SPACE STRUCTURE

STUDY OF SPACE PROPERTIES WITH THE HELP OF HYPOTHETIC IMAGINARY PARTICLES OF "SPACE INTERVALS"

M. V. Chesnakov

JSC "Concern "Sozvezdie", Voronezh, Russian Federation

chesnakov47@mail.ru

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Classical physics features plenty of paradoxes and unsolved problems. It is proved that sometimes the interpretation of results of a successful practical formalization of some phenomena has turned out to be a mistake; therefore, false physical representations of objects with nonexistent properties have been established in classical physics. Further analysis of such physical representations with the help of physical intuition has resulted in paradox, accordingly.

The hypothesis involves alternative physical representations of objects that comply with the same mathematical equations. In particular, a physical representation of structural components of the matter (in this hypothesis referred to as space intervals) is used as the basis for forming the Space representation, which may be analyzed with the help of physical intuition and logic and allows to find valid answers to the problems related to its fundamental properties.

The study proves that there is the Intranuclear Space along with familiar Macro Space, which drastically differ from each other.

Specific properties of the Intranuclear Space have allowed to create conditions for forming more complicated objects that the Electron (Positron), Photon, and Neutrino.

The hypothetic Macro Space has all fundamental properties with one amendment only – the principle of relativity is approximately fulfilled. However, due to small values of attractive forces in real processes, the violation of this principle is practically unnoticeable.

The study contains some notes related to a number of objects and phenomena of the Global Space (dark matter, Einstein shift, the moment of the Universe's birth, black holes, proper time).

This hypothesis offers one of possible variants of the Space structure. As the velocity of interstitial interaction is higher than the velocity of light while being not an infinite value, along this the fact that it passes in the structureless imaginary part of the complex Space, any theoretical studies in the field of General Theory of Relativity are becoming more urgent while the issue related to gravitational waves is still open.

Keywords: Continuum, Universe expansion; closure, infinity and homogeneity of Space; principle of relativity, directivity of Time; Photon, particle Mass, space intervals.

Introduction

As academician A. B. Migdal once said: "Physics cannot exist without mathematics and mathematical concepts but it's not limited to them. Moreover, physics is not based on formulae but on their interpretation, i.e. the understanding how it fuels intuition. The development of physics is not based on mathematical logic but on physical intuition".

We may also say here that physical intuition deals with subjects of research such as the concept of a physical object or a physical object interpretation.

It's a bold statement that many paradoxes of modern physics have appeared due to an exaggerated role of mathematics, due to an implicit and fascinating faith in mathematical symbols. A successful formalization of processes, in terms of calculations, and their absolutization under conditions when physical consequences of formulae cannot be proved by means of direct experiments or any obsolescent wrong beliefs may hamper, has resulted in the situation that in some cases the presentation of a physical object non-existent in the nature has been created.

It is known that mathematics is similar to physics. But, as it turned out, this principle was often forgotten as many examples proved.

The mathematical analysis of the particle structure proves the existence of formations called quarks in the particle structure. However, further interpretation of the mathematical analysis findings created the physical presentation of a particle as the bound state of quarks (not monopoles as the hypothesis shows) and, therefore, led to failed attempts to find quarks in a free state.

We often see the statement that it is impossible to create an understandable physical interpretation of the Photon, because it is impossible to represent wave and corpuscular properties of the Photon simultaneously; that is why the Photon should be regarded as a mathematical interpretation that has no physical presentation. As it turned out, it's not difficult to create a physical interpretation of the Photon – all you need is to reject the property such as periodic oscillations of the electrical component vector that are not proved by means of direct experiments . The only proof of the existence of this property is an accurate mathematical analysis of the interference phenomenon with the help of wave concepts. It turned out that interference phenomena can be explained not by a wave process but with the help of a periodic process while the mathematical interpretation actually remains unchanged.

Implicit adherence to mathematical formulae also affected cosmological concepts. The explanation of so called "Universe expansion" by means of the Doppler's effect is definitely insufficient. Moreover, the application of mathematical findings (without appropriate remarks) that prove the existence of, for instance, the effect of curved space, indirectly leads

to the admission of the fact that the Space has its own essence. This is not admissible if we agree that the Universe is material.

