Geometric hypothesis

The strongly speculative nature of the current attempts to unify interactions raises the question whether we should go back to classical physics. The analysis of the classical image is not denial of the quantum properties of interactions. A properly conducted analysis should explain why in some cases some or all interactions have specific quantum properties.

In the classical picture of the electromagnetic interaction, it was assumed that space is filled with weightless substance, which was attributed the possibility of deforming the value. The question must be asked whether the problem of the classical image arises from the properties attributed to the substance filling the space, or from the very concept of filling the space with any substance. Given experience, it is difficult to determine the properties of substance filling space that would be consistent with the measurement results. For this reason, the analyses concern the property of space is not filled with anything.

The analyzed spaces three-dimensional space described by three perpendicular lengths. With three perpendicular lengths, the area and volume are also defined. These are the only parameters by which it is possible to define other physical quantities, such as time or energy.

An elementary particle is either point and its volume is exactly equal to zero, or it is extended and its volume is greater than zero. Assuming the point character (geometric point) of an elementary particle, we must find method by which we remove infinite values from calculations and differentiate the parameters of geometric points. The renormalization mechanism used in the standard model has no theoretical justification. Any two geometric points differ only in their position in space. Differentiation of parameter values of elementary particles (e.g., mass) can be explained by extension. If particle of the Planck length has Planck mass, then particle elementary with electron mass (10^{-23} Planck masses) has of the length $\sqrt[3]{10^{-23}}$ of the Planck length. Extension elementary particle is an object of immeasurable size.

The extended elementary particle is either the substance filling the space occupied by the elementary particle, or the elementary particle is only the space it occupies. The adoption of an elementary particle as substance filling space creates similar difficulties as in the image of the field as substance filling space. Taking into account these difficulties, we treat the elementary particle as space of finite and immeasurable size.

The space of an elementary particle of finite size differs in some parameters from the surrounding space. These parameters cannot be related to the size of the elementary particle. These parameters can only result from changes in the length, area, or volume of finite space relative to the corresponding lengths, areas, or volumes in the space surrounding it.

Length change is the springy deformability of the length. Springy deformability the space must also be rigida. Springiness causes that after the cessation of the action of the deformation factor, the space returns to the undeformed state. The rigidity of the space means that the deformation and return to the undeformed state does not depend on the direction of action of the deformation factor. Springy rigidity applies to the individual axes of space. To illustrate the influence of rigidi on the deformability of space, one can recall the macroscopic analogy of slender rod and rope. The slender rod and rope are characterized by springy. The slender rod is rigid and retains its springy when compressing, stretching, bending and twisting. The rope is spring only when stretched.

Deformation of space can be the result of stretching, compressing, twisting or bending space in one axis, in two axes or in all three axes. The stretching, twisting and bending of finite space cannot be the result of action on the deformed space of the surrounding space and requires the assumption of the existence of an additional factor in addition to space.

With local fluctuation (disorder) of rigidity, the area of space of finite size does not balance the spring rigidity of the surrounding space. The surrounding space compresses a space of finite size with disorder rigidity. Finite and immeasurable space compressed by the surrounding space is called elementary space.

1. Deformation of the space

The size of the space surrounding the elementary space means that compression of the elementary space does not cause deformation of the space surrounding the elementary space. The space surrounding elementary space is an undeformed space.

The parameters describing the deformation of the elementary space are either the ratio of the length, area or volume of the elementary space after deformation to the length, area or volume before deformation, or are the ratio of the difference between these parameters after deformation and before deformation to the parameter before deformation.

The change in the volume of space is described by number. The volume change is scalar. The change in the volume of space is referred to as the relative deformation (of space). The relative deformation (h) is equal to the relative change in volume

$$h = \frac{V}{V_0}$$

Undeformed space (h = 1) is called flat space. Relative deformation of the undeformed space h=1 means that the relative deformation is the product of the relative deformed in each axis

$$h = 1 = 1 \times 1 \times 1 = h_x \times h_y \times h_z$$

The axes of space X, Y, Z are indistinguishable and the relative deformation of each axis is the same. For compressive space, the relative deformation is less than one. The relative deformation of one axis given by the symbol s is the relative deformation constant.

$$h_i = s < 1$$

The relative deformation constant is the fundamental constant of the geometric hypothesis of the universal interaction. All physical coefficients and quantities in the geometric hypothesis whose value is different from one are functions of the relative deformation constant. It is not possible, within the framework of the geometrical hypothesis, to determine the causes of local fluctuation (disorder) of rigidity of the area a finite size space. It is only possible to compare the value of the physical quantities known from the measurements with the value of these physical quantities dependent in the geometrical hypothesis on the relative deformation constant s.

We distinguish three types of elementary spaces:

1. uniaxial space – the space is deformed in one axis $h_x = s$, in two axes it is undeformed $h_y=h_z=1$
2. biaxial space – the space is deformed in two axes $h_x = h_y = s$, in one axis it is undeformed $h_z=1$
3. three-axis space – space is deformed in all three axes
   $h_x = h_y = h_z = s$

The relative deformation of elementary space is:

1. uniaxial space $x = s \times 1 \times 1 = s$
2. biaxial space $y = s \times s \times 1 = s^2$
3. three-axis space $z = s \times s \times s = s^3$

The change in the length of space is described by number, sign, and direction. The change in length is vector. The change in the length of space is referred to as linear deformation (of space). The linear deformation (f) is equal to the relative difference in length

$$f = \frac{\Delta l}{l_0}$$

For an undeformed space, the linear deformation is zero (f = 0). For compressive space, the linear deformation has a negative value.

The deformation of the space cannot take arbitrarily large values. If compressive deformation is interpreted as buckling (curvature of space), then the buckling of single axis of space as slender element cannot exceed the bending angle of 180^0.

