the horizontal region of Fig. 1, completes one revolution around the center of the galaxy in 220 million years. Approximately, one fourth of this movement takes about 55 million years. With this ratio of times, the base of the right-angled triangle ONA turns out to be so small on the OT axis (Fig. 3) that in the drawing it will approach the thickness of the geometric line OL in the same coordinate system.

The V/L ratio along this line is the following: (L/T) / L = 1/T. After mutual reduction of L/L we see that this does not depend on the actual usage of space. So in Fig. 3 the option to be tested is: L_0 = Ln = 5.3 cm. Based on the unit of measurement of time T accepted as 1 second, the 1/T ration becomes a relative unit of space-time relationships. As a result of this, at the beginning of the coordinate system in Fig. 3, we arrive at two equalities: L_0 = Ln = 1 and Rn = Vs = 1.

Once Lorentz proposed to recognize the fundamental coordinate system as a state of rest. At that time, the idea of existence of a «world ether» dominated in many minds of theorists of the Universe. Since the interaction of photons of light with the world ether was not established in the course of physical experiments, this proposition was rejected.

Let us look at Lorentz's proposal from a different perspective. When we study the motion of point N. in two coordinate systems, L depending on T, sharing a common center, one of these (in Fig. 3) is stationary and located in the plane of a sheet of paper, and the other rotates around the 0 point:

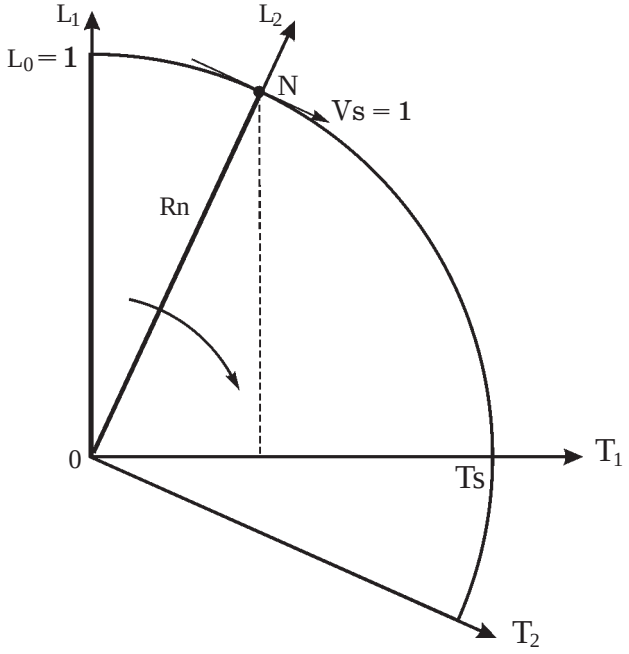


Fig. 4

The radius of the circle of the second coordinate system contains information about the speed of point N. As shown above, it can be reduced to a relative unit of spatio-temporal relations: Rn = Vs = 1. At the same time, this is the constant rotation speed of the second coordinate system, in relation to the first.

Rotation of the second coordinate system by 90° leads to an alignment of the radius of the Rn circle with the axis OT_1 of the first system, and at the same time, to the numerical value of the travel time of point N. along the fixed 1/4 of the circumference at velocity Vs, equal to 1. In Fig.4, it is equal to Ts.

Here, special attention should be paid to the fact that the change in the numerical results of the projection of point N. onto the OT_1 axis is associated not only with a change in the angle of inclination of the ON radial line (as in Fig. 3), but also with a change in the direction of the velocity vector (Vs) per time unit (1 s). At each point of a quarter of the circumference, it is directed along its tangent. The change in its position per second determines the magnitude of the angular acceleration. With a constant spatial velocity of movement of all points located on the circle radius line in Fig. 3, their angular velocity of rotation in Fig. 4 will vary along the ON line, from V = 0 at the beginning of the coordinate system, to Vs = 1.

Since after rotation of the second coordinate system by 90°, the change in the numerical values of the speed of its rotation from V = 0 to Vs = 1 overlaps with the time axis OT of the first system, the geometry of the quarter circumference can be obtained using the Pythagorean theorem:

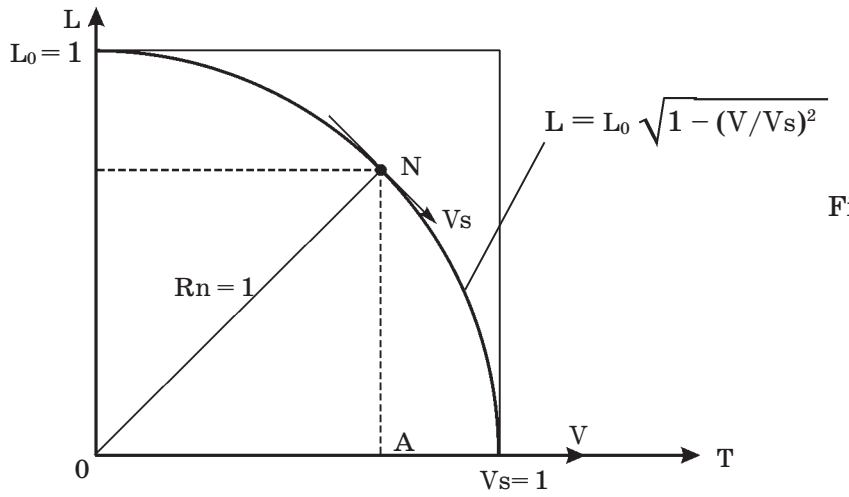


Fig. 5

Based on the formula for forming a quarter-circumference, where V = 0, L = L_0 = 1. At the same time, the tangent to the circumference at point L_0 is parallel to the OT time axis. Where V = Vs, L_0 = 0, and the tangent to the circumference is parallel to the spatial axis OL. Intersecting each other, they form a space-time square with a side equal to 1.

Let us compare the formula in Fig. 5 with the direct Poincarй radical underlying the SRR and GRT:

$$L = L_0 \sqrt{1 - (V/C)^2}\,.$$

In this formula, the numerical values of the spatial velocity of motion are subject to change. They increase with a linear regularity from V = 0 to V_{max} = C and correlate with a constant speed of light in vacuum (C = 299.7 … thousand km per second).