1. Structural Components of the Space
Node Structure in Space of Nodes

According to the [5], note that the process of Space creation occurred within an imaginary space in such conditions when each space Interval might be linked up with any other space Interval. Being linked up with their poles, space Intervals formed Nodes. Nodes were formed in accordance with the principle stating that two like-directed space Intervals were not allowed to link up two similar Nodes or, just the same, two Intervals were are not allowed to be in the same phase state. **The level of energy is not covered by this exclusion principle, and space Intervals can easily exchange with this attribute.** In fact, **the relocation of Nodes is the process of energy redistribution** between space Intervals.

The process of node formation will be finished as soon as two unlike parts of the Node appear within the Node. These parts of the Node are called positive Monopole and negative Monopole. Each Monopole is formed by its own group of space Intervals. For the purpose of this hypothesis, the central part of each Monopole is called the Core. There are either single-core or dual-core Nodes in Nature, as well as their real prototypes in the world of particles. Two Monopoles combined into an ensemble have formed a complicated dual-core Node.

Below we will discuss dual-core Nodes. As for single-core Nodes, we will provide some brief notes only due to their specific role.

Each space Interval included in one Monopole always goes with another collinear space Interval with the **opposite direction included in the other Monopole**. Collinear Intervals have formed **axes of symmetry.**

Node "B" linked up with other Nodes "A" and "C" via space Intervals (double arrows) is shown in the centre of Figure 1. Cross connections between these Nodes and other Nodes are not shown; different thickness of lines means a different level of a specific space Interval. The positive Monopole (a Node component) is designated "Bl" and shown in blue while the negative Monopole is designated "Rd" and shown in red.
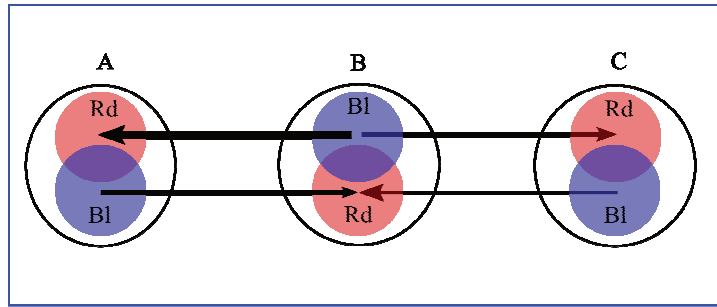
Fig. 1

The hypothesis shows that each Monopole may be located in the Shell phase or in the Charge phase. Two monopoles located in the Charge phase form the Photon. If one Monopole is located in the Shell phase and the other in the Charge phase, in the simplest case, they will form the Electron or, the Positron, respectively. Particles "A", "B" and "C" are collectively shown at the level of Monopoles, without indication which Monopole is the Shell and which one is the Charge. **The ensemble of space Intervals forms the Node boundary**. Therefore, the entire node boundary may be located within an imaginary space (Charge phase) or partially within the real space (Shell) or partially within an imaginary space (remaining parts of the Shell in the state of spatial uncertainty).

Space within a System of Nodes

According to the hypothesis, the ensemble of all interconnected space Intervals and Nodes formed by these Intervals is the real Space.

The real part of the complex space consists of Nodes (poles combined together); each Node features its own unique set of numbers that define its place in the universe phase space of Nodes. An imaginary part of the complex space is basically formed by space Intervals, in other words, an imaginary part contains the **boundary of space Intervals** or **Fields**, according to modern terminology. In addition to Nodes themselves, an imaginary part simultaneously belongs to all space Intervals; such a state of the boundary of space Intervals is defined herein as the state of spatial uncertainty. All space Intervals (**their boundary**)

simultaneously co-exist within the entire imaginary space. It is evident that no local formations are theoretically possible within an imaginary space.

The unity of the real part (Nodes) and imaginary part (space Intervals out of nodes) have formed the real existing Universe, the real existing Space.

The system comprises space Intervals with similar properties, for which an increase/decrease in energy is governed by the similar law while each Node has central symmetry. The proper Space does not have its individual essence and cannot exist independently, without Space Intervals and their Nodes.

If we assume that the Space does not have any links with other similar formations, it should be considered to be a **self-contained formation with no center and no boundaries.** In a space with such properties, any Node or any object will not be positioned in the center or on the edge of the system, but will be positioned at a **relative distance** from another Node.

The Space is a **finite** space in terms of a number of Nodes but it's an **infinite** space in terms of its extent, because nothing and nobody can break through the space and observe such a space from outside. Each Object of this space is its integral part; this Object may interact with other Objects only within the space system. Each hypothetical observer, trying to look beyond such a Space, will not be able to do that and will be able to observe only the same Space endlessly moving far away, because light quanta also belong to this Space.