2. Motion parameters (kinematic)

In uniaxial and biaxial space, there is an internal difference in linear deformation between deformed and nondeformed axes. The difference of linear deformation is the cause of the movement of uniaxial and biaxial space. To analyze the motion of elementary spaces, we use the analogy of macroscopic compression. The macroscopic analogy shows that the compressed matter flows in plane perpendicular to the direction of compression. The biaxial space pressed in two axes moves in progressive motion in direction perpendicular to the compressive plane. The movement turn is random. Uniaxial space compressible in one axis has two degrees of freedom of motion: progressive motion in plane perpendicular to the direction of compression with random direction and turn, and rotational motion with random direction (L, R). In three-axis space, the compressed in three axes does not have an internal difference in linear deformation. Compression does not cause movement of the three-axis space. The movement of three-axis space can be caused by external factors

The motion of an elementary space is change of position relative to the space surrounding the elementary space. Space is homogeneous and it is not possible to determine the position of elementary space relative to the surrounding space. The position of elementary space can only be specified relative to another elementary space. The motion of elementary space defined relative to other elementary spaces is relative motion.

The length (l) as the distance between two positions of moving elementary space is parameter of the space and does not depend on the motion of elementary space. The parameter of motion is time (t), which is number describing changes in the position of elementary space. Time (t) as number describing changes in the position of elementary space is proportional to the length of motion. In continuous motion, with continuous motion of elementary space, the number of changes in the position of the elementary space has an infinite value and is not parameter of motion.

In deformed space the length changes. Change of length changes the value of a number that describes changes in the position of the elementary space. Time (t) as number describing changes in the position of elementary space is proportional to the deformation of space. In undeformed space, the movement time is the shortest. The relative deformation (h) is inversely proportional to the deformation of the compressive space. For compressed space, time is inversely proportional to the relative deformation of the space in which the movement of elementary space takes place.

$$t = \frac{1}{h} \times l$$

Time as number describing the change in the position of elementary space describes movement that has already taken place. The parameter describing the currently taking place movement of elementary space is velocity (v)

$$v = \frac{l}{t} = h$$

The motion of elementary space is not motion of space as such. The movement of elementary space is the movement of the deformation of space, and more precisely it is the movement of the change the deformation of space. The velocity proportional to the relative deformation is the propagation speed of the deformation change in space.

The deformation of elementary space is perpendicular to the direction of motion. Before the moving elementary space, space is compressed perpendicular to the direction of motion. After moving space elementary compressed space expand (stretching to the state before the compression) perpendicular to the direction of motion. In the plane perpendicular to the direction of motion of elementary space, the change in the deformation of space caused by the movement of elementary space propagates in as form spherical change the deformation of space. The spherical change deformation of space is inversely proportional to the square of the distance from the place of formation of the lesion.

The movement of the biaxial space causes biaxial spherical change deformation of space in two axes perpendicular to the direction of motion.

The movement of uniaxial space causes uniaxial spherical change deformation of space in one axis perpendicular to the direction of motion. The deformation of uniaxial spherical change deformation of the space is rotated in accordance with the rotation of the deformation of the uniaxial space. Due to the rotation of deformation uniaxial spherical change deformation of space is sinusoidally variable.

Spherical changes deformation of space adds up. The sinusoidal nature of the uniaxial spherical change deformation of space causes that the summation result depends on the frequency of rotation of the deformation and the phase of rotation of the deformation. As a result of summing uniaxial spherical changes deformation of space may occur wave phenomena such as interference, resonance or polarization. The summation of the biaxial spherical changes deformation of space does not cause any wave phenomena.

2.1. Motion parameters (dynamic)

The reason for the compression of an elementary space by the surrounding space is the imbalance of the spring rigidity of the space by space with disturbed spring rigidity. In compressed space with disturbed spring rigidity, the value of relative deformation and linear deformation decreases (negative value increases). The difference in linear deformation produces an action with the opposite turn called the force (F)

$$F + \Delta f = 0$$

The amount of motion of elementary space is described by the scalar product. The scalar product as the amount of motion is the potential or actual energy density. The physical dimension of energy density is the dimension of pressure. The spring rigidity of space is the pressure of space. The pressure of spring rigidity of space is the potential density of energy space. The spring space rigidity pressure is the scalar product of relative deformation

$$p = h^2$$

With imbalance of spring stiffness pressure difference occurs. At certain deformation value of space with disturbed spring rigidity, the force caused by the difference linear deformation balances the pressure difference between the ambient space pressure and the pressure of the space with disturbed spring rigidity. The relative deformation of the compressive space in one axis at which the linear deformation balances the spring rigidity of the ambient space is equal to the relative deformation constant s. In the undeformed space the spring space rigidity pressure is equal to one

$$p = h^2 = 1$$

Spherical change deformation of space reduces space pressure in one or two axes. The pressure difference of the spherical change deformation of space causes force of direction (turn) opposite to the direction of propagation of the spherical change deformation of space. The energy of the spherical change deformation of space is the potential energy of pressure that can be transferred to elementary space within range of the spherical change deformation of space.

By deforming the elementary space, we do not change its volume. The relative deformation of elementary space as whole does not change. By squeezing elementary space in one place, we cause the elementary space to stretch in another place and vice versa. In compressed fragments of elementary space, the relative deformation decreases. In stretched fragments of elementary space, the relative deformation increases. Between the compressed and stretched fragments of the elementary space, the force caused by the difference in linear deformation acts according to the direction of the difference in linear deformation.

The scalar product of the relative deformation of elementary space as residue of energy density (space pressure) is the inertial mass density.

$$\rho = \frac{m}{V} = h^2$$

The inertial mass density of elementary spaces is

1. uniaxial space$\rho_x = s^2$
2. biaxial space $\rho_y = s^4$
3. three-axis space $\rho_z = s^6$

3. Geometric hypothesis

The progressive motion of elementary space is caused by the internal difference of linear deformation. Changes in the motion of elementary space are caused by external factors. The speed and time of motion of elementary space depends on the relative deformation of the space surrounding elementary space. If the individual fragments of the elementary space will be in a space with different relative deformation, that the difference in the time of motion of individual fragments of elementary space will cause differences in linear deformations. The force resulting from the differences of linear deformations causes additional movement of individual fragments of elementary space according to the direction of difference in linear deformation.

When moving, elementary spaces can collide with each other. From the side of the collision with the second elementary space, the time of movement is clearly longer than the time of movement of the opposite side. With the collision of spaces elementary move relative to each other in centripetal motion and can superimposition. The superimposition of elementary spaces is not the superimposition of one space on top of another space, but is the superimposition (summation) of the deformations of space. In directions where elementary space is not deformed, the superimposition of elementary spaces on each other does not cause any change in space.

