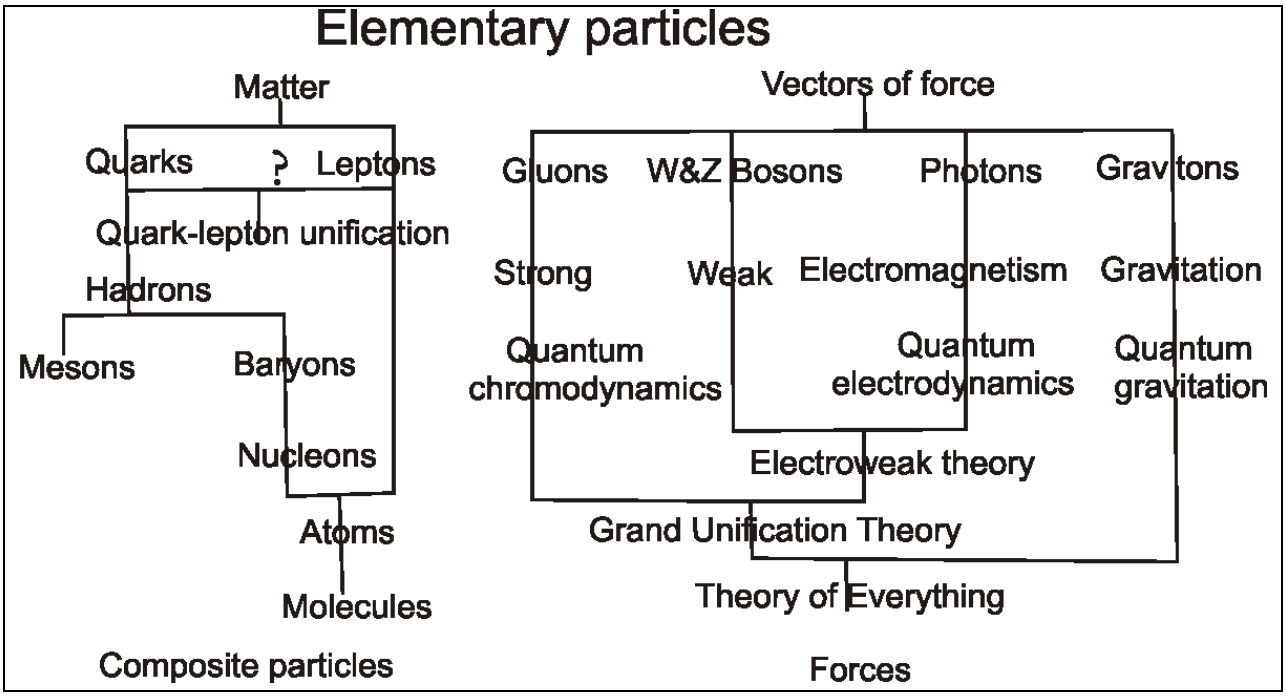
2. The structure of the fundamental particles and metastable

2.1. Field and particle

The substance is a hierarchical level of matter. The substance is built from the highest levels of the field. They differ only in the level of energy. Field is the flow of «hot» vortex particles. Substance is chilled «lumps» of these particles [3].

Modern theoretical physics suggests that the basis of matter are the fundamental particles: quarks and leptons (neutrinos and electrons). A hierarchy of composite particles has described by the Standard Model semi empirically. The particles are divided into groups according to their participation in the fundamental interactions. Every interaction between fermions «transfer» special boson. Interactions are independent and «merge» at very high energies. Below is a diagram of the elementary and composite particles and the theory describing their interactions.



In considering this scheme raises questions, but that there is no answer. First of all, why is responsible for electromagnetism assigned photons? What does the light to electricity? What do the W & Z bosons in the weak interaction? Pushes the proton and electron in neutron? If so, where bosons go after the collapse of the neutron? And generally, what specifically interacts with anything in the weak interaction? What general does it have with the electromagnetism?

Where did the bosons — “interaction carriers”? This is the same material as the quarks and leptons, or it's a different matter? And as such, the gluons are distributed in space: fill the entire space as photons, or are only in the nuclei of atoms? How gravitons carry gravity bodies? The term "interaction carriers" suggests that the property of "attraction" have masses themselves, and gravitons only take the property in one mass and pass it to the other mass.

Matter is particles (quarks and leptons), and what is between the particles? If empty, it is necessary to recognize the repository of matter — the absolute space of Newton.

And what had all the quarks and leptons generated? Apparently, there was any process that generates them in the appropriate amounts to each other? Today physics defines three families of fundamental particles in the table. The masses are in fractions of the proton and MeV.

Family 1		Family 2		Family 3	
Particle	Mass	Particle	Mass	Particle	Mass
Electronic neutrino	$<10^{-8}$	Muonium neutrino	<0,0003	Tau-neutrino	<0,033
Electron	0,00054 (0,510 MeV)	Muon	0,11 (106 MeV)	Tau	1,9 (1777 MeV)
u- quark	0,0047 (4 MeV)	c- quark	1,6 (1250 MeV)	t- quark	189,0 (175000 MeV)
d- quark	0,0074 (7 MeV)	s- quark	0,16 (150 MeV)	b- quark	5,2 (4500 MeV)

Consider the existing ideas in terms of the vortex model.