In such a space, the Interaction may occur only between Nodes, affecting the state of all the nodes through binding space Intervals that form Nodes. Such a space is free of any other structures that are able to independently affect the motion of Nodes.

Attractive Forces within a System of Nodes

Attractive forces occur only in relation to dual-core nodes. Single-core nodes (single-core Monopoles in the Charge phase, neutrino-single Monopoles in the Shell phase) are not involved in the system of attractive forces.

In classical physics, the most often statement is that the relativistic Mass is an **active link** of the mechanism that **limits** the relative velocity, eventually preventing the exceedence of some maximum value.

According to the hypothesis, the Mass is the **residual effect** of the *velocity limitation mechanism.* **Relative velocity limitation is caused by failure of space Intervals interconnected within Nodes to exceed some limit of its energy variation rate.**

When two Nodes interact, the process is developing in compliance with the same general procedure. Interactions involve those Nodes, at least one of which should have spatially definite Shell. Generally, in case of collision between the Node and the Shell and the Node with both Monopoles being in the Charge phase (Photon), the phase space of both interacting Nodes will be distorted to such conditions, which will make node boundaries unite. In doing so, a temporally existing **collective Shell** will appear (at least, due to the particle with the Shell). Combined by this Shell, the Particles will be maintained in an interlinked **generalized state** for a period of time. The common Shell will provide proportional redistribution of energy among all the space Intervals that form both Nodes. The resulted new relation of forces will pull particles apart in new directions. The process of energy redistribution will take place in an imaginary part of the space, therefore, **at a speed that is at least not lower than the velocity of light** (some sources specify the time about 10^{-18} s).

This means that there are no collisions **in the microcosm that may be similar to a collision in the world of macro bodies; instead of this, the interaction reaction** is carried out, according to certain patterns and at a certain speed. **The absence of encounters means the absence of repulsive forces, and the pulse is just a symbolic description of the energy of this process, but not a real physical force** that scatters particles after collision (therefore, it is useless to expect that quarks may appear as physically free matter fragments). According to the hypothesis, the force scattering particles after interaction is the **imbalance of attractive forces** caused by an external impact.

A priori, it is assumed that **collinear Intervals** that form the axis of symmetry are **included in the Node in different ways** and the effect upon the Node differently affects the state of collinear Intervals, i.e. the **boundary of Nodes is polarized**.

Let's assume that Node "B" **has gained extra energy** due to the impact of pulse **P** (from a particle that is not shown) as shown in Figure 2. Figure 2 is divided into 2 parts by plane Z orthogonal to a sheet of paper. The process shown in the left part (space intervals are marked with solid lines) is intimately connected with the process shown in the right part (space intervals are marked with a dotted line). Nonetheless, both processes are independent and the only difference between them is a complex change in their sign and direction of motion to opposite ones, depending on the Node ("A" or "C") relative to which the motion of Node "B" is being analyzed. We may analyze either the positive direction of motion (approach) and positive disproportion of Node "B" relative to node "A", or the negative motion (separation) and negative disproportion of Node "B" relative to node "C". The following discussions will regard to the left part.
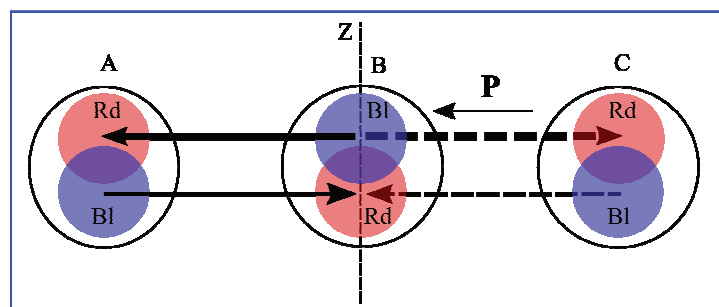

Fig. 2

The hypothesis assumes that the **phase space of Node "B" will eventually change in the direction of each particular axis of symmetry** to such extent as they correspond to the direction of the axis of symmetry of the Node, which has transmitted energy (pulse **P**); besides, it will increase to the maximum extent if the axis of symmetry aligns with the pulse. The Node boundary will expand to the axis of symmetry and cover its corresponding part. It is assumed for **clearness** that an increase in the energy of Node "B" boundary relative to "A" due to the external Force **merges** (increases a dotted interval with regard to Node "C") part of the space Interval **included in Node "B"** (in one of the cores) with **its beginning** (with its end, dotted interval). Due to this increase, a partially merged space Interval included in the