At the sum of the deformations of elementary spaces colliding with each other greater than the maximum deformation, the difference between the maximum deformation and the sum of the linear deformation of the colliding elementary spaces causes repulsive force of the superimposed elementary spaces. Elementary spaces then move relative to each other on their external surfaces.

The deformation of the three-axis space is the greatest. The structure composed of elementary spaces can be formed when the elementary space moves on the outer surface of the three-axis space. For such movement to be possible, the deformation of the three-axis space (Z) must be less, and the sum of the deformation of the three-axis space and the uniaxial space (X) must be greater than the maximum deformation T_{max}

$$Z < T_{max} < Z + X$$

If moving elementary space is within the range of spherical change deformation of space that the time of movement of elementary space from the source of the spherical change deformation of space is longer than the time of movement of the opposite side. The resultant motion of elementary space within the range of spherical change deformation of space is centripetal motion relative to the source of the spherical change deformation of space

The interaction of elementary space with spherical change deformation of space is an attractive interaction of infinite range and is inversely proportional to the square of the distance between elementary spaces. The mathematical description of the probability of occurrence of wave phenomena in interaction with uniaxial spherical change deformation of space concerns the quantum properties of this interaction.

3.1. Structures elementary

At the point of collision with three-axis space, the time of movement of elementary space increases. The difference in the time of motion between the place of collision with the three-axis space and the opposite side of the collision site causes the stretching of the biaxial space on the surface of the three-axis space. The biaxial space stretched over the surface of the three-axis front forms rotating ring in the equatorial position. On the surface of the three-axis space, three biaxial rings perpendicular to each other can form. With three perpendicular rotating biaxial rings, the progressive motion of the biaxial rings is transmitted on the three-axis space. Structure composed of three-axis space and three rotating biaxial rings perpendicular to each other is the basic elementary structure.

The gravitational interaction is the interaction of the biaxial spherical change deformation of space to the biaxial ring (biaxial space). Spin of the sign L (left rotation) or R (right rotation) is parameter describing the rotation of three biaxial rings. Neutrino is the basic the elementary structure.

In collision place, uniaxial space with three-axis space is greater time of progressive and rotational motion. The time difference of motion between the point of collision with the three-axis space and the opposite side of the collision site causes the stretching of the uniaxial space on the surface of the three-axis space. Stretching in rotational motion is perpendicular to stretching in progressive motion. The uniaxial space is stretched inclined to the equatorial position and does not form uniaxial ring. There will be no structure composed of uniaxial and three-axis spaces.

At the point of collision of the uniaxial space with the biaxial ring of the basic elementary structure, the time of progressive and rotational motion increases. In the rotational motion, the uniaxial space is pulled in the interior of the biaxial ring, and in progressive motion, the uniaxial space is stretched circumferentially. The stretched uniaxial space forms uniaxial ring inside the biaxial ring. Uniaxial ring will rotate inside biaxial ring when it is not in contact with the three-axis space in which the biaxial ring rotates. The cross-sectional area of uniaxial ring is smaller than the cross-sectional area of biaxial ring.

The deformation of the space of the uniaxial ring rotates transversely to the motion rotation of the uniaxial ring inside the biaxial ring. The transverse rotational motion of the deformation of the uniaxial space is synchronized with the rotational motion of the uniaxial ring.

Time of the motion of the sites of the biaxial ring with the superimposed uniaxial space is greater than the time of motion of the places of the biaxial ring in the ambient space. With greater time of motion, the radius of centripetal motion increases the ring of the biaxial. The biaxial ring is circumferentially tensible. Stretching reduces cross-section of the biaxial ring. Biaxial ring with uniaxial ring superimposed on it has larger diameter than biaxial ring without uniaxial ring superimposed.

The electron is fundamental elementary structure with three uniaxial rings rotating inside the biaxial rings.

The U quark is a fundamental elementary structure with two of uniaxial ring rotating inside the biaxial rings.

The D quark is a fundamental elementary structure with one uniaxial ring rotating inside the biaxial ring.

3.2. Sign of uniaxial ring

The rotations of the uniaxial inside the biaxial ring are randomly opposite or consistent with the rotations of the biaxial ring. At opposite revolutions, the time of one full rotation of the uniaxial ring is longer than with compatible revolutions. With longer time of motion of the uniaxial ring, the deformation of the space of the biaxial ring with the superimposed uniaxial ring is the sum of the uniaxial and biaxial deformation of the space. With shorter movement time of the uniaxial ring, the deformation of the space of the biaxial ring with the uniaxial ring superimposed is the difference of the biaxial and uniaxial deformation of the space. At opposite rotations, we assign positive space deformation sign to the uniaxial ring (biaxial space deformation + uniaxial space deformation). With consistent rotations, we assign negative space deformation sign to the uniaxial ring (biaxial space deformation – uniaxial space deformation). The sign of the uniaxial ring must be the same for all uniaxial rings of the elementary structure. With different signs of uniaxial rings of given elementary structure, the difference in the time of motion of individual uniaxial rings makes it impossible to synchronize their movement with each other.

The sign of uniaxial ring is with the sum of the deformations of the space of the rotating biaxial and uniaxial rings. The space deformation of the positive and negative rings and the uniaxial the is such same. When uniaxial space stretched into ring is superimposed on biaxial ring, the deformation of the ring in one axis changes. The uniaxial ring is not an additional ring in addition to the biaxial ring, but is the difference of the deformation of the space of the biaxial ring with the superimposed uniaxial deformation of the stretched uniaxial space and the deformation of the space of the biaxial ring. For negative uniaxial ring, the decrease in deformation is an increase in the negative value.

3.2.1. Sign of uniaxial spherical change deformation of space

The superimposition of uniaxial ring on biaxial ring causes the uniaxial spherical change deformation of space to be superimposed on the biaxial spherical change deformation of space. For positive uniaxial spherical change deformation of space, the sinusoidal change deformation of space is greater from the biaxial the spherical change deformation of space (biaxial change deformation of space + uniaxial change deformation of space). For negative uniaxial spherical change deformation of space sinusoidal change deformation of space is smaller from the biaxial spherical change deformation of space (biaxial change deformation of space - uniaxial change deformation of space).