Vortices of the formatter were formed after inflation in a super dense state. They represented the quantum of fluid with its “boiling point”. Cool to the boiling point, the gravitons liquid formed larger vortex structures in the form of electron neutrinos and antineutrinos (Figure 2.1). This is stable neutral leptons with half-integer spin, participating only in weak and gravitational interactions. Only electron neutrinos and antineutrinos are the elementary particles of matter. All other particles are composite.

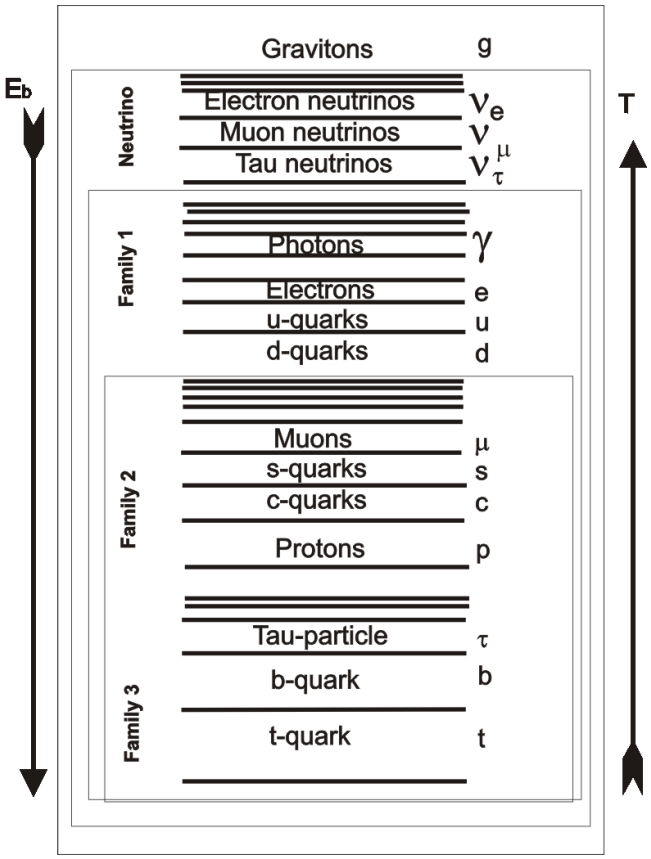


Figure 2.1. Level diagram of the fundamental particles

Further cooling of the medium allowed neutrino interconnected, moving to lower levels. Consolidation into a pair of electron neutrinos and antineutrinos formed photons, electrons and positrons. Paired interactions of muon quarks formed protons. Thus, the neutrino is intermediate between the quanta of the field and matter. They are built of graviton field. Figuratively speaking, the neutrino is both «cold»

quantum of field and «hot» particle of matter. All lower levels of matter built of neutrinos and antineutrinos.

2.2. The first family of fundamental particles

Electron neutrino and antineutrino

As the cooling of the Universe gravitons grouped vortex rings. In the vortex ring is supported by two rotating flow of gravitons: one stream is toroid flow around a circular core with a high frequency Ω (Figure 2.2). This provides movement along the axis of the torus through «eversion» itself. Angular momentum is closed toroid rotation on itself.

Another motion is ring rotation along a core with frequency ω. This is rotation of the torus as a whole around a central axis. The angular momentum of the ring rotation is directed along this axis. In fact, the motion of gravitons lines in the vortex is a spiral lines. Toroid and annular velocities are relative to each other as the right or left screws.

We will identify the left screw gravitons vortex ring with the electron neutrino ν. And the right screw gravitons vortex ring — with electron antineutrino $\tilde{\nu}$. These particles are asymmetrical. According to the law of conservation of angular momentum they have created a pair. Annihilate, i.e. disappear, merging with each other, they can not because of its asymmetry. Spatially, they are incompatible. This structure of the neutrino is the basis of the law of conservation of the combined parity.

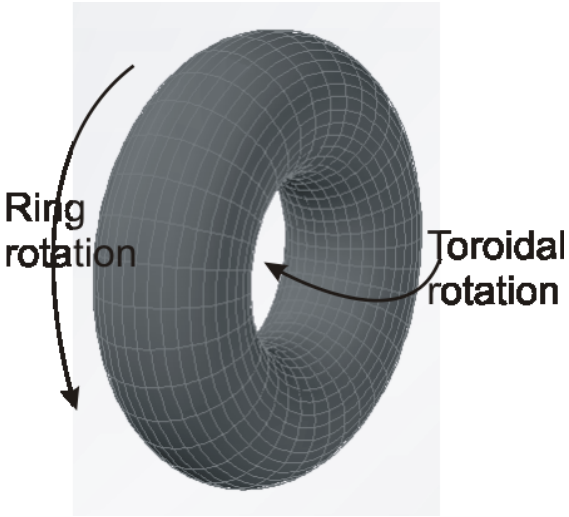


Figure 2.2. Ring vortex neutrino

Figure 2.3 represents a section of the torus. The left vortex rotates counterclockwise. He carries away the boundary layer field environment. In the placement of the right vortex, this flow is directed upwards. Similarly, the right vortex, rotating clockwise, is forming a flow at the location of the axis of the left vortex up with a constant speed. The left vortex moves up the right one and the right vortex moves up the left one.