Node with its beginning will reduce its length. The inequality or, in other words, **disproportion** will occur between the levels of energy of a partially merged Interval and the corresponding collinear Interval. This disproportion is conditionally shown in Figure 2 with different thickness of space Intervals. This figure also shows that the disproportion actually occurs as the **imbalance of attractive forces** caused by an external force. One space Interval has the lack of energy, the other has the excess of energy with respect to some unknown common level.

As the disproportion occurs, the **process of its elimination will be initiated**. It will be physically implemented as the Node Acceleration Force (deceleration force) **with respect to each Node in the entire universal space**.

In respect to the hypothesis, we should conclude that the system has initially been formed by means of space Intervals, which are associated with the following rule: **the higher the energy of Interval, the shorter the distance between Nodes it corresponds to**, **but, sine qua non, with exceptional smallness of attractive forces**. This is an important note to be taken into account; otherwise, Space properties such as Isotropy, Homogeneity, etc. **will not be available**. According to this rule, merging the axis of symmetry, i.e. **shortening the Interval length means an increase in the Attractive Force** (the nature limits this rule in the near zone of interaction and the order of intranuclear distances; this state is not discussed in detail herein).

The imbalance of attractive forces will create new directions of motion for both Nodes, as well as new **uniform** relative velocities for a very short period of time (as specified above, approx. 10^{-13} s) while both Nodes will be linked by means of the collective Shell.

However, not the whole amount of disproportion energy will be transformed into kinetic energy of particles motion. The relativistic mechanism will prevent it. The relativistic mechanism is intended to compare the **momentum transmitted by the common Shell to the Node** with the amount of **relative motion of the Node**. The activity of space Intervals may be represented in vector form. That is why the momentum should be considered to be the **pulse**; the law of combination of pulses is known as $\mathbf{A^2 + B^2 = C^2}$.

According to the hypothesis, a particle is exposed to the impact of pulse **M**C acting from the imaginary space through the **collective Shell;** this pulse is **opposed** by pulse **M**V (depending on accelerated speed) and by constantly active pulse m_0C (the structure of the particle with the rest Mass is that its Shell provides irremovable disproportion in all the directions of the entire universal space).

The formula will be represented as follows: $(\mathbf{MC})^2 = (\mathbf{MV})^2 + (m_0\,\mathbf{C})^2$,

where M is total particle Mass, including rest Mass m_0 and some relativistic makeweight to the rest mass gained due to acceleration. Value **C** is the **minimum finite** value of velocity generated by the **collective** shell from the imaginary space. The **maximum initial** value depends on the level of disproportion between particles that have come in collision. The total Mass M is the **residual** value of the process of redistribution of disproportion levels. It is evident that the particle will continue to move at velocity **V** in the real space with the same value of the Mass gained at the moment of destruction of the collective shell. Value M is commonly known as the Relativistic Mass. According to the particle structure, relativistic Mass M is not something special for rest Mass m_0; both types of Mass are caused by the disproportion of space intervals

When the Shell loses its energy advantage over the internal energy of particles, they will fly apart. As a result, the process of disproportion elimination **will be stopped before value 0 is reached**; collinear Intervals **will not be equal**, while part of disproportion energy will remain unused and **will be kept** inside Nodes in the potential form. The inequality of collinear intervals will create attractive forces while the relativistic Mass will be their numerical expression.

Relativistic Mass is the numerical expression of residual disproportion of axes of symmetry remaining after velocity stabilization and is materialized in the Node's phase space.

Therefore, it is not an increase in the Velocity that creates the relativistic Mass; on the contrary, the relativistic Mass is the residue of the process that creates the Velocity.

The numerical value of the relativistic mass along with one of the axes of symmetry will have no relevance to values in directions determined by other axes of symmetry, i.e. the Relativistic Mass is **always relative**.