The relative deformation of the uniaxial spherical change deformation of space is inversely proportional to the square of the distance from the site of the change and does not depend on the summation sign. For positive uniaxial spherical change deformation of space, the deformation decreases with distance. For negative uniaxial spherical change deformation of space decrease in the magnitude of deformation is an increase in negative value.

Changing the sign of uniaxial ring, as well as changing the sign of uniaxial spherical change deformation of space, changes the sign of the difference in movement time and the turn of the interaction.

With the interaction of positive uniaxial ring with positive uniaxial spherical change deformation of space the time of movement of the uniaxial ring from source side spherical change deformation of space is longer than on the opposite side and the resultant motion of the uniaxial ring in the reference frame of the spherical wave source is a centripetal motion. With interaction of positive uniaxial ring with negative uniaxial spherical change deformation of space and negative uniaxial ring with positive uniaxial spherical change deformation of space the time of movement of the uniaxial ring from the side of the source of the uniaxial changes in space deformation is shorter than on the opposite side and the resultant motion of the uniaxial ring is centrifugal. With the interaction in negative uniaxial ring with negative uniaxial spherical change deformation of space the time of movement of the uniaxial ring from the source side of the uniaxial spherical change deformation of space is longer than on the opposite side and the resultant motion of the uniaxial ring is centripetal motion.

3.2.2. Interaction indirect on the biaxial ring

In the elementary structure, three-axis space has no degrees of freedom of movement relative to the biaxial rings. The interaction of the biaxial spherical change deformation of space is transmitted to the entire elementary structure. Uniaxial ring superimposed on biaxial ring has one degree of freedom of rotation relative to the biaxial ring.

The change in the time of motion of a uniaxial ring caused by interaction with uniaxial spherical change deformation of space is change in the time of motion of uniaxial ring relative to the biaxial ring. Change the time of motion of a uniaxial ring relative to the biaxial ring is the change in the time of motion of the biaxial ring relative to the uniaxial ring with the opposite sign. The interaction of the uniaxial spherical change deformation of space transmitted by the biaxial ring to the entire elementary structure has the opposite sign to the interaction on the uniaxial ring.

With the same sign of uniaxial ring and uniaxial spherical change of the deformation of space the interaction of uniaxial spherical change deformation of space on uniaxial ring is an attractive interaction. The interaction on the entire elementary structure carried by the rings of the biaxial is repulsive interaction. With different signs of uniaxial ring and uniaxial spherical change deformation of space the interaction of uniaxial spherical change deformation of space on uniaxial ring is repulsive interaction. The interaction on the entire elementary structure transmitted by the rings of the biaxial is an attractive interaction.

3.2.2.1. Magnitude of indirect interaction

The motion of elementary space caused by the interaction of spherical change deformation of space is centripetal motion (centrifugal). In centripetal (centrifugal) motion the magnitude of the change of motion in the centripetal (centrifugal) direction is inversely proportional by the radius of motion. The radius of centripetal (centrifugal) motion of uniaxial ring is comparable to the distance between elementary structures interacting with each other. The radius of centrifugal motion (centripetal) of the biaxial ring in response to the interaction of the uniaxial ring is comparable to the size of the elementary structure and does not depend on the distance between the elementary structures. The distance between elementary structures is many orders of magnitude greater than the size of the elementary structure. The radius of centripetal motion of biaxial ring in interaction with biaxial spherical change deformation of space is comparable to the distance between elementary structures interacting with each other. The action of uniaxial spherical change deformation of space on the entire elementary structure transmitted by biaxial ring is many orders of magnitude greater than the interaction of biaxial spherical change deformation of space and the elementary structure.

Uniaxial spherical change deformation of space also changes the time of the transverse rotation of the deformation of the space of the uniaxial ring. With the zeroing of superimposed uniaxial spherical changes deformation of space, an interaction may occur due to the difference in the frequency of rotation of the deformation and rotation phase of the deformation of the uniaxial spherical change deformation of space and the uniaxial ring.

The electromagnetic interaction is the interaction transmitted by a uniaxial spherical change in the deformation of space.

3.2.3. Resonant interaction

In the elementary structure, the biaxial ring is pressed against the three-axis space by a three-axis difference the deformation of the space. The uniaxial ring is pulled into the interior of the biaxial ring by biaxial difference in space deformation. The interaction holding the biaxial ring in the elementary structure is greater than the interaction holding the uniaxial ring in the elementary structure. The interaction of uniaxial spherical change deformation of space on uniaxial ring has the opposite sign to the interaction of the ring of uniaxial on the biaxial ring. On one side of the elementary structure the biaxial ring is pressed against the three-axis space, and the uniaxial ring is pulled out of the biaxial ring.

On the opposite side of the elementary structure the biaxial ring is repelled from the three-axis space and the uniaxial ring is pushed into the biaxial ring. For very small distances between elementary structures with the agreement of the phase of rotation of the deformed space in the uniaxial ring and the uniaxial spherical change deformation of the space resonant interaction can pull out the uniaxial ring out of the biaxial ring.

The interaction weak this the interaction uniaxial spherical change deformation of space of the character of resonances.

3.3. Elementary particle generations

For progressive elementary space, the position of the space deformation is perpendicular to the direction of progressive motion. Stretching elementary space in to rotating ring changes the spatial position of the space deformation. In rotating ring, the deformation of space moves in the circumferential direction defined with respect to the axis of rotation of the ring. In the reference system of the axis of rotation of the ring we have three possible mutually perpendicular positions of the deformation of space: circumferential, radial, axial.

Position the deformation of space in the frame of reference of the axis of the rotating ring can be described by one, two or three components. In the first generation of elementary particles, the position of the deformation of space in the rotating ring is determined by one component. In the second generation of elementary particles, the positions deformations of space are determined by two components. In the third generation of elementary particles, the positions deformations of space determine all the components.

The individual deformation components of the rotating ring do not differ from each other. The relative deformation in one axis of the rotating ring is the resultant of the components and is

$$h_p = \sqrt{n} \times s$$

The relative deformation for rotating rings is

1. uniaxial ring $x_p = h_p \times 1 \times 1 = \sqrt{n} \times s$
2. biaxial ring $y_p = h_p \times h_p \times 1 = n \times s^2$

The inertial mass density of the rotating rings is

1. uniaxial ring $\rho_{xp} = n \times s^2$
2. biaxial ring $\rho_{yp} = n^2 \times s^4$

The deformation of the space of the rotating ring must be the same for each ring of the elementary structure. With different positions at the deformation of space in different rings of the elementary structure, the difference in time at the motion of the individual rings makes it impossible to synchronize the motion.