Proceeding from that, where V = 0, L = L_0, and where V = C, L = 0. The zero result thus obtained was the basis of the hypothetical theory of compression of space when movement occurs at the speed of light. As a bright example of such compression, school physics textbooks compare the size of the globe with that of a matchbox.

The theoretical research conducted by the author of the article enables him to look at the physical essence of the zero result from a different angle.

In this physical and mathematical form, the direct radical flows from its opposite, with the help of which Poincare geometrically approximated Lorentz's experimental curve. According to his data, energy costs are connected with increasing the speed of electrons close to the speed of light, and there exists a quadratic regularity in this dependence. Since the particle-wave nature of electrons was not known at that time, the increase in the inertia of electrons (m) was considered to be the reason for increasing energy costs. Thus, this formula evolved: $m = m_0/\sqrt{1 - (V/C)^2}$, with a reverse radical for its denominator.

Proceeding from that, where V = 0, m = m_0 in the coordinate system of the state of rest, and where V equal to C, m acquires an infinitely large numerical value. Its combination with a spatial L equal to 0, this theoretically justified formation of «black holes».

As Einstein did not believe in their physical existence, he designed an original way of correlating Newtonian mechanics with Maxwell's electrodynamics. He replaced Newton's designation of «W» as energy with the «E» component (of electromagnetic waves). As a result of this, the familiar formula appeared: $E = mC^2$. It is valid if a material body with an m mass exists in a coordinate system at a state of rest; but upon transition to a coordinate system of motion at the speed of light it will fully transform into electromagnetic matter.

Einstein himself did not look at his modification in this way, yet he led physicists to a theory of other spatio-temporal relations that come into force when moving at the speed of light. However, by «solving» the problem of matching Newtonian mechanics with Maxwell's electrodynamics in this way, physicists gave rise to another problem, when what happens within atoms was examined using the special (SRT), and in external – general (GRT) theories of relativity.

Peter Higgs' attempt to overcome this physical and mathematical uncertainty using another hypothetical theory did not lead him to the result expected. After the fact of the decay of the Higgs bosons was established during physical experiments conducted on the Large Hadron Collider (LHC), voices were heard among modern theorists of the Universe about the need to create a new physical science.

We go on with the theoretical justification of the result of American astrophysicists' research, which by its very essence deletes not only the hypothesis of the existence of «dark matter», but also forces us to return to the origins of STR and GTR.

Based on the constancy of the speed of movement of point N along the quarter-circumference, we divide it into eight equal parts, and the results of the numerical ratios V/Vs are denoted by n:

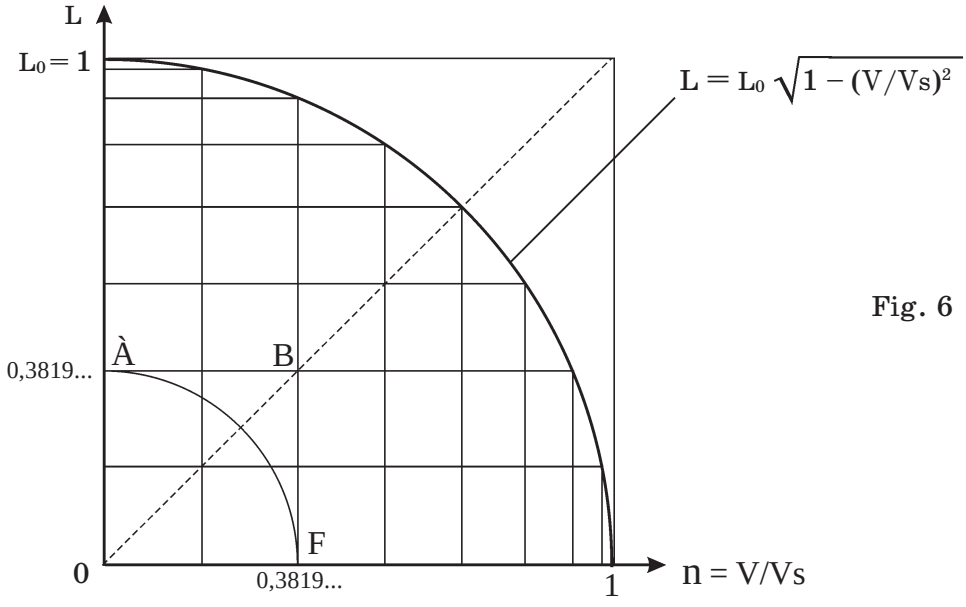


Fig. 6

The projections of equidistant points on the quarter-circumference in Fig. 6 on mutually perpendicular axes of the two-dimensional coordinate system L depending on n produce unequal segments.

Their length decreases with the same regularity at increasing distances from the origin of this coordinate system both along its axis OL and along the axis On. Let us pay attention to the resulting OABF square, in which the spatio-temporal relations are nearly equi-proportional. Of no less interest is the fact that the numerical values of the locations of points A and F on their coordinate axes are equal to the value of the «golden» ratio, 0.3819 ...

Earlier, we carried out a similar geometrical a study of the mathematics of Poincare's direct radical for numerical V/C ratios in our article, *From the foundations of the general and special theories of relativity to the physical root cause of what happens in galaxies* [1]. There, we also associated the dynamics of change in numerical results obtained using a similar pattern with changing acceleration. We defined the spatial region of the OABF square as the area of sphere formation, which requires a constant acceleration value g_0. This can be visually illustrated in placed a drop of water in a state of weightlessness. Since the constancy of the velocity of electromagnetic matter propagation in vacuum (V/C), and not the constancy of the angular velocity of rotation (V/Vs), was taken as the basis for computing the results of the velocities ratio, it was not continued in this direction of theoretical research. This also led to other interesting discoveries.