The hypothesis suggests that the energy of disproportion (relativistic Mass) is transformed in the Node's phase space into a form orthogonal to further motion velocity. There are some reasons for such a conclusion. First of all, the relativism condition requires that the **vector of 4-dimensional acceleration** should be **orthogonal to the vector of 4-dimensional velocity**. Moreover, such representation corresponds to the observed interaction cross-section, which rises in accordance with an increase in relative velocity. As a result, any particle, which has the rest Mass, may be represented as a sphere covered with projections different in length. Each projection is the phase space occupied by the relativistic Mass. The priority given to projections instead of discs is based on one of the properties of Photons, i.e. the plane of polarization directed along the axis of motion.

Figure 3 illustrates the end result of energy exchange during encounter. The state when Node "B" has gained relativistic Mass "RM" relative to Node "A" corresponds to the **uniform** motion of Node "B" relative to Node "A"; relativistic Mass MR is orthogonal to the axis of symmetry.
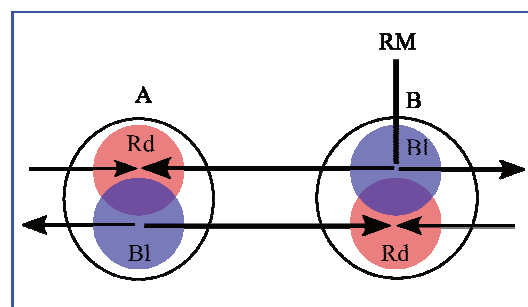

Fig. 3

The only difference between the state of **relative rest** and the state of **straight-line uniform motion** is the **absence of relativistic Mass** (MR). The state of relative rest or uniform motion is the state with **constant disproportion** of collinear space Intervals. Accelerated motion changes disproportion.

When the Node rotates, all the space Intervals included in the Node will gain positive disproportion. In other words, the Node's relativistic Mass will gain a different but positive increment in all directions (excluding the direction along the axis of rotation; the increment in this direction will be equal to zero). It is difficult to illustrate such a state.

Creation of Space within Nodes

The hypothesis suggests that a spatially undefined boundary of a Node **exposed to external factors**, in the limiting case, may change to become a spatially defined one. **Under certain coinciding conditions**, when the Node is experiencing attractive forces on all sides, the spatially defined boundary may stay in this state even when the conditions that have caused it disappear. In the hypothesis, such a boundary is referred to as Shell.

Two processes are involved in the creation of the Shell: materialization and the process of relativistic Mass generation.

The first process draws the Node boundary from infinity towards its center, which can be clearly seen in Photons, where the Photon's region of the most probable existence and interaction narrows as its energy grows.

The second process is directed from the particle center to its periphery, and is geometrically represented as an extension of the interaction cross-section along with the growth of relativistic Mass.

A construction using space Intervals **suggests the following.** In the Node's phase space the interaction cross-section is spatially realized as **a growing separation** between a space Interval pole (or a group of poles) and other poles from **a group of homogeneous poles** (in the hypothesis, this group forms a Monopole).

In a system of two interconnected Monopoles in the Charge phase, the separation involves not only homogeneous poles **but also the center of** a Monopole of the opposite sign or, where it doesn't exist, some conditional center.

If by an external impact all the Space interval poles of one of the Monopoles are removed from the opposite Monopole's center (or the conditional center), an area known as the Shell will be formed around that center (in the context of external space, it is created during materialization), prompting the Monopole to go into the Shell state. The Shell will acquire a spatial definition (hence, will lose its Charge) and under certain conditions may lose a Spin.

The only assumption that might account for the fact that the spin of the Electron equals ½ and that of the Photon equals 1 in spite of both particles having two cores is that when due to external forces the Spin's energy is added to the energy of the Shell, the Spin will disappear. It will then enter a degenerate state. In this case, the Shell's energy would **always** be greater than the internal energy of a particle, and the particle will acquire a constant disproportion known as Rest mass m_0. *Always* here is to be taken literally, for in a system of particles the initial interaction occurs between Shells before extending to everything else. In any interaction reaction the Shell is the first to acquire energy followed by redistribution of the energy in compliance with the reaction developing by the rules. At least no case of destruction of a particle by its internal energy has come to our notice.

As for the force that keeps the Monopole in the bound state, according to the hypothesis it increases with the reciprocal separation of poles, the integrated force action is directed towards the center of the Node. The conditions for the Node's existence imply that it is the most powerful force in nature, and a Monopole cannot be destroyed.

This force and its spatial realization (as presented above) provide a disproportion between space intervals and, consequently, the energy of generation of relativistic and constant Masses. Externally, **this disproportion** manifests itself as an appearance of attractive forces with a specific numerical expression in terms of relativistic Mass or rest Mass.