The three generation and two spins (direction of rotation L, R of the biaxial rings) give total of six structures (neutrinos). The three generation, two spins and two sign uniaxial rings give twelve structures (electrons, quarks U and D quarks).

3.4. Elementary charge.

Thea interaction of the uniaxial spherical deformation of space will change the movement of the uniaxial ring only in the peripheral direction. The interaction of uniaxial spherical change deformation of space on uniaxial ring cannot change the position of the axis rotation of the biaxial ring. The change in the motion of the uniaxial ring of the first, second or third generation associated with the interaction of the uniaxial spherical change deformation of space caused by the rotating uniaxial ring of the first, second or third generation is as such as the change in the motion of the first-generation ring associated with the interaction of uniaxial spherical change deformation of space caused by rotating uniaxial ring of the first generation. The basic electric charge as source of electrostatic interaction corresponds to the relative deformation of the three uniaxial rings of the first generation and is also three relative deformation constants

$$e = 3 \times s$$

Fine structure constant is proportional to the scalar product of the relative deformation constant

$$\alpha = e^2 = 9 \times s^2$$

4. The shape of the elementary structure.

The three-axis space has the shape of sphere. The biaxial ring is shaped like toroid. Three toroidal perpendicular rings rotating on the surface of the sphere form structure with central symmetry similar to sphere. The superimposition of three uniaxial rings on three biaxial rings creates the same structure with larger diameter. Leptons are spherical elementary structures similar to sphere with central symmetry

Biaxial ring with superimposed uniaxial ring has larger diameter than biaxial ring without uniaxial ring superimposed. Superimposition on the surface of the three-axis space of biaxial rings differing in diameter change shape of the three-axis space from the sphere to the ellipsoid of rotation. Only one biaxial ring then has the shape of circular toroid. The other biaxial rings have the shape of elliptical toroid.

Quarks are ellipsoidal elementary structures similar to rotating ellipsoid with axial symmetry. The U quark has shape similar to an elongated rotating ellipsoid. The D quark has shape similar to flattened rotating ellipsoid.

4.1. Relative deformation constant

Changing the shape of a spherical three-axis space from sphere to rotating ellipsoid does not change the volume of the three-axis space. For a three-axis space in the shape of flattened rotating ellipsoid, we obtain the dependence

$$\frac{4}{3} \times \pi \times a^2 \times b = \frac{4}{3} \times \pi \times R^3$$

In flattened rotating ellipsoid biaxial ring with superimposed uniaxial ring expanded rings of the biaxial rings without superimposed uniaxial rings in to an elliptical shape. The three-axis space is stretched in the long semi-axis and compressed in the shorter semi-axis of the ellipse. The sum of linear deformations in the shorter and longer semi-axis of the ellipse of a three-axis space with the shape of flattened rotating ellipsoid is equal to zero

$$\frac{a-R}{R} + \frac{b-R}{R} = 0$$

For flattened rotating ellipsoid, we get the equation

$$\left(\frac{a}{b}\right)^3 - 5 \times \left(\frac{a}{b}\right)^2 + 3 \times \frac{a}{b} + 1 = 0$$

The ratio of the longer semi-axis to the shorter semi-axis is

$$\frac{a}{b} = \sqrt{5} + 2$$

With the spherical shape of three-axis space, the relative deformation in each axis is equal to the relative deformation constant

$$\frac{R}{R_0} = s$$

Differences in linear deformation in the individual axes of the three-axis space in the shape of rotating ellipsoid reduce the value of the relative deformation in the compression direction and increase the value of the relative deformation in the tensile direction. Maximal the value of the relative deformation in the tensile direction is equal to the deformation of the undeformed space and is one.

$$1 = \frac{R_0}{R_0} = \frac{R}{R_0} \times \frac{R_0}{R} = s \times \frac{R_0}{R}$$

$\frac{R_0}{R}$ specifies the relative reduction in compression of three-axis space to non-deformed state when changing shape from sphere to rotating ellipsoid. The deformation of three-axis space in elliptical section is deformation in two axes and depends on the square of the ratio of the longer semi-axis of the ellipse to the shorter semi-axis of the ellipse. The deformation of three-axis space into rotating ellipsoid occurs in two elliptical sections perpendicular to each other. The relative reduction of the compression of the three-axis space to the undeformed state is the sum of the deformation in both elliptical cross-sections

$$\frac{R_0}{R} = \left(\frac{a}{b}\right)^2 + \left(\frac{a}{b}\right)^2$$

The relative deformation constant is

$$s = \frac{9-4\times\sqrt{5}}{2}$$

Theoretical value of the fine structure constant is

$$\alpha = 362{,}25 - 162 \times \sqrt{5} = \frac{1}{143}$$

The analysis of the shape of the quark does not take into account the influence of the rotation of biaxial rings on the shape of the three-axis space. Hence, the theoretical value of the fine structure constant differs from the value known from the measurement.

4.2. Size of leptons

The formation of biaxial ring on the surface of three-axis space results from the difference in the time of movement of the part of the biaxial space in contact with the three-axis space and the part moving on the opposite side. The speed of motion of biaxial ring on the surface of three-axis space is equal to the relative deformation of the three-axis space

$$v = s^3$$

The maximum the value of accelerated centripetal with which the biaxial space can move on the surface of the three-axis space is equal to one. The minimum radius of the three-axis space on which the biaxial space moves is

$$R = \frac{v^2}{a_r} = \frac{{s^3}^2}{1} = s^6 = \left(\frac{9-4\times\sqrt{5}}{2}\right)^6 = 4{,}68 \times 10^{-10}$$

The size of the elementary particle (radius of three-axis space) depends on the centripetal acceleration of the elementary space rotating on the surface of the three-axis space and is proportional to the density of the inertial mass

$$R = k \times \rho$$

From the radius of space, three-axis of the basic elementary structure of the smallest magnitude (n=1), we calculate the proportionality factor

$$R = k \times \rho_{yp} = k \times n^2 \times s^4 = k \times s^4 = s^6 \qquad k = s^2$$