Further, we combine four graphic images in a circle in Fig. 6:

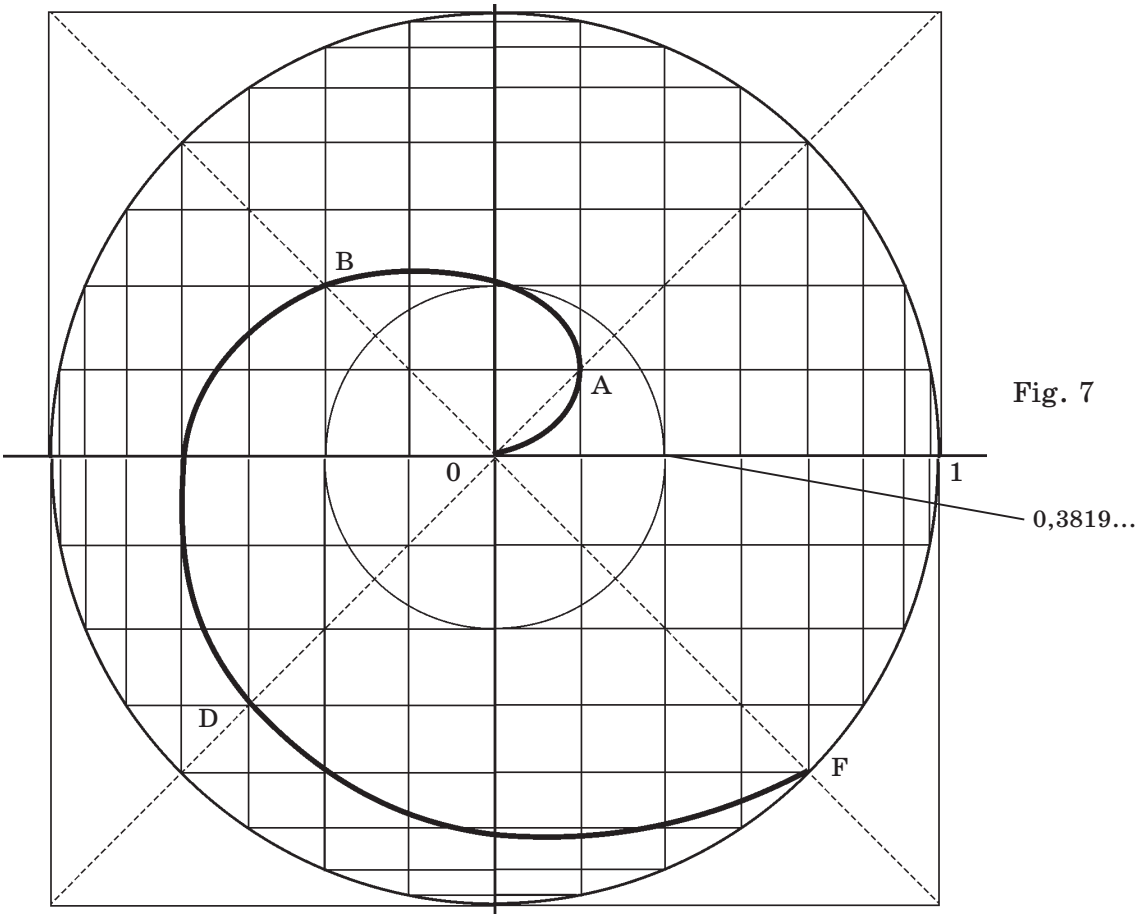


Fig. 7

The spiral of spatio-temporal relations shown in Fig. 7 is a Fibonacci spiral. It graphically connects points O, A, B, D, and F. Four of them indicate vertices of squares, whose area keeps increasing with a quadratic regularity, as these points travel farther away from the center of the circle with a linear regularity.

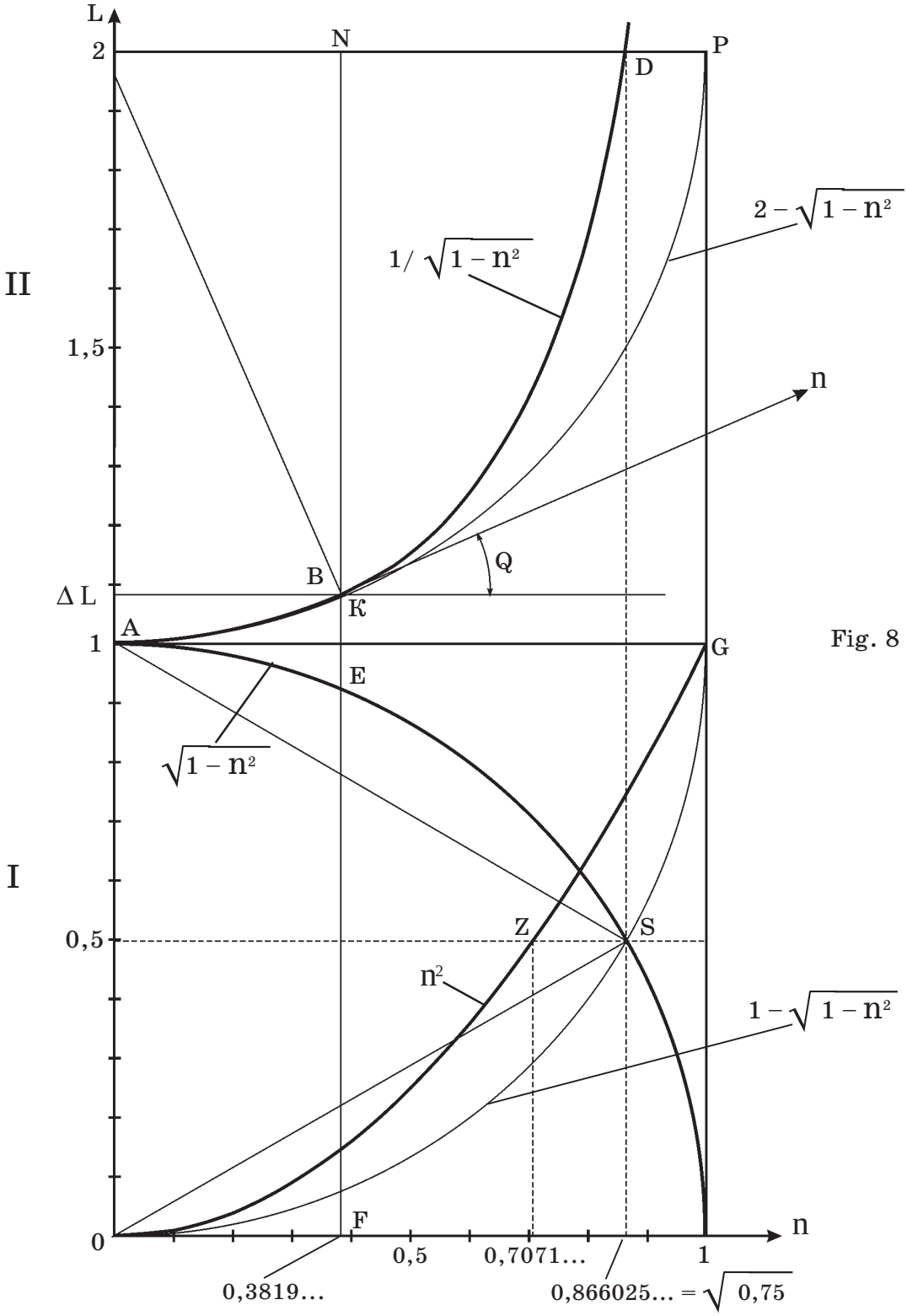
Applying a 180° turn, we get its second image, a mirror one, and rotating by 90° and 270°, we obtain two more spirals. If we draw a spiral starting from the circumference of the inner circle (the area of sphere formation), then we get a geometrically clear mathematical basis for the formation of gas-dust spiral arms. In this case, the rotation of the inner circle in Fig. 7 determines both the rotation of the circle as a whole and the rotation of the Fibonacci spirals formed inside it with the same angular velocity.