The space intervals themselves provide for the electric attractive forces of the Charges. It follows from the introduced construction that electric forces are considerably stronger than attractive forces, the fact experimentally confirmed. It also follows that free Monopoles in the Charge or Shell (neutrino) phase have no way of producing attractive forces for their lack of collinear space intervals. There are no experiments that could counter such a conclusion.

The impression is that only these two individual forces (one that creates a Monopole and the other that drives Monopoles) manage the development of Nature and all particle interactions. Is it possible to create a mathematical representation that would contain these two forces based on the energy of a space interval?

The creation of a Shell results in **a Space forming inside it**; this Space **is** intrinsically **different** from **the external space**. In classical physics, the analog of the Shell is a core; its size is estimated by some to equal 10^{-13} cm. All that resides within the Shell is subject to centripetal force. The Space's size and centripetal forces of the Shell provide for the

presence of particular forces. It is evident that these forces acquire a spatial definition with the screening of forces occurring at the same time. The interdependence of Nodes through space intervals leads to a formation of other temporarily existing interpenetrating Shells inside the outer Shell as well as temporary connections that ensure the integrity of the cores.

From what have been said, a Photon-wise conclusion that does not contradict the experiment should be made. Since the Monopoles comprising the Photon reside in the near zone, at the distance of less than 10^{-13} cm, the electric attractive forces bonding the Photon's Monopoles together should be of the same nature as the forces in the near zone (as in the core). In other words, two collinear space intervals linking the Photon's Monopoles must be spatially defined and have a finite (i.e. not an infinite) value.

Compared to that of mathematics, a physical representation is fuller yet does not contain any specific values. The suggested hypothesis almost wholly is based on some physical representations, accounting for its incompetence. Therefore, the nonlinear field equations domain has to be explored for a possibility of constructing such a Shell.

2. Fundamental properties of Space
Three-dimensionality of Space

Natural relativistic effects, such as relative velocity limitation and some others, require at least a 3-dimensional geometric space structure as well as a fourth coordinate – time. In this classical 4-dimensional world, a 4-dimensional **velocity vector is orthogonal to** a 4-dimensional Acceleration vector or a 4-dimensional **Force** vector. The notion of geometric orthogonality itself implies that **any Force's side** should be expressed in terms of **geometrical dimensions**.

From what have been said it follows that **relativistic Mass** (potentially) **is the Force** that will be used during interactions to change the velocity and direction of motion. **Another** representation of **relativistic Mass is an interaction cross-section** with a completely specific spatial geometry that is naturally orthogonal to the velocity.

The hypothesis makes an assumption that **three-dimensionality** (at least) is an essential feature of a spatially undefined boundary of space Intervals. Therefore, it allows us to exclude three-dimensionality from the list of attributes of Hyperspace where these space Intervals seemingly exist. Central symmetry of Nodes also naturally becomes 3-dimensional.

The hypothesis considers the same three dimensions borrowed from the classics while the fourth one is actually the **Velocity** at which a Node moves relative to another Node. In

the classics, in terms of relativistic effects, the fourth dimension is expressed by Time. In the hypothesis, Time is a rating value dependent on relativistic Velocity. It is evident that the concept of three-dimensionality is reasonable to apply only to the system of interconnected Nodes. Using it for a free Space interval would be incorrect.

Axial symmetry of space Intervals is some integrated (given the spatially undefined boundary) **direction of interaction or energy transfer**. When Nodes and systems of Nodes are created, each of them automatically acquires not axial, but **central symmetry** as a result of superposition of one-dimensional directions of interaction in a 3-dimensional space.

Isotropy of Space

According to the principles of classical physics, Space is considered to be **isotropic** if it does not have any preferential directions. In particular, it must be **symmetric** (in coordinate transformation formulas, if signs of both velocity and direction of motion should be reversed nothing must change).

Figure 4 shows a space that is conditionally divided into 2 parts (right part "II" and left part "I") by plane Z (marked by a dotted line) orthogonal to a sheet of paper. Nodes are denoted by circles. Let's assume Node "A" has been accelerated in the direction defined by a pulse P.