The radius of neutrinos is

$$R_n = n^2 \times s^6 \qquad R_{n1} = 4{,}68 \times 10^{-10} \quad R_{n2} = 6{,}62 \times 10^{-1} \quad R_{n3} = 8{,}1 \times 10^{-10}$$

The radius of electrons is

$$R_e = n \times s^4 \qquad R_{e1} = 6{,}03 \times 10^{-7} \quad R_{e2} = 8{,}52 \times 10^{-7} \quad R_{e3} = 1{,}04 \times 10^{-6}$$

4.3. The inertial mass of leptons

The biaxial space forming biaxial ring is stretched from the unit value ($\sqrt{n}$) to the full circumference value($2 \times \pi$). In plane perpendicular to the tensile direction, the perimeter of the biaxial space decreases to unit value. The biaxial ring is toroid with radius ($R = R_n + r$) and circular cross-section of radius (r). The ratio of the cross-sectional radius of the ring to the radius of centripetal motion is the inverse of the extension

$$\frac{r}{R} = \frac{\sqrt{n}}{2\times\pi}$$

The volume of the three biaxial neutrino rings is

$$V_n = \frac{3}{2} \times \left(1 + \frac{\sqrt{n}}{2\times\pi}\right) \times n^7 \times s^{18} = 1{,}54 \times 10^{-2} \times \left(1 + \frac{\sqrt{n}}{2\times\pi}\right) \times n^7$$

In the calculation of inertia, we consider only the spaces with the greatest inertia. The inertial mass of the three biaxial neutrino rings is

$$M_n = \frac{3}{2} \times \left(1 + \frac{\sqrt{n}}{2\times\pi}\right) \times n^9 \times s^{22} = 9{,}27 \times 10^{-35} \times \left(1 + \frac{\sqrt{n}}{2\times\pi}\right) \times n^9$$

$$M_{n1} = 1{,}07 \times 10^{-34} \quad M_{n2} = 5{,}81 \times 10^{-32} \quad M_{n3} = 2{,}33 \times 10^{-30}$$

The formation of a biaxial ring extends the biaxial space to value 2π. Another biaxial stretch describes the changes the cross-sectional area of the ring is caused by the stretching. Extended of the biaxial ring by superimposing uniaxial ring reduce the cross-sectional area of the biaxial ring to the value one

$$\frac{\pi\times r_{yx}^2}{\pi\times r_y^2} = \frac{\sqrt{n}}{\pi}$$

The cross-sectional area of the uniaxial ring is less than the cross-sectional area of the biaxial ring and is the unit part of the cross-sectional area of the biaxial ring

$$\frac{\pi\times r_x^2}{\pi\times r_{yx}^2} = \frac{\sqrt{n}}{\pi}$$

The volume of the three uniaxial rings of electron is

$$V_e = \frac{3}{2\times\pi^2} \times \left(1 + \frac{n^{\frac{3}{4}}}{\pi^{\frac{3}{2}}} - \frac{n}{2\times\pi^2}\right) \times n^6 \times s^{12} = 3{,}33 \times 10^{-20}\left(1 + \frac{n^{\frac{3}{4}}}{\pi^{\frac{3}{2}}} - \frac{n}{2\times\pi^2}\right) \times n^6$$

The inertial mass of the three uniaxial rings of electrons is

$$M_e = \frac{3}{2\times\pi^2} \times \left(1 + \frac{n^{\frac{3}{4}}}{\pi^{\frac{3}{2}}} - \frac{n}{2\times\pi^2}\right) \times n^7 \times s^{14} = 2{,}58 \times 10^{-2}\ \left(1 + \frac{n^{\frac{3}{4}}}{\pi^{\frac{3}{2}}} - \frac{n}{2\times\pi^2}\right) \times n^7$$

$$M_{e1} = 2{,}92 \times 10^{-2} \qquad M_{e2} = 3{,}97 \times 10^{-21} \qquad M_{e3} = 7{,}11 \times 10^{-20}$$

The influence of the inaccuracy of the theoretical value of the relative deformation constant on the results of theoretical calculations of electron inertia is large (s^{14}). The circular cross-section of the rings was assumed in the calculations and the influence of deformations resulting from the extension of the biaxial ring on the surface of the three-axis space on the shape of the rings was not taken into account. In addition, the influence on the shape of the rings of the superimposition of uniaxial ring on biaxial ring is not taken into account.

5. Rotation of three-axis space

The change in the shape of circular biaxial rings to elliptical rings in the D quark is caused by the extension of the rings in the long semi-axis of the ellipse. The change in the shape of circular biaxial rings to elliptical rings in the U quark is caused by compression of the rings in the shorter semi-axis of the ellipse. The linear deformations associated with the change in the shape of the biaxial rings cause additional motion of the biaxial deformation of space from the shorter semi-axis towards the longer semi-axis of the ellipse. This motion is consistent with or opposite to the rotational motion of the biaxial deformation of space in the rings. The additional motion caused by linear deformation reduces the time of motion of the biaxial deformation of the ring space between the shorter and longer semi-axis of the ellipse and increases the time of movement between the longer and shorter semi-axis of the ellipse. The differences in the time of movement are symmetrical with respect to the center of the ellipsoidal elementary structure.

Deformations resulting from differences the time of motion before and behind the long semi-axis of the elliptical biaxial ring cause moment of force (the moment of pair of forces) rotating biaxial elliptical rings. The direction of rotation of the elliptic ring of the biaxial ring is consistent with the direction of rotation of biaxial deformation of space in the ring.

Three-axis space has no degrees of freedom of motion relative to the biaxial rings, and the rotation of the biaxial ring elliptical forces the rotation of part of three-axis space with a radius greater than the shorter semi-axis of the ellipse. Between part of three-axis space with radius less than the shorter semi-axis of the ellipse and part of three-axis space with radius longer to the shorter semi-axis of the ellipse is tangential linear deformations. Tangential deformations cause moment of force (moment of pair force) rotating part of three-axis space with radius smaller than the shorter semi-axis of the ellipse. The rotational speed of part of three-axis space with radius less than the shorter semi-axis of the ellipse decreases to zero in the center of the three-axis space.