Based on this, we can conclude that the basis of the formation of the geometric spiral of spatio-temporal relations in Fig. 7 is the unity of linear and quadratic changes in numerical values, correlated with the physical process of rotation.

The combination of linear and quadratic patterns of change in numerical values is equally present both in the formula of the line of a quarter circumference in Fig. 6 and in Poincarй's direct radical. In the first case, velocity V varies with a linear regularity from 0 to Vs = 1, and in the second from 0 to $V_{max} = C$.

The results of the V/Vs and V/C ratios are equally immeasurable (n) and equally vary from 0 to 1. After they are squared, the quadratic regularity $(1 - n^2)$ that is mirror-relative to the mathematical unit the quadratic regularity is calculated under the square root.

In this regard, we study the geometry of the forward and reverse radicals in the two spatial squares with sides equal to 1:



First of all, it should be noted that the ratios of 1 to the numerical results of a direct radical are geometrical opposites of a reverse radical (see the AD curve in Fig. 8) when it is protracted beyond the first square.

Also, the geometry here shows that the velocity $V_{max} = C$ ($n = V/C = 1$) can only be reached if $L = \infty$, which runs contrary to physics of electromagnetic matter (whose $V_{max} = C$) in inside atoms, which are limited in their sizes. That is why it is important to understand the physical essence of the mathematical result obtained and to exclude the possibility of infinite values for inertia m.

Let us look into the geometry of the reverse radical, as shown in coordinate square 2 in Figure 8. We are especially interested in the fact that the quadratic regularity of n^2 is (in square 1) absolutely coincides with the AD line of the reverse radical. To see this, we have to shift coordinate square L depending on n from the first square to point B on the AD line (coordinate square 2), and then rotate the line counterclockwise by angle Q.

As a result, the projection of the point of convergence (B) onto the horizontal axis On of the original coordinate system L depending on n (Line FN) divides its unit into two constituents that equal the golden ratio: 0,3819... and 0,618... Thus, if the geometry of the direct radical shows its mathematical kinship with the pi (π) constant, the geometry of the reverse radical shows a mathematical relation between the quadratic regularity and the golden ratio.

It should also be noted that the crossing point (D) of the reverse radical with a side of coordinate square 2 leads us to the value of 0.8660... The height of the equilateral triangle OAS (with its side = 1) is actually the same numeric value.

Another point to note is that at its beginning, the other side of the reverse radical line (AB) is virtually a mirror reflection of line AE of the direct radical, in relation to the horizontal line AG in Figure 8. If we replace this with a part of the quarter-circumference line of a circle with a radius equaling 1, with its center at point 2 of coordinate square 2 on the OL axis (line AP), then there will be a small difference between the crossing points on line FN: $\Delta L = 0.00622091492...$ Zoomed in, this looks like this:

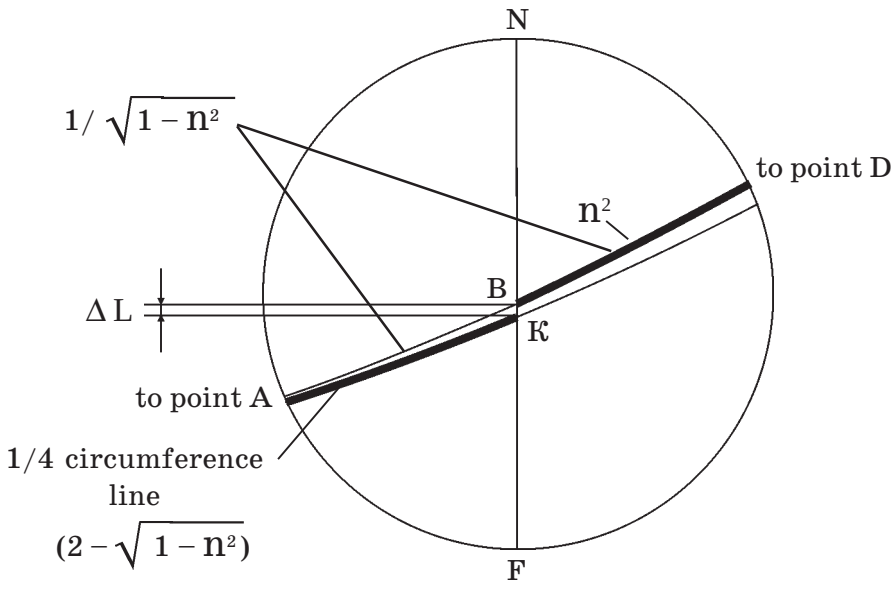


Fig. 9

Proceeding from the above, we conclude that in the geometry of the reverse radical, within the range of values on the On axis up to 0.3819..., linear change of numerical values n of the direct radical mathematics prevails, and in the remaining range (0.618...) the regularity is quadratic, n^2.

At the same time, it is necessary to note that the figures of the golden ratio are interrelated through a quadratic dependence: 0.3819 ... = (0.6180 ...)², and through the geometry of the direct radical, we establish their mutual relationship with pi (π).

Following that, we compare their mutual relationship with the instance of the golden ration in Fig. 6 and the Fibonacci spirals in Fig. 7. The spatial difference ΔL, identified in Fig. 8, has its physical extension in the transition from the stellar sphere (core) of a galaxy to the beginning of the formation of its spiral gas-dust arms. Astrophysicists called it a «bar». In it, stars move along strongly elongated elliptical trajectories, at velocities slightly higher than those located along the horizontal section in Fig. 1.