The free neutrino due to its toroid rotation immediately begins to move steadily along the axis of the ring with a constant velocity V closed to the light velocity. Speed of light c is the average («thermal») particle velocity of the field. Translational motion of the vortex ring neutrino supported by the toroid rotation with frequency Ω. Angular momentum of the toroid rotation is closed by itself. It can not

participate in the spin-spin interaction with other objects. Its closure is a guarantee of stability of the particle. This hidden internal energy can not be dissipated in interactions.

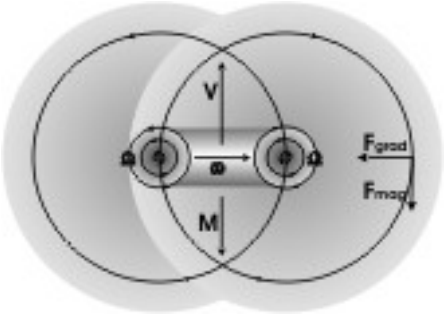


Figure 2.3. The toroid and ring rotations of neutrinos

Circular rotation with a frequency ω determines the angular momentum $\vec{M}$ and energy neutrinos. In the ground state minimum (intrinsic) angular momentum (spin) is equal to h/2. When excited by the frequency of ring rotation ω increases. The energy range of particles can be very broad.

The direction of translational motion forms the left screw system with the direction of ring rotation in the neutrino and the right screw system in antineutrino. They also say that neutrinos have helicity (-h/2), i.e. spin is directed against the direction of motion. Helicity of antineutrinos is h/2.

Neutrinos and antineutrinos are a rallying point in the chain of levels of evolution of matter. All field components at levels above neutrinos more energetic than neutrinos. In the gravitons, and then neutrino passed only a small portion of dark energy. If we could reduce the field of vision to the scale of neutrinos, then we would see them as rare dark dots on the solid bright background "environment".

The structure of the photons

In the early hot Universe, the concentration of vortices neutrinos was so high, that provides very small distances between them. Therefore due for the interaction supports all forms of Multivortex entities - "excited" neutrinos. After cooling some of them proved to be sustainable, including photons and electrons — build a pair of neutrinos.

Scheme of formation of photons is shown in Figure 2.4. Photon “picked” from the two neutrinos (the left screw photons) or of two antineutrinos (the right screw photons or "antiphoton"). They settle down coaxially facing each other and are attracted vortex interaction. Neutrinos are constantly changing places, changing their size, and passing through each other on the principle of "game of vortex rings". Front ring operates its attached layer flow field on the back ring. In such a way (see rigs line the left of the figure) the center of mass of the rear vortex is shifted to the axis and forward. But then the own stream of toroid rotation causes the rear ring to reduce its diameter and accelerate. Similarly, the rear ring (see the middle line of tanker design) inhibits and increases the diameter of the front ring. When the rear ring is held back through the hole in the front ring, then it becomes the front and the whole picture again.

Need to draw attention to the fact that the circular rotation of neutrinos in a photon in the same direction. After reattachment of the field available to monitor the frequency of circular rotation of the two neutrinos aligned — they revolve around the axis as a whole.

The figures show that the merger of the two antineutrino helicity (the projection of spin on the momentum) is positive and is equal to 1 (h). When connecting two neutrino helicity is -1 (-h), And a pair of neutrino-antineutrino give helicity equal to zero. We say that the spin of a photon in units of h can

have values 1, -1, 0. The figure shows that while we are different particles, although other parameters are indistinguishable.

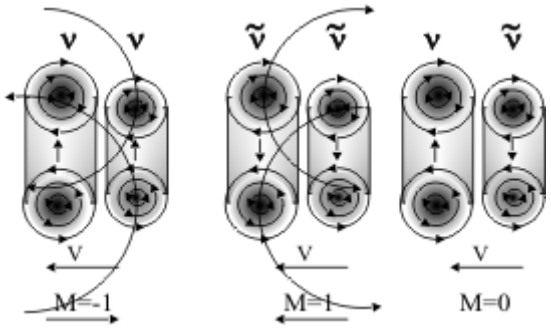


Figure 2.4. Scheme of formation of photons

There is a third option in the figure. The connection with neutrino and antineutrino can not be observed, although it may exist. Ring rotation should inhibit each other. Such photons can only have its own frequency ω_0 (corresponding to zero energy $h\omega_0/2$, which can not be taken away). But if the photon can not pass its momentum to recording device, it is not available observation and it is impossible to fix. Therefore, the number of possible spin orientations of a photon is equal to two, not three, which would have a particle with spin S= 1 (2S+1 = 3).

Toroid rotation provides a constant speed of photons of translational motion. The energy of the toroid rotation can not be dissipated in interactions, as well as angular momentum is closed by itself. Therefore, the photons are constantly moving, being in thermal equilibrium with the surrounding environment gravitons.

Each photon has energy, impulse, angular momentum, the frequency of "Game of the Rings" and the frequency of rotation of the rings as a whole. The ring frequency ω not connected with their own intrinsic properties of the photon. Therefore, it can serve as a carrier of information. In one place, the photon was twisted action of some factors, but if it moves to another place, untwisted, also produced some action. This is the frequency of rotation of the ring involved in Planck's formula $\varepsilon=h\omega$ and determines the color of light. The photon can decay into two neutrinos with absorption of communication energy.

Photon structure gives it a constant translational velocity regardless of the speed of the source. Forward speed of photons of different "colors" is the same. This speed is *c* relative to the graviton environment in which the movement takes place, but not relative to the observer in any inertial frame of reference.