Since a space Interval may be represented as a vector, according to the rule of composition of vectors **all** Space intervals comprising **the accelerated Node** and all Nodes within the space region "I" **will gain in** additional energy. Space intervals are indicated by a heavier line. The direction of motion of the Node "A" towards any Node in the Space "I" has **a positive velocity sign** (i.e. speeding up) **and positive velocity** (i.e. approach).
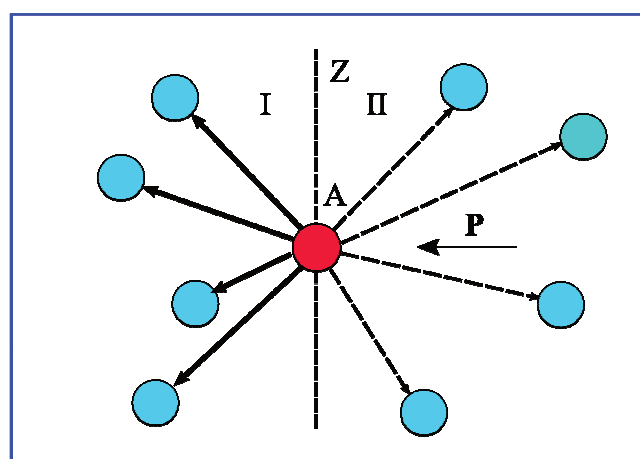

Fig. 4

The same **level of energy will decrease for all the space Intervals** located beyond the plane Z, in the space "II". Therefore, **the direction of motion** of the Node "A" towards the Nodes in the region 'II' has **a negative sign and negative velocity**. The concepts of a velocity sign and direction of motion in each plane are conditional, so that the signs could be easily reversed at the same time. Hence, **a hypothetic Space model meets the Symmetry condition**. Moreover, the division of Space using a plane is also conditional, and one could always draw a plane through the accelerated Node to any other space point, thus, it should be admitted that the suggested space model exhibits the **Isotropic** property.

Homogeneity of Space

By convention, space Intervals do not have a structure; the whole imaginary space belongs to each Node. In other words, every Space Interval inseparably exists in the whole imaginary space. It means that space Intervals are continuous, therefore, so is the motion of the Node. Both parts of Space are inseparably interconnected by a single continuous process that does not have any discontinuities and jumps, therefore, coordinate derivatives and velocity derivatives will be constant. According to classical representations, such a Space may be referred to as **Homogeneous**. Coordinate transformations will be linear.

Principle of Relativity

In the context of classical interpretation principle of **Relativity** means that moving and fixed systems are equivalent to each other. In other words, transition from system **Z** to system **Z**' is identical to the transition from **Z**' to **Z** with the respective velocity sign change. As applied to the Space based on space intervals, principle of **Relativity** is interpreted as **a possibility of addressing relations between two interacting Nodes without considering influence of the other Nodes that do not participate in the process directly.**

It is possible because, as clearly stated above, **Attractive forces are insignificant in comparison with Acceleration forces and it is possible to not consider their remote object influence.** Principle of Relativity, thus, becomes not **absolute** but limited to some extent. *Such an interpretation does not conform to the classical one but it is closer to the reality and more substantial than the classical one.*

Furthermore, the classical interpretation contains a fundamental weakness since it does not explain the "twin paradox". The paradox consists in the fact that, in accordance with one of the relativity theory conclusions, the twin who travels fast on a circumterrestrial spaceship

ages slower than their twin who waits them on Earth. However, at the same time the same theory states that both twins are identical; consequently the aging process for the twins must be indistinguishable. Why are there differences between moving and fixed objects despite the relative equality? The existing theory explains the physical meaning of the effect unconvincingly. For instance, B. Hoffmann states: "In reality these twins cannot be considered absolutely identical as it was assumed before. There is a considerable difference between them that shows to the utmost when the motion direction of the travelling twin's spaceship changes drastically (approximately within just 30 seconds)".

There is more convincing explanation where, as an alternative, relative motion of the whole outer space corresponds to the travelling spaceship. According to this assumption if we connect reference system with the travelling spaceship, it (the outer space) would have to create enormous acceleration which would slow down time on the travelling ship. Reference to enormous accelerations does not sound very clear.

Nevertheless difference between the twins does exist and it (the difference) becomes evident **when we address the paradox in the context of the Node space.**

Turning back to Fig. 2 and transfering its meaning to Fig. 4 we should make an evident conclusion concerning interaction directionality. We can **consider** interaction either concerning [concerning] any Node of "I" space and **not consider** it concerning Nodes of "II" space, or, simultaneously changing velocity sign and motion direction to the opposite one, consider interaction concerning any Node of "II" space and not consider it concerning Nodes of "I" space. Thus, habitual Relativity concept is supplemented by its property of asymmetry or interaction directionality.