From the side of the push of the biaxial rings the elliptical the three-axis space is compressed, and on the opposite side it is stretched. In compressed fragments of three-axis space, the deformation of space increases, and in stretched fragments of three-axis space, the deformation of space decreases. In the part of three-axis space with radius less than the shorter semi-axis of the ellipse, the deformed space changes sinusoidally. The frequency of sinusoidal change of deformation of space small to zero in the center of three-axis space.

5.1. Resonance changes in relative deformation

Three-axis space does not differ in deformation in individual axes from superimposed perpendicularly on each other of the biaxial space and the space of the uniaxial. The difference is relative deformation. When uniaxial space is superimposed on biaxial space, the deformation of the space is the sum of the uniaxial and biaxial deformation of the space. Reciprocal of the relative deformation of the superimposed spaces is the sum of the reciprocal of the relative deformation of uniaxial space and biaxial space.

$$\frac{1}{h_{1+2}} = \frac{1}{s} + \frac{1}{s^2}; \quad h_{1+2} = \frac{s^2}{s+1} = 7{,}553 \times 10^{-4}$$

The relative deformation of three-axis space is the product of the relative deformation of it in each axis

$$h_3 = s^3 = 2{,}163 \times 10^{-5} \ll h_{1+2}$$

The pressure of uniaxial space and the superimposed biaxial space is clearly greater than the pressure of the three-axis space. With relative deformation greater than the three-axis deformation and less than relative deformation of the uniaxial space and the superimposed biaxial space, difference pressure the balanced is force equal to the linear deformation

$$(h_{1+2})^2 < p < h_3^2 \ \rightarrow (p - h_3^2) + F = 0$$

At the frequency of sinusoidal change of the deformation of space equal to the resonant frequency, the deformation of the three-axis space locally exceeds the value of the deformation the corresponding superimposition of the biaxial space and the uniaxial space. With relative deformation greater than the relative deformation of the uniaxial space and the biaxial space superimposed on it, the force resulting from linear deformations does not compensate for the pressure difference.

$$p > (h_{1+2})^2 \ \rightarrow (p - h_3^2) + F > 0$$

The size of the space in which the relative deformation is greater than the relative deformation of the uniaxial space and the superimposed biaxial space is very small in relation to the size of the three-axis space. When the deformation corresponding to the superimposition of the biaxial space and the uniaxial space is exceeded, the unbalanced pressure difference expands the three-axis space. Increasing the length of randomly selected axis to the length corresponding to the relative deformation of uniaxial space, create space of the uniaxial. Increasing the length of the other two axes to the length corresponding to the relative deformation of the biaxial space creates space of the biaxial superimposed perpendicularly on the space of the uniaxial. The ratio of the axis length of the deformed uniaxial space after expansion to the length before expansion is approximately equal to the ratio of the pressure of the uniaxial space to the pressure of the three-axis space

$$\frac{l_1}{l_0} = \frac{p_1}{p_3} = \frac{s^2}{(s^3)^2} = 1{,}66 \times 10^6$$

The expansion of the three-axis space occurs in two places symmetrical with respect to the center of the three-axis space. With two biaxial elliptical rings, the three-axis space is expanded in four places and four uniaxial spaces are formed with perpendicular spaces superimposed with the biaxial spaces.

5.2. Uniaxial space

In the vicinity of the center of the curvilinear triangle formed by three biaxial rings, the expanding uniaxial space is in contact with the ambient space of the structures elementary. The outer surface of the three-axis space is formed by four pairs of curvilinear triangles. Uniaxial space is in contact with the ambient space around the center randomly selected curvilinear triangle from given pair. The ambient pressure balances the linear deformation of the uniaxial space from the outer side of the three-axis space. On the opposite side, in the center of three-axis space, the expanding spaces uniaxial are in contact with each other.

The time of movement of uniaxial space at the point of contact with the second uniaxial space is shorter than the time of movement at the point of contact with the three-axis space. Uniaxial spaces repel each other upon contact. Change in the direction of motion resulting from the difference in movement time (repulsion) causes the ends of uniaxial spaces to twist. In the center of three-axis space, the ends of four uniaxial spaces are entangled.

Uniaxial compressed space in one axis has two degrees of freedom of movement in plane perpendicular to the direction of compression. The movement of uniaxial space in plane perpendicular to the direction of compression is prevented by the surrounding three-axis space.

5.3. Biaxial space

The biaxial space extends the three-axis space perpendicular to the direction of expansion of the uniaxial space. Force caused by linear deformation balances the pressure difference between the biaxial space and the three-axis space

$$F + ({s^2}^2 - {s^3}^2) = 0$$

In the center of three-axis space four biaxial spaces are in contact with each other. The time of movement of biaxial space at the point of contact with the second biaxial space is shorter than the time of movement at the point of contact with the three-axis space. Change in the direction of motion resulting from the difference in movement time causes the ends of biaxial spaces to turn and entangle. Entanglement together is subject to twelve directions of deformation of space: four directions of uniaxial spaces and eight directions of biaxial spaces. The weaving of the twelve directions of deformation of space in three-dimensional space prevents the movement of entangled ends of the deformations of space relative to each other.

The biaxial space compressed space in two axes moves in progressive motion in direction perpendicular to the compressive plane. The movement of biaxial space to the center of three-axis space prevents node of entangled ends. Biaxial space makes progressive motion in the ambient space. The pressure difference between the biaxial space and the undeformed ambient space is many times greater than the pressure difference between the biaxial space and the three-axis space. The ratio of the pressure difference of undeformed space and biaxial space to the pressure difference of biaxial space and three-axis space is

$$\frac{\Delta p_{0,2}}{\Delta p_{2,3}} = \frac{1^2 - {s^2}^2}{{s^2}^2 - {s^3}^2} = 1{,}66 \times 10^6$$

Unbalanced pressure of the undeformed ambient space compresses the biaxial space. The cross-section (deformed axes) of the biaxial space decreases and the length (undistorted axis) of the biaxial space increases. The entanglement of the ends of biaxial spaces in the center of three-axis space connects the extended the biaxial space with the ellipsoidal elementary structure. Taking into account the expansion of uniaxial space, the length of the biaxial space increases relative to the space size of the three-axis space

$$\frac{l_2}{l_0} = \frac{\Delta p_{0,2}}{\Delta p_{2,3}} \times \frac{l_1}{l_0} = 2{,}75 \times 10^{12}$$

Given the length of biaxial spaces, ellipsoidal elementary structures (quarks) are many orders of magnitude larger than spherical elementary structures (leptons).