Speed of a photon is equal to *c* relative to the observer in all directions only in very massive frames, which "is carrying the ether." On the surface of the Earth, for example, there is no "ether wind". Earth is surrounded by a layer of bound vortex gravitons. Otherwise vortices photons addicted to directional flow graviton environment. Approval of the theory of relativity that the speed of light is invariant value in all inertial reference frames is unfounded. Both Einstein's postulates require the following clarification:

1. In any very massive inertial frame of physical phenomena occur equally.
2. In any very massive frames the speed of light in a vacuum is independent of the motion of the source and is the same in all directions.

The electron and positron

If two free neutrinos have oppositely directed velocities, then when flying at very close range, they can come to close and form a new particle. Strength neutrinos made by the mechanism strong interaction. Entrained flow field of a neutrino shifts the center of mass of the vortex of another neutrino. The vortex flow of the second neutrino is pressing it to first. In turn, the first neutrino enters the flow field of the second neutrino and drifts up to him. The velocities of neutrinos are opposite, so that the force of attraction is the centripetal and the orbit of the rotation is a circle. Work at this not taking place.

The structure of the electron shows in Figure 2.5. The structure of the positron shows in Figure 2.6. Electron is formed from two vortices-neutrinos with oppositely directed velocities. Positron is formed from two vortices-antineutrinos with oppositely directed velocities.

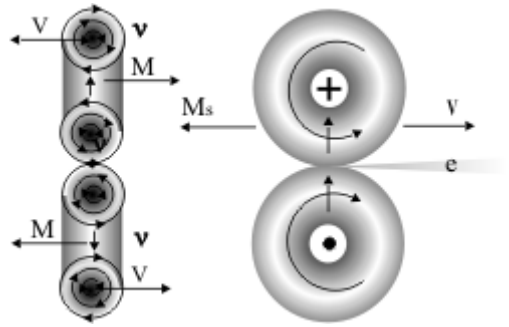


Figure 2.5. Structure of the electron

Neutrinos are mutually attracted to each other on the mechanism of strong interaction. They rotate in a circular orbit around a common point in the plane perpendicular to the plane of the rings. The speed is close to light. Moments of neutrinos are opposite. The new vortex that formed by rotating has spin — own moment of the electron M_s=-h/2. Own moment of the positron M_s=h/2.

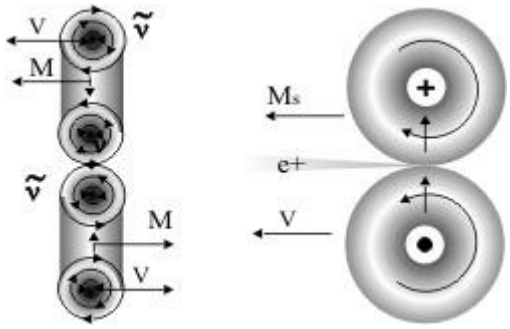


Figure 2.6. Structure of the positron

Consider this model in another plane (see right side of figures). Ring neutrino fluxes, comprising an electron (positron), mutually affect each other, so that the frequency of their rotation is the same. Here the circular flow, rather than toroid flow is the engine of the particle. In Fig.3.5 the electron moves to the right — in the direction opposite to the spin M_s. Positron moves to M_s. Speed of their "Brownian" motion corresponds to the own frequency of circular rotation. With increasing angular velocity of rotation of the rings the forward speed of the particles increases too.

The rotating in the electron neutrinos forms a kind of "gear pump". They are tightly squeezing the central part of the surface layer of the field. Then the rings push the jet entrained gravitons in the

direction of the velocity **V**. The open vortex tube indeterminate length is formed along the axis, rotating around its axis with a frequency of toroid rotation Ω.

Here we use the term "tube" is not in the sense of describing the geometry, but in the sense of "charge tube Faraday". Tube is coming from the point of contact vortices neutrino beam with a screw motion of gravitons. The rotation of the vortex tube for the electron forms a left screw, and for the positron forms a right screw with the direction of flow.

Screw beam of gravitons in the open vortex tube is identified with the electric field. We call this up "charge", because the flow determines a charge of the particle. At the beginning of the charge tube in the positron source is located, and in the electron runoff is located. Therefore, a positron charge called like positive, and the charge of an electron called like negative.

Charge tubes provide electrostatic interaction between particles in their coaxial approximation. The mechanism of action of force based on Bernoulli's law: the more dynamic flow rate of gravitons, the less it static pressure. Thus, on the axis of the particle on either side of the center point the differential pressure can be created by applying an external flow of the other particle. Power is provided by a gradient of energy density. Some variants of the overlay flow vortex tubes particles are shown in Figure 2.7.

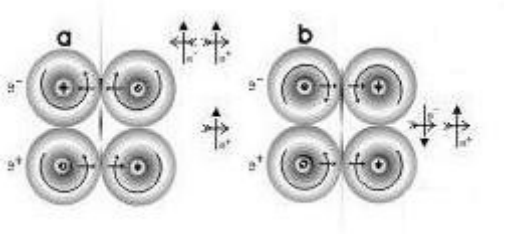


Figure 2.7. Interaction of an electron and positron

In the case of "a" positron and an electron are moving in one direction. The charge tube of the positrona passes through the electron tube. The left screw gravitons flow of electron is neutralized by the right screw flow of positron. The rotational speed of the flow at the axis of the electron is zero on both sides of the central point. An electrostatic field of the electron is not acting to the positron. Electron does not feel the impact of the positron. However the particles are attracted to each other by vortex interaction (direction of rotation of the vortices are the same).