As a result of oscillations along the Z axis in this galactic region in Fig. 1 stars move along less elongated elliptical trajectories. As in the case of the planets orbiting our Sun, when approaching the galactic core, the velocities of the stars increase, and when moving away, they decrease. As the stars have different masses, we cannot ignore their various inertia values. Taken together, all the above facts explain the causes of the minor departure in the velocity of stars from the average orbital (Vav.o), shown in Fig. 1 as a horizontal line.

To understand the physical root cause of the motion of these stars with a relatively constant orbital velocity Vav.o, we return to the geometry of a quarter circumference in a two-dimensional coordinate system L depending on T:

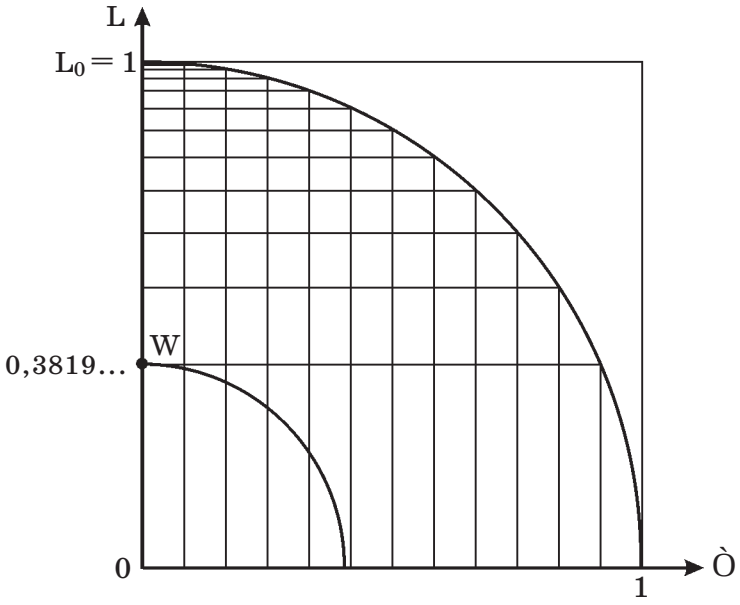


Fig. 10

As the time flow is equi-proportional, we divide its time axis OT into equal parts. The quarter-circumference line forms segments of unequal length on the spatial axis OL, their length decreasing with a certain regularity with growing distance from the origin of this coordinate system. Based on the results of the study of Fig. 8 and starting from the inner region of sphere formation in Fig. 6 (0.3819 ...), we find that this pattern is quadratic.

The equi-proportionality of the flow of time is based on the constancy of its unit of measurement. Considering this, the transition from one point to another along the spatial axis OL in Fig. 10 should occur at a speed that also increases with a quadratic regularity.

If we implement point W in Fig. 10, giving it a physical mass m, then increase in its velocity along the OL axis with a quadratic regularity is possible, if the centrifugal force applied to it increases with the same quadratic regularity. The same should work for energy E that generates this force.

Space L retains its equi-proportionality, provided that energy E decreases along the axis OL in Fig. 10 with an inverse quadratic regularity. Actually, this is what happens, if we pay attention to the physical fact that matter radiated by the stars in an electromagnetic state (recognized by physicists as a special kind of matter) is dispersed at a constant speed (C) in all directions of the three-dimensional space surrounding the stars.

Moreover, in a two-dimensional spatial plane, the energy of this matter degrades inversely, with increasing area of the circle — with a quadratic regularity. This also applies to the plane

perpendicular to the axis of rotation of the galactic nucleus. At the same time, the constant velocity of electromagnetic matter in cosmic vacuum with $V_{max} = C$ determines the equi-proportionality of the flow of time along the OT axis in Fig. 10.

We can now complete this picture with the dynamics of the movement of stars in spiral galaxies in an equi-proportional two-dimensional coordinate system L depending on T:

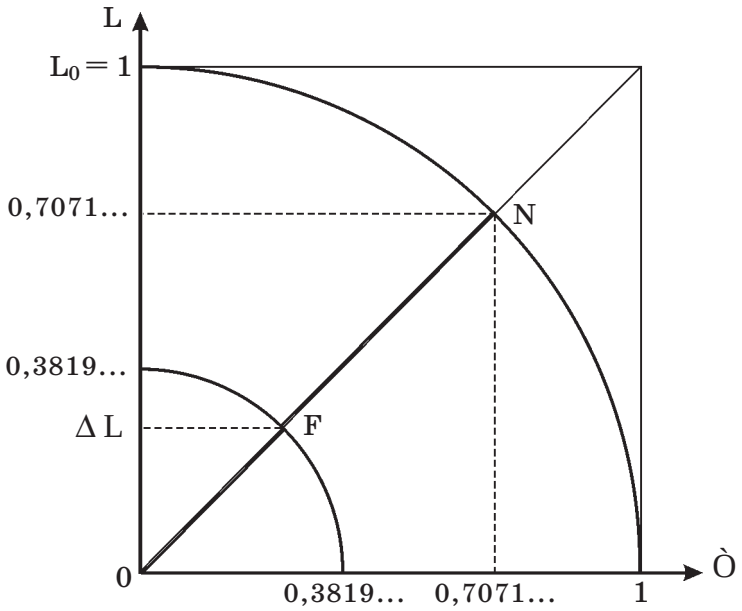


Fig. 11

On the way to point F, on the line ON of the radius of the quarter circle in Fig. 11, the angular velocity of the stars' rotation remains the same, and the orbital velocity of their movement increases with a linear regularity (V = L/T) with increasing linear distance from point O. And, vice versa, on its segment FN, their orbital velocity is constant, and the angular velocity of rotation decreases with a linear regularity with increasing linear distance from point F. In this case, in the spatio-temporal area of point F, a transition occurs from one combination of these velocities to its mirror reflection.

At the core of the galaxy shown in Fig. 11, a quarter-circumference with radius OF concentrates a large number of stars located at relatively small distances from one another. Each of them is a powerful source of radiation of matter in its electromagnetic state. It is equally dispersed and energetically attenuated in all directions of the three-dimensional space surrounding the stars. In the nearest opposite directions, due to polarization of electromagnetic waves, their material N-elements are balanced through the processes of radiation and absorption, and energy E, vectorly perpendicular to H, arrange the stars at spatio-energetic levels, so that their orbital velocity increases with a linear regularity as they linearly move away from the galaxy's center.