In such case explanation of the "twins paradox" does not require using the whole inertia mechanism of the whole Outer space. The whole Outer space does become an alternative to the moving travelling spaceship but it is sufficient to address only those **areas in whose relation** the object separation – approach is adressed.

In accordance with the hypothesis, the Shell presence creates unavoidable space collinear Interval Disproprtion concerning all the particles of the whole outer Space, that was called rest Mass. Thus, formula of the particle internal energy $E=mC^2$ is indeed the expression of the Node internal energy concerning all the nodes of the whole Space.

As we can see from Fig. 4, when the "A" Node is accelerated, disproportion occurs concerning the Nodes of the "I" space; "II" space is **not addressed** for the interaction is

asymmetric. In other words, only **half** of the Space intervals, the same as those that create the rest Mass, participate in velocity creation. Hereof the 0,5 proportionality coefficient originates.

Since velocity is created by disproportion of the same Space intervals that create rest Mass, it is completely justified to call the quantity $E=0.5mV^2$, by analogy with the aforesaid quantity, the internal energy as well, only it is produced by velocity and dependent on velocity direction.

The internal energy $E=mC^2$ produced by Attractive Forces is irrelative while the kinetic energy $E=0.5mV^2$ is always relative.

Thus, model of the Space formed by Space intervals demonstrates unity of Isotropy, Homogeneity and Relativity principle properties simultaneously. Classical physics does not address Space properties in unity because there is no definite physical carrier of those properties. **Vacuum does not count.**

Physical meaning of Attractive forces smallness in comparison with all the other Forces acting in the World also becomes clear. If they were much greater, all the fundamental properties would have broken, especially the **Relativity** principle. In that case any Attractive forces alteration would have affected the relations between all the objects, and the system of connected Nodes would have been unstable.

The Homogeneity, Isotropy and Relativity principle concepts concerning **actual** space should be applied with reservations. These concepts can be easily applied either to void (that does not actually exist) or to its limited areas.

There must be quite many places in actual world where fundamental Space properties would have been thoroughly broken. For instance, those places where space Intervals start screening each other. Such conditions are created in nuclei, in super dense and super heavy objects, near cosmic objects with huge mass such as black holes. For such objects hypothetical representations differ from the habitual ones. Inside these objects space Intervals are presented in the space certainty phase, therefore, they screen each other. Thus, black hole attraction should grow with much less ratio than we are used to thinking.

If we supplement the aforesaid Space properties with **relativistic Mass and Time dependence** from node-forming space **Intervals Energy alteration speed** we would obtain the whole set of properties corresponding to actually observable 4-dimension World phenomena.

Space interpretations that were made in this hypothesis are alternative to the currently existing curved Space-Time theory. Differences concern only physical meaning of the curved Space-Time effect but do not deny the effect itself. The effect exists but it should be explained not the customary way. Space appears as a new quality of space Intervals appearing as a result of their connected state. As for Time it is derived from **motion and energy exchange** between connected nodes that are derived from space Intervals as well. Thus, both Space and Time continuum and, therefore, the curved Space-Time effect not only are not denied but they both are based on actually single physical entity that is space Intervals.

Time Directionality

Owing to the fact that Energy transformation velocity limits due to relativistic effect, **interdependence between processes,** in other words, cause-and-effect relations, **is not broken**.

Events in the actual area are always **a reflection, a result** of processes in the imaginary area and, at the same time, events in the actual area **are a push, source of new processes formation** in the imaginary area. A cycle has only one "rotation" direction which can be defined as **time flow directionality.**

Relativistic mechanism adjusts relative motion of a single particle or a particle group. Any velocity, should it be very low or very high, **decreases proportionally** by the relativistic effect. When relative velocity of a limited particle group increases, not only relative velocity of the whole group decreases but so do all the velocities of the particles **inside the group itself**. It is inadmissible that relative velocity of any particle in the group exceeds velocity of light concerning the object which the whole particle group approaches. In the actual world any process (chemical, biological, physical etc.) is a Node motion. Therefore, **the greater relativistic effect limits velocity of a particle group, the slower become all the processes inside that group**. There is no mystery in this effect.

Thereupon **time does not have its own essence, it is a coefficient** that depends on the collinear interval disproportion level.

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