In the case of “b” positron and electron are moving towards each other. Axial flows out of particles are appropriate unperturbed flows. Counter-flows of between particles cancel each other, and rotation is added with each other. Hydrodynamic pressure on the axis between the particles is smaller than the outside, and the particles are attracted along the axis. Power is provided by the gradient of energy density.

The interaction of two positive positrons, following along the axis in chase each other (a) and in the opposite direction (b) shows at figure 2.8.

In the first case the low positron is not experiencing the force effect. For the upper positron rotational flows inside and outside are added. Consequently, the pressure drop in the central point on the axis does not arise. The particles do not repel for a given orientation. It is worth to note that the particles with the same name in this position attracted to each other by vortex interaction and can form a pair with spin *h* and charge *2e*.

In the second case, the counter-flows do not change outside the particles. Rotating flows between the particles is compensated. Static pressure on the axis between the particles is greater than the outside. The charges repel.

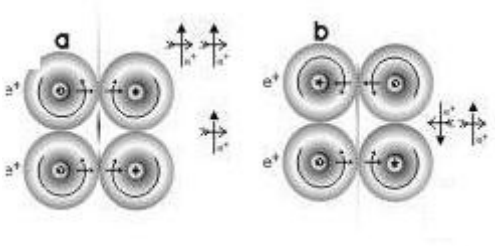


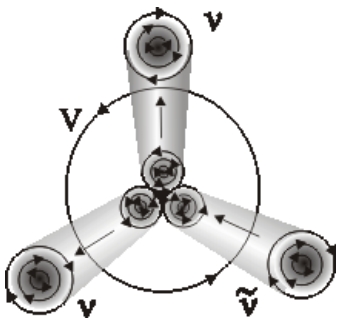
Figure 2.8. Interaction of two positrons

Thus, the electrostatic field of the electron and positron do not have a central symmetry. Fields are sustained mechanical flow of gravitons in the form of a rotating beam. Electrostatic interaction of charged particles takes place only along the axis of the particles by the force at the point of contact neutrinos. This force is due to the difference of hydrodynamic pressure on both sides of the point of contact.

Sustained flow of gravitons, carrying the electrostatic interaction, embodies the idea of Faraday of charge tubes (power lines, strings), which are connected by charged particles. Unlike the case of a centrally symmetric field, the relationship axisymmetric charge is only possible for the pair interactions. Mutual attraction or repulsion of charged particles depends on their orientation. Comparing the structure of the electron and positron with the structure of the photon, we can see that these particles embodies the idea of supersymmetry between bosons and fermions.

Quarks of the first family

In the first family of fundamental particles assumed to exist u-quark with a charge of +2/3 e and d-quark with charge -1/3 e. Production of new particles in the hot universe occurred most likely in the binary collisions. Binary collisions of neutrinos generated electrons and positrons. These particles are again faced with the neutrino, creating quarks. In Figure 2.9 shows a diagram of d-quark, this is obtained by the addition of the electron antineutrino to electron.



Ris.2.9. d-quark scheme

Directly from Figure 2.9 shows that one ring antineutrinos emits the positive flow of gravitons from a point of contact rings on the reader. Two rings neutrinos emit negative flow of gravitons behind drawing. Charge of the particle is the intensity of the forward flow of gravitons along axis. If we assume that all three rings form a flux equal to a single charge, the charge d-quark at one end is 1/3, and at the other end is -2/3. If we assume the charge of the positron is 1, then the share contributed by the charge on each ring, is equal to ½. Quark charge in this case is -1 on one end and 1/2 — from the other end.

Really attached flows of gravitons will close between the poles of the particle, so that will remain uncompensated charge -1/3 or - ½ e. The spin of d-quark is equal to - ½.

Analyzing the scheme u-quark in figure 2.10, we conclude that the charge of the quark will be 1/3 or 1/2e. The spin u-quark is ½.

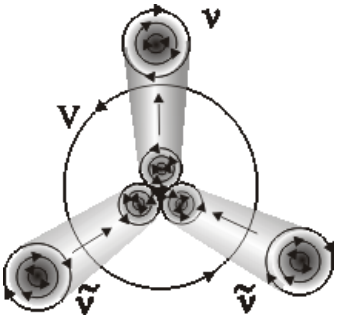


Figure 2.10. u-quark scheme

Note that because of the fragmentation of the resulting charge quarks can not exist independently. They must unite or in pairs, or rebuild. Figure 2.11 shows a diagram of the reconstructed d-quark. Its charge is -e, and the spin is zero. Between an electron and an antineutrino supported vortex attraction by the same directional toroid rotation.

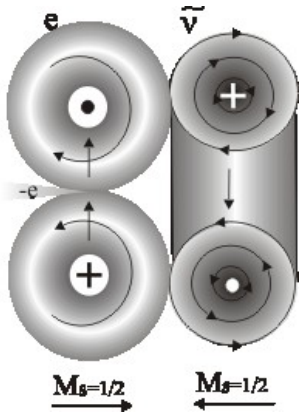


Figure 2.11. Rebuilt d-quark

Spin reconstructed d-quark is zero and longitudinal mass is equal to the mass of the electron.