As a result of these physical processes, a three-dimensional energy field E is formed in the three-dimensional space of the galactic nucleus, increasing with a linear regularity with growing linear distance from point O. In the two-dimensional plane of Fig. 11, this predetermines linearity of the spatio-temporal relations of the two-dimensional coordinate system L depending on T.

Point F in Fig. 11 denotes a transition to other spatio-temporal relationships. This is natural, since the stellar sphere of a galaxy (its core) is a powerful shared source of energy for the movement of stars and other types of matter in the space surrounding it. Here, we observe the same dynamics of propagation of electromagnetic matter, but already at the level of galactic core emission. Its energy decays with the same regularity in the surrounding space. On the one hand, the orbital velocity of stars in a plane perpendicular to the axis of its rotation is constant, due to the causes shown in Fig. 10. On the other hand, rotation of a galactic core is geometrically visualized in Fibonacci spiral Fig. 7 creates in it a different dynamics of their angular velocity of rotation. It linearly decreases with growing distance from point F.

Proceeding from physical properties of scattered gaseous matter concentrated in a small space and bearing incomparably greater inertness m, we can use Fig. 7 to justify the formation of gas/dust arms of spiral galaxies, as well as the difference in their motion with stars located in this spatial region.

In turn, each of the stars is the dominant source of radiation of electromagnetic matter for the surrounding planets and other material bodies. As for the shift between the orbital velocity of stars in spiral galaxies with Kepler's regularity of velocity change inherent in the dynamics of the planets orbiting the Sun, it is necessary to pay attention to the fact that the elliptical trajectories of the planets are their projections onto a two-dimensional plane that is perpendicular to the direction of the Sun's motion. In fact, they move along the trajectories in the form of elliptic spirals, and they must be considered together with the Fibonacci spiral of spatio-temporal relations in Fig. 7. The medieval astronomer Titius discovered that the distances between the planets of the Solar system change in accordance with the Fibonacci sequence of numbers.

We cannot but note another mathematical fact. The diagonal of the space-time square in Fig. 11 with a side equal to 1 also forms the bisector of the right angle in the two-dimensional coordinate system L depending on T. The projection of the point of its intersection with the quarter-circumference yields the same numerical values for the spatial and temporal axes of coordinates equal to 0.7071... Mathematically, this is the result of extracting the square root of 0.5, and physically it is the average effective value of the E-components of the rectified sinusoidal oscillations of electromagnetic waves (Eav.eff.).

For millennia, the geocentric system of the Universe has dominated the minds of people. However, several centuries ago, as a result of the evolution of scientific thought this was replaced by the heliocentric theory. Nowadays, the halocentric theory makes a persistent claim upon us, and it is based on the «golden mean» of the Unified Law of opposing forces, centripetal and centrifugal.

Inside atoms, electrons also revolve around their nuclei along elliptical trajectories. Moreover, they are located in the electronic shells of atoms, at specific spatial and energy levels. And their quantity varies depending on this numerical sequence: 1, 2, 8, 18, 32, which the author of the article previously called the electronic numerical sequence.

We previously showed the results of analyzing the numerical relationships formed inside this sequence in an article called *«The «Golden Mean» in the Unified Pattern of the struggle of contraries»* [2] and continued in the article *«Relativism as a fatal mistake of modern science»* [3]:

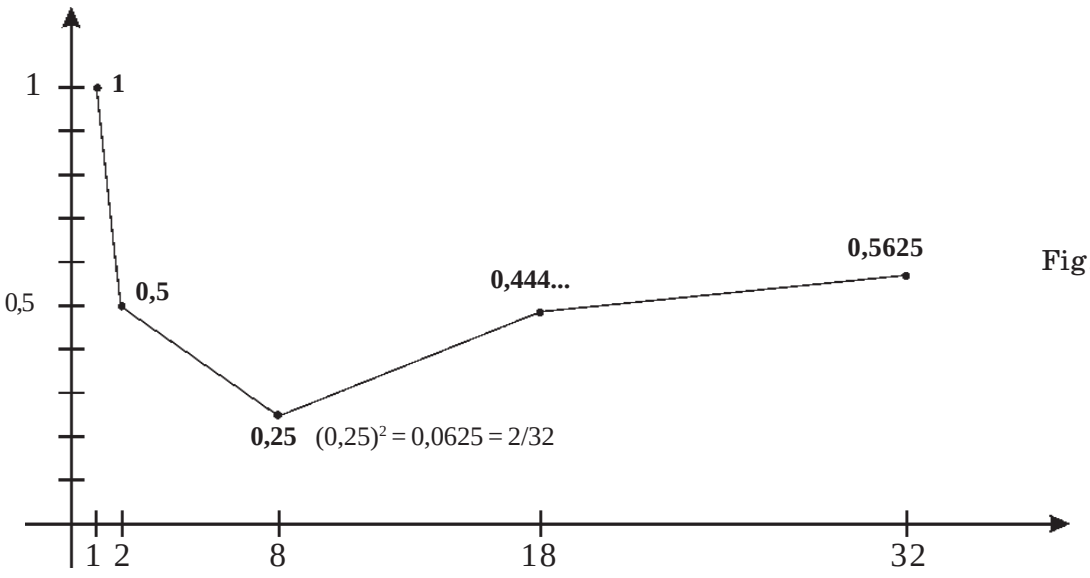


Fig. 12

Fig. 12 shows the numerical results formed from the ratio of a smaller number of the electronic numerical sequence to the following greater number:

$$1/2 = \mathbf{0.5};\quad 2/8 = \mathbf{0.25};\quad 8/18 = \mathbf{0.444\ldots};\quad 18/32 = \mathbf{0.5625}.$$

In the case of the maximum numerical value (32):

$$0.5625 - 0.444\ldots = \mathbf{0.11805555\ldots}$$

In turn, the difference: $0.444\ldots - 0.0625 = 0.38194444\ldots$, where $0.0625 = (0.25)^2$. The numerical results obtained in this way lead to the range of numbers of the Fibonacci sequence: … 55, 89, 144 …, where their ratios are:

55/144 = 0,38194444... and **89/144 = 0,61805555...**

Unlike the irrational numbers of the «golden ratio», computed via the Fibonacci numbers sequence, 0.6180555… и 0.3819444… are strictly rational decimal fractions, starting with the fifth decimal place.