5.3.1. Interaction of biaxial space

The biaxial of moving ellipsoidal elementary structures are the source of biaxial spherical changes deformation of space. The interaction of spherical changes deformation of space (gravitational interaction) changes the motion of space of the biaxial. The change in the motion of biaxial spaces is transmitted to the entire ellipsoidal elementary structure through a knot located in the center of the three-axis space.

The different biaxial space ellipsoidal elementary structures can collide with each other. On collides the biaxial space superimposition. The time of motion of the place of superimposition of biaxial spaces is longer than the time of motion of parts of the biaxial spaces located in the ambient space. The difference in movement times increases the length of the superimposition of biaxial spaces on top of each other. The superimposition of biaxial spaces is attraction interaction. Direct interaction the superimposition of the biaxial space is transmitted by the knot to the entire ellipsoidal elementary structure. The range of direct attraction is limited by the length of the biaxial spaces.

The direct attractive interaction is different from the attractive interaction of the uniaxial spherical change deformation of space. The attraction interaction of superimposed biaxial spaces maintains the distance between ellipsoidal elementary structures corresponding to the length of the biaxial spaces. Ellipsoidal elementary structure can interact directly by superimposing biaxial spaces with only four adjacent ellipsoid elementary structures.

The strong interaction is attraction interaction of superimposed spaces of biaxial ellipsoidal elementary structures (quarks).

6. Universal interaction

The universal interaction results from the dependence of the parameter of motion of elementary space (time of motion, speed of motion) on the deformation of space (relative deformation). The universal interaction is an additional motion of an elementary space caused by the difference in deformation of the space in which the elementary space moves. The universal interaction can be divided into the elementary interaction responsible for the formation of elementary structures that are elementary particles and the fundamental interaction occurring between elementary particles.

The elementary interaction is the direct interaction of elementary spaces that are in contact (colliding) with each other. The elementary interaction is not directly observable. The geometric hypothesis of the elementary interaction gives the theoretical value of the relative deformation constant, whose scalar product is measurable quantity as fine structure constant.

The fundamental interaction is the interaction between the elementary spaces that make up the elementary structures, not the interaction between the elementary structures. Can be direct interaction of superimposed elementary spaces or an indirect interaction transmitted by spherical change deformation of space. The transfer of the fundamental interaction to the entire elementary structure depends on the degrees of freedom of motion of the interacting elementary spaces with respect to the three-axis space which is the central part of the elementary structure.

Three-axis space has no degrees of freedom of motion relative to the biaxial rings and the interaction of the biaxial spherical change deformation of space (gravitational interaction) is directly transferred from the biaxial rings to the entire elementary structure.

Uniaxial ring has one degree of freedom of rotation relative to the biaxial ring. The interaction of the uniaxial spherical change deformation of space is transmitted with the opposite sign through the biaxial ring to the entire elementary structure (electromagnetic interaction). The interaction with the opposite sign of biaxial space on the entire elementary structure is greater by many orders than the interaction of the uniaxial spherical change deformation of space on the uniaxial ring.

The interaction of the biaxial space of ellipsoidal elementary structures is transmitted to the three-axis space through node of uniaxial and biaxial spaces located within the three-axis space. Uniaxial spaces do not have degrees of freedom of movement relative to the three-axis space. The difference in interaction on individual biaxial spaces causes shift of the node of biaxial spaces relative to the center of the three-axis space. The displacement of node of biaxial spaces is shift of node of uniaxial spaces. Displacement of uniaxial node deforms uniaxial space. The force caused by the deformation of uniaxial spaces causes the movement of the three-axis space and the entire elementary structure.

The interaction on the biaxial spaces of ellipsoidal elementary structures transmitted by the biaxial spherical change deformation of space (gravitational interaction) is so small that the displacement of the node of uniaxial spaces can be considered negligibly small.

When interacting by superimposing the biaxial space, the differences in interaction and individual biaxial spaces are so large that the displacement of the node of uniaxial spaces changes the inertia of uniaxial spaces. Inertia is the product of volume and the product of scalar relative deformation, which causes space with a smaller volume and the associated lower relative deformation value to have less inertia and vice versa. Uniaxial spaces have the least inertia at the central position of the node of uniaxial spaces. The differences in inertia of ellipsoidal elementary structures (quarks) caused by the interaction difference by the superimposition of individual biaxial spaces (strong interaction) are measurable.

The largest node shift will take place for three ellipsoidal elementary structures (quarks) forming triangular structure connected by six biaxial spaces. The inertia of quarks in such structure is the greatest.

7. Conclusion

The analysis of the spring rigid three-dimensional space shows that elementary spaces form structures corresponding to known elementary particles. Spherical changes deformation of space caused by the motion of elementary spaces forming elementary structures are carriers of interactions at distance with the properties of gravitational, electromagnetic and weak interactions. The cause of the quantum properties of the electromagnetic and weak interaction are wave phenomena. The analysis of the dependence of quantum properties on the course of wave phenomena is beyond the scope of the article.

The strong interaction is the direct interaction of superimposed biaxial spaces with range limited by the length of biaxial spaces. The four biaxial spaces of the quark are an explanation of the quantum properties of the strong interaction.

The analysis of interactions transmitted by spherical change deformation of space explains the reasons for the differences in the properties of gravitational, electromagnetic and weak interactions. The analysis of the direct interaction by superimposing biaxial spaces explains the difference between the strong interaction and the other fundamental interactions.

Geometric hypothesis imposes constraints on the size of the deformation of space. The curvature of space as compression-induced buckling cannot take arbitrarily large in value. General relativity does not describe the curvature of space and imposes no restrictions on the amount of curvature of space (space-time). With value limitation of the maximum of the space deformation, the time taken to cover finite distance has finite value regardless of which frame of reference time will concern.

In the geometric hypothesis, the gravitational mass of neutrinos is 10^4 times that of inertial mass. Such large difference the mass gravitational and mass inertial of neutrinos at 10^9 neutrinos per baryon should produce effects observable on an astronomical scale.