2.3. The second family of fundamental particles

Muon neutrino

In the second family of fundamental particles muon neutrinos and muon antineutrinos occupy the ground state. They, like neutrinos and photons, always travel at the speed of light. Muon neutrino consists of two neutrinos and one antineutrinos (Figure 2.12). You can also say that the muon neutrino is formed neutrino photon and antineutrinos in binary collisions.

Translational motion is done on a "game of vortex rings". Rings of neutrinos constantly pass through each other. Speed of all the components in the same direction. The spin of muon neutrino, equal h/2, is the opposite of speed. The spin of the muon antineutrinos and the direction of speed are the same.

Rings of neutrino in the muon neutrino, as in a photon, are attracted to each other due to the vortex interaction. The direction of rotation of the attracted vortices has to be the same. In the figure the flow of gravitons in all sections of the upper vortex is directed clockwise, and the lower — counterclockwise.

Compare figures 2.9 and 2.10 to figure 2.12. Boson the muon neutrino ν_μ is a superpartner for fermion d-quark and the muon antineutrinos $\nu_\mu{}^\sim$ is superpartner for u-quark.

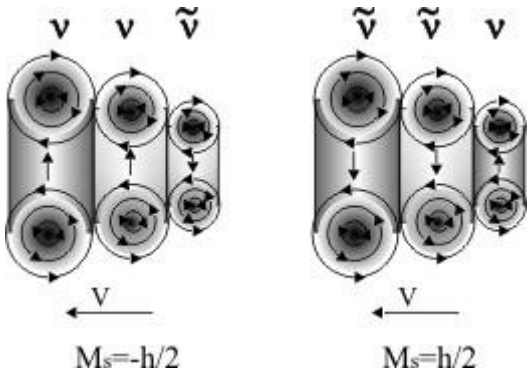


Figure 2.12. Muon neutrinos and muon antineutrinos

Muons

Most unstable particles obtained in excess of the energy on the powerful accelerator beam by bombardment of targets of energetic particles. The structure of the particles can be judged by their decay products. For example, consider the possible structure of the muons. According to the properties they can be called "heavy" electrons (positrons) with a mass of 206,7 m_e and lifetime 2,22 • 10^{-6} s. Muon decay is most likely under the scheme:

$\mu^- \rightarrow e^- + \nu^\sim + \nu_\mu$;

$\mu^+ \rightarrow e^+ + \nu + \nu_\mu^\sim$.

Since the muon spin is 1/2, their structure is generally repeats the structure of the electron. Only instead of the electron neutrino particles the muon neutrino rotates around the axis (Figure 2.13). This structure of the muon gives him a significant increase of the measured "longitudinal" mass in comparison with the electron.

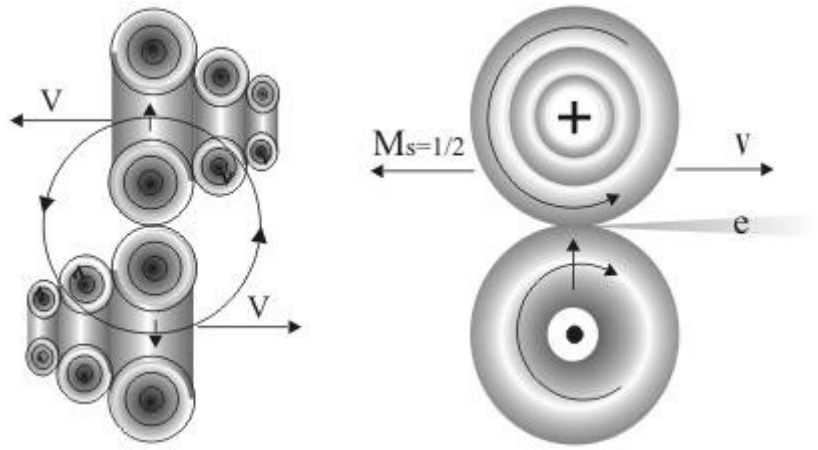


Figure 2.13. The structure of the muon

Since the muon has a half-integer spin, it can decay into three particles only. Therefore, the decay of one of the muon neutrinos should split into two parts: an electron and an antineutrino. Suppose that the muon neutrino crashing “in advance”, at the moment of forming of the muon. Then we shall have the combination of three particles — the decay products of the structure shown in Figure 2.13. In the

event of such a structure a break ties without variants would go to the stable particle: the muon neutrino, electron and an antineutrino (Figure 2.14).

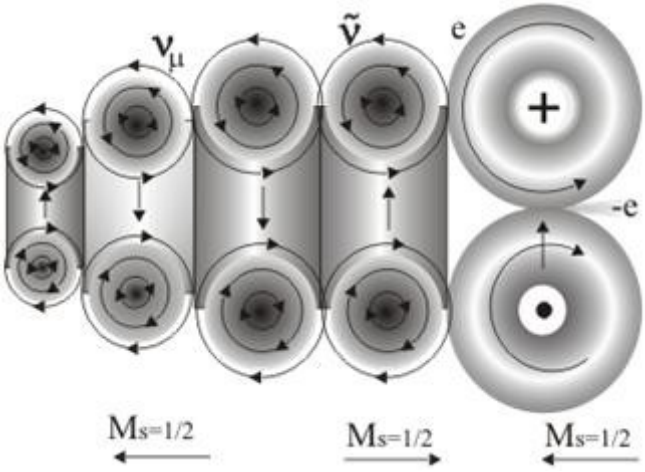


Figure 2.14. Possible structure μ^- - muon

Communication in the new structure could be implemented at the expense of the vortex interaction of the muon neutrino, antineutrino and electron. The figure shows that the direction of rotation of the neighboring vortices is the same. All particles have the speed in the same direction in the figure — the right. This provides additional stability, namely the axial coil gravitons closes around all four ring vortices, forming a "bag." This "bag" is a "game of the four vortex rings."