This indicates that inside atoms nothing happens by chance, as adherents of the special theory of relativity and of quantum mechanics would have it, but everything is mathematically predictable.

The value 0.5625 is of particular interest, since it is formed both through mathematical operations with the first two values: $0.5 + (0.25)^2 = 0.5625$, and from the ratio of intermediate numerical results: $0.25/0.444\ldots = 0.5625$.

Besides, $0.5625 = (0.75)^2$ and $0.75 = 3/4$ – this is the height of an equilateral triangle fitted inside the circumference of a circle with a diameter equal to 1. When two such mirrored triangles overlap on top of each other, they will form a hexagram, which is one of the most ancient geometric symbols of the contraries in unity. The vertices of these triangles divide the circle line of the circle into six equal parts, creating this ratio: $5/6 + 1/6 = 1$. In this regard, one cannot ignore the sum of the intermediate ratios of the electronic numerical sequence:

$$0.25 + 0.444\ldots = 0.69444\ldots = (0.8333\ldots)^2, \text{ where } 0.8333\ldots = 5/6.$$

The circle's radius fits exactly six times along the line of its circumference. As a result, it is combined with complete accuracy with an equilateral hexagon, which underlies the calculation of the geometric constant, the number pi (p).

Thus, where in Leonardo da Vinci's drawing (*Vitruvian Man*) two projections of the human body on a two-dimensional plane are fitted within a circle and a square (with their dimensional ratio of 5/6), then the geometry of the hexagram is visible in the inner spaces of the atoms.

Observing the rotation of an electron around the nucleus of an atom using ultrashort laser pulses, physicists have found out that it is possible to define 2/3 of the trajectory of its motion. The core of this is the particle-wave duality of the electron, which is intermediate between the Newtonian material energy and Maxwell's electromagnetic energy.

Dividing the circumference of the circle into three equal parts, we obtain the numerical ratio of 2/3. In it, the numerator is divisible by 2, and the divisor is divisible by 3. The product of these is six, and their sum is five. At the same time, it is necessary to note that 2 and 3, follow 1 in the numerical Fibonacci sequence: 1, 1, 2, 3, 5, 8, … .

The decimal result of the 2/3 ratio is 0.666… Squaring it makes 0.444… – the same as the result of the 8/18 ratio in the electronic numerical sequence. At the same time, we note that 8 is divisible only by 2, and 18 is a divisible by 2 and 3, as is the number of 6.

The horizontal axis of symmetry of the circle divides the height of each triangle in the hexagram into two unequal parts with the same proportionality (2/3). In a previously published article entitled *«Ancient Symbols and Modern Science»* [4], successive rotations of hexagram triangles by 120° resulted in identity of the spatio-temporal relations arising in relation to the mode of a person's movement on the earth's surface (as a result of alternate movements of his two legs).

Nowadays, physicists are trying to penetrate into the secret of the structure of atomic nuclei through their collision with the help of powerful magnetic accelerators of elementary particles. Their actions can be opposed by mathematical «fractioning» – dividing the numerical values of the masses of protons and neutrons by 6, 2, 6, 6, 6, 6. The intermediate results of this mathematical process are given in the article *«The «Golden» tri-unity as the basis of the Universe»* [5]. Ultimately, it leads to the same numerical result as the numerical difference:

$$0.5625 - 0.444\ldots = \mathbf{0.1180555...}$$

And in the case of: 2 8 18 32 32 18 8 2

we observe a complete and at the same time mirrored symmetry in the electron shell of the atom.

For specific atoms, local symmetry of the number of electrons is characteristic:

12 (Mg)	—	2	8	2					
20 (Ca)	—	2	8	8	2				
38 (Sr)	—	2	8	1 8	8	2			
56 (Ba)	—	2	8	1 8	1 8	8	2		
86 (Rn)	—	2	8	1 8	3 2	1 8	8		
120 (x)	—	2	8	1 8	3 2	3 2	1 8	8	2

Based on the above, the 88th chemical element (Ra – radium) does not form the expected symmetry. For 86 (Rn) the sum of its electrons 2, 8, 18, 32 is 60, and the fifth and sixth energy levels are 8 + 18 = 26. The result of the ratio is 26/60 = 0.4333... The number thus obtained is less than 0.4444... The appearance of another electron at the seventh level of the next atom would raise it from 26 to 27. In this case: 27/60 = 0.45, which is more than 0.4444... Besides, the difference: 0.45 – 0.0625 = 0.3875 exceeds the deviation in the number range of the Fibonacci sequence ...55, 89, 144..., equaling 0.38194444... As a result, when going from 86 (Rn) to 87 (Fr), the difference is 15 electrons, and as a result 32 electrons fill the fifth energy level 87 (Fr).

In this regard, we draw attention to an equilateral triangle depicted in the article *«The «golden» section. Physics of the root cause»* [6]. It is based on the dynamics of changes in the number of electrons in the electron shells of atoms and on the dynamics of change in their atomic masses, in accordance with the periodic system of chemical elements:

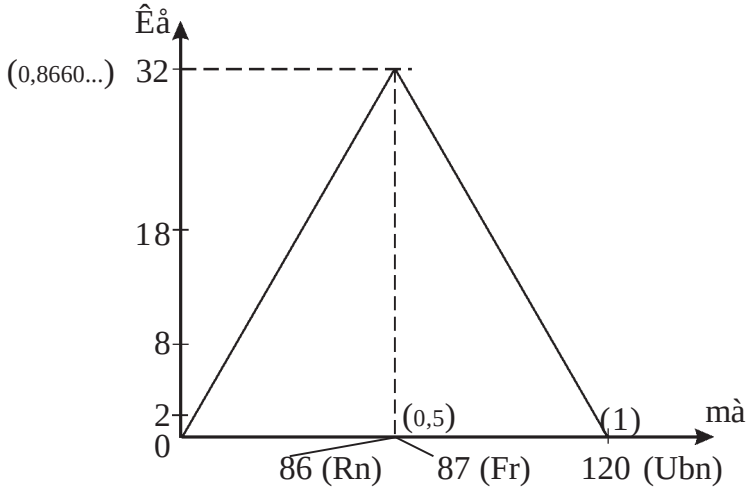


Fig. 13

In Fig. 13, the location of the Francium atom (Fr) is predetermined by half the sum of the masses of all atoms of the periodic table (including 120). When going from 86 (Rn) to 87 (Fr), a difference of 15 electrons appears. Moreover, the result of the ratio of the mass of radon (Rn) to the maximum possible: 222/296 = 0.75, returns to the numerical value of the height of an equilateral triangle fitted within a circle with a diameter equal to 1.