However, the longitudinal mass of such education will be close to the mass of the electron, as four concentric rings have a small longitudinal neutrino mass. In practice, such a structure is not realized.

As for the τ-neutrinos, we can assume that the structure it continues boson number: electron neutrino — photon — the muon neutrino. It is possible that τ-neutrino has four rings, axially facing each other. In a family of three is now known τ--lepton with mass 1784.1 MeV and lifetime $0{,}3.10^{-12}$ s. Structure τ-lepton is likely similar to the muon, but instead of muon neutrinos in the orbit of a particle is τ-neutrinos.

Second family of quarks

In the second family of fundamental particles quarks can be formed by joining the muon neutrino to μ^+-muon or by joining the muon antineutrinos to μ^-- muon. Figure 2.15 shows a diagram of the c-quark.

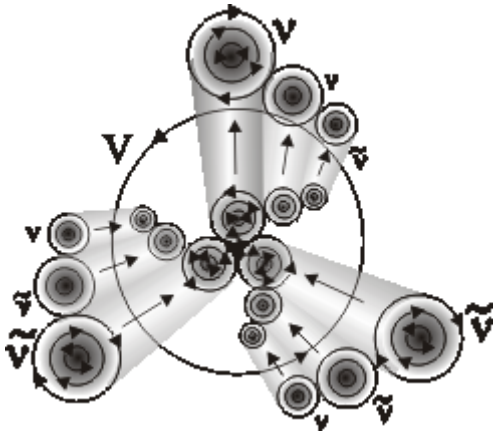


Figure 2.15. Scheme with the c-quark

C-quark formed by the capture of the antimuon muon neutrino. Possible that quarks formed in three-body collisions. Quark is fastened on the axis of the vortex forces of attraction between the three

particles: two antineutrinos and neutrinos. In the resulting structure two antineutrino create flux of positive charge, aimed at the reader and one neutrinos create a stream of the negative charge, of the drawing plane. Recall that the sign of the charge is determined by the direction of rotation of forward flow of gravitons.

If we assume that all three rings form a flux equal to a single charge, the charge of a quark at one end is equal to 2/3, and the other end is -1/3. If we assume the charge of the positron is 1, then the share contributed by the charge on each ring, is equal to ½. Quark charge in this case is equal to 1 at one end and -1/2 — from the other end. Really attached flows of gravitons will close between the poles of the particle, so that will remain uncompensated charge of 1/3 or + ½ e. C-quark spin is equal to ½.

Analyzing similarly scheme s-quark, we find that it has on one side a charge -2/3, on the other hand 1/3. Uncompensated charge s-quark is -1/3 or -1/2e.

The structure of the c-quark, as shown in Figure 2.15, can not exist independently of the result due to fractional charge (+1/2e). Really this quark connected to the same quark to form a proton with charge + e. Structure interaction component is not changed. In other cases, the c-quark is reconstructed in the design shown in Figure 2.16, i.e. becomes π^+-meson (pion) with a charge of + e.

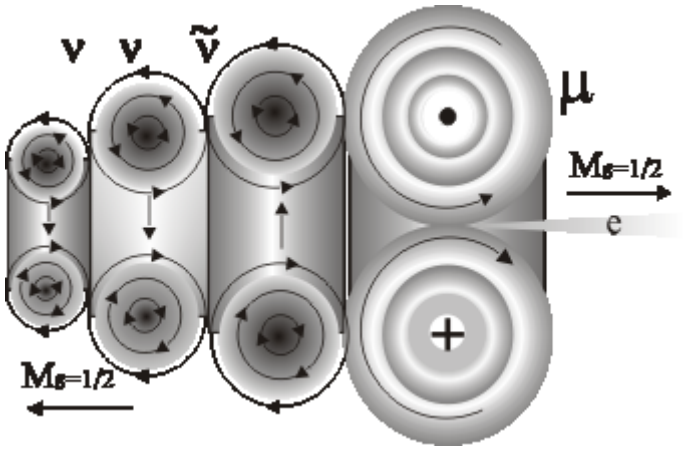


Figure 2.16 — The structure of the rearranged c-quark — pi-meson

2.4. Features of the structure of the proton

According to modern concepts of the proton is a composite particle. It consists of three quarks with spin h/2 (one d-quark with charge -1/3 e and two u-quarks with charge 2/3 e). However, in the conventional quark model, there are some ambiguities.

1. Fractional charge of quarks. It turns out that the elementary charge -1/3 e has d-, s-and b-quarks. In order to have twice the charge 2/3 e u-, c-and t-quarks must contain two elementary charge carriers. But if we accept the truth of the assertion that the quarks have no structure, then we will have been four elementary charges: -1/3 e, +2/3 e, + e,-e, which contradicts the experience.

2. The property of confinement: composed of quarks to the proton quarks can not parse ("free quarks do not happen!"). This situation resembles the child's question, "Mom, he's hiding his uncle, who says of the radio? '.