In our commentary to Fig. 11, attention was drawn to the mirror symmetry of the combination of angular velocities of rotation of the stars and orbital velocities of their motion relative to the location of the spatio-temporal region of the «golden» proportionality (point F), as well as the energy difference formed there.

There is nothing paradoxical about the fact that this physical process is identical to the one studied using Fig. 13. Squaring 0.75 makes 0.5625, which returns us to the results of the study of the electronic numerical sequence, and its difference from 0.444... leads us to the Fibonacci numerical sequence (...55, 89, 144...). At the same time, as Fig. 13 illustrates, when the maximum number of electrons is reached during the transition from Radon to Francium (32), a quantitative difference of 15 electrons occurs.

The main difference between living matter and nonliving matter is the ability of the living to counteract the planet's gravity due to internal energy processes. Another kind of physical process is of interest, too, as it show how living organisms change spatio-temporal relations: the dramatic acceleration of the human body growth during adolescence. In new-born babies symmetry of height is complete (0.5 to 0.5 divided at the navel line). Until adolescence, it grows to 0.6, with a linear pattern in time. At 13-14 years of age, the tempo of growth becomes considerably higher as compared to the previous development. By the age of 21, body growth ceases at the ratio of 0.625. If the whole life time equals 1, where 1/6 + 5/6 = 1, 1/6 is about 14 years long, then the product is 14 x 6 = 84 years. Dividing 84 by 4, we get 21: this is the age of maximum body growth and attainment of physical maturity. For clearer visualization, we can show approximately the related energy processes geometrically:

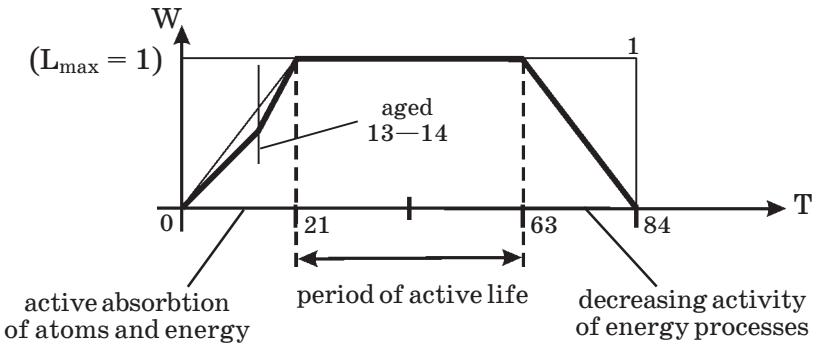


Fig. 14

Concerning this, we can also mention the discovery of U.S. scientists who have proved that aging of body cells starts when we are 39 years old. If we proceed from 13 years as the beginning of adolescence, its product (lifetime) is 13 õ 6 = 78, and half the life is precisely 39 years. The ratio 13/21= 0.619... is quite close to 0.618...

The identity of all types of living matter lies in their similar cellular-molecular basis. Also, all information about the internal structure and appearance of all living things was originally laid in their genetic DNA helices. In this regard, it is necessary to pay attention to another discovery made in 1990 by J. Perez in genetics – the discovery of the DNA resonance, called the «DNA SUPRA code». He was the first to establish that 144 neighboring nucleotides, which are formed from 55 T-Type bases T and 89 bases of type CAG, are involved in the process of DNA division (mitosis). The results of numerical ratios: 89/144 = 0.6180555... and 55/144 = 0.3819444..., led Perez to the same Fibonacci numerical sequence.

As stated in our article *«The Root Cause of the Origin of Life»* [7], this discovery complements the results of studying the electronic numerical sequence with one more applied example and is of fundamental importance not only for establishing the mathematical basis for the division of the DNA double helix. It helps to understand that the formation of the proportion of the «golden» rationality (0.6180555... + 0.3819444... = 1) in DNA is predetermined by the energy processes occurring in the internal spaces of atoms.

In addition to the similar atomic and cellular-molecular basis, the identity of all types of living matter is divided into two opposite sexes, and this is also embedded in their genetic DNA helices. In this regard, attention should be paid to the discovery made back in the middle of the 19th century. By measuring two thousand humans, A. Zeising established that the proportions in the structure of male and female bodies diverge from the «golden» proportion. He also linked them to the ratio of the numbers of the Fibonacci sequence: female $3/5 = 0.6$, and male – $5/8 = 0.625$.

In all natural occurrences of the «golden» ratio, its connection with linear symmetry is inextricable. Geometrically, this is illustrated by Leonardo's drawing of the *Vitruvian Man*. In his commentary, he drew attention to the resulting spatial difference of 1/14.

As a painter, Leonardo used to take greats pains rendering details, to the very minutest lace in his characters' clothes, thus bringing out the harmony of each thread. We wonder, what he would say about the *Black Square* of Malevich, now deemed a masterpiece of modern painting? Most likely, he would find it awkward, to say the least. But learning that the today's researchers of nature have employed mathematics, to end up with so many more «black squares» (black holes, black matter, or black energy), he would be shocked at the effort of these Malevich-type mathematicians. For him, the only conclusion to make would be that the recipients of his message have neglected his warning and arrived at a blind alley, 500 years later (He sealed his will on April 23, 1519, leaving his text as a warning to the generations to come).

Nowadays his words still sound as bitter reproach to the merited physicists and abstractionist artists, ***«And should you say that knowledge is true which begins and ends in speculation, it is impossible to agree with you about this; and this has to be refuted for many reasons; first of all, as such pure contemplation has no assistance from experience, and without the latter, there is no assurance».***

The applied study of U.S. astrophysicists S. McGaugh, F. Lelli and D. Schombert is another proof of the truth of Leonardo's words. Opposed to the hypothetical fantasies of modern theorists of the Universe, together with recent discoveries in other areas of human knowledge, their discovery leads to the final proof of the unity of the physics of motion of various types of matter in the macroworld and in the internal spaces of atoms. The basis of this unity is the Unified Pattern of opposing forces: centripetal and centrifugal.

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