3. In the proton quarks have spin ½, should be oriented so that the total spin of the three quarks also equaled ½. If the spins of the quarks are parallel to each other, then one of them must have a rotation opposite to the other two. But in this case it will be repelled from the other two quarks. Proton would be unstable.

4. Weight of three free quarks that form the proton is 4 +4 +7 = 15 MeV. By combining three quarks mass should decrease with the energy of communication. In reality, mass increases to 940 MeV, this is contrary to the law of conservation of energy.

Based on the above existing (uud)-quark model of the proton should be considered unreasonable.

The structure of the proton can be judged by its decay products. In the annihilation of the proton and antiproton are most likely to flow (jet) free pion and photons, for example:

$$p + p^- = 2\pi^+ + 2\pi^- + \pi^0$$

It can be assumed that the decay of the proton spawned two π^+-meson and antiproton spawned two π^-- meson. But then, we must first recognize that the proton is formed by particles is not the first, and the second family. Protons formed in the hot universe in binary collisions with quarks. In the formation of the binding energy of the proton is released 2 * 1250 - 940 = 1560 MeV. The high kinetic energy of the particles ensure a uniform distribution of particles rotating around an axis, as shown in Figure 2.17. As a result of the strong interaction between the rings formed, the combination of three particles: two μ^+-muon and a μ^-- muon. All three vortex-muon revolve in the same direction. Muon spin also are such that the total spin is ½. Flows of electric charges are added, so that the total flow is + e. After the formation of a proton from the old quarks there is no — there is only muons. Therefore, the decay of the proton get re c-quarks can not.

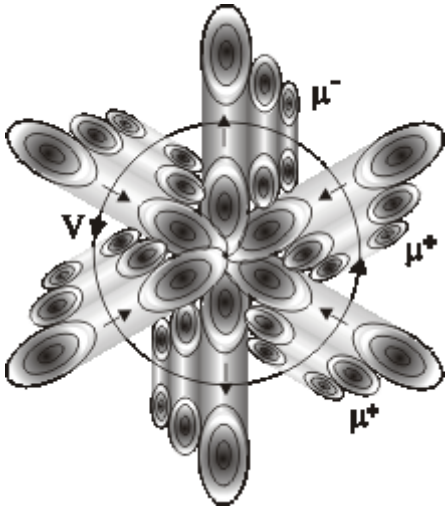


Figure 2.17. The structure of the proton

The particles in the proton, rather, neutrino rings of different particles are facing each other with their planes as a photon. In the photon back vortex ring is compressed bound vortex front and accelerates it, providing a "game of vortex rings." Here, in an axially symmetric proton each of the 18 vortices neutrinos can be considered "back." Therefore, all the rings strongly compressed towards the center.

Proton charge, i.e. mass is forced into a second axis radial flow of gravitons is +2e (two antimuons μ^+) in the direction from drawing to the reader and is (-e) (one muon μ^-) in the direction of drawing. Graviton flow of charge -e and the flow of charge +e closed to each other outside of the proton in the form of a hollow sphere (Figure 2.18). All mesons are in the "bag" of a rotating flow of gravitons. The figure of the "bag" with sticking vortex tube charge is transferring the flow of positive charge.

Similarly, in the world closed magnetic fluxes between the South and the North Magnetic Pole. The radius of the Earth's magnetosphere is more than 20,000 km.

The magnetic moment of the proton is formed by the outer layer of the attached general field. The average radius of this layer is almost three times the radius of rotation of the centers of mass of the quarks. Therefore the magnetic moment of the proton is 2,79 $\mu_{яд}$.

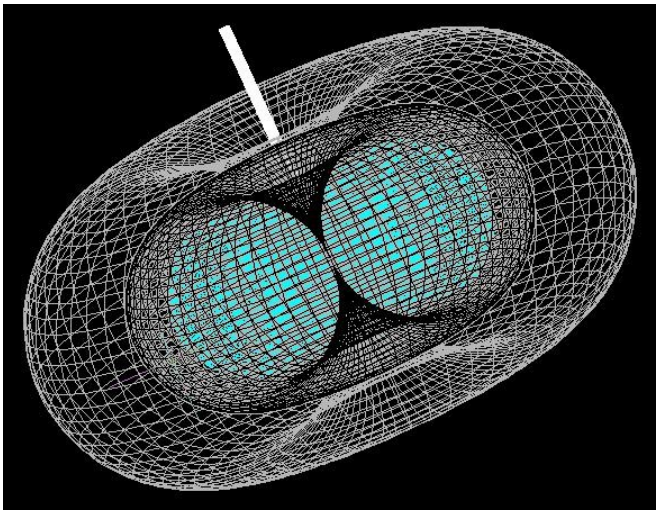


Figure 2.18. The closure of the charges in the proton

If we again assume $\mu_p = e \cdot c \cdot r_1$, the radius of the center of mass of the attached layer is equal to $r_1 = \frac{\mu_p}{ec} \approx 3\ 10^{-16}$ m. Longitudinal mass of a proton is 1836 m or 938.256 MeV. Transverse mass of the proton is zero.

2.5. Metastable particles

If accelerate particles to high speeds, then the collisions with other particles, or they "stick together", being kept together by pressure on each other, or fly into fragments, of which the formation of new particles. "Sticking" particles can be quite none-optimal — such lump is fixed as "resonance", they quickly falls apart. But part of the "sticking together" of the particles can be relatively long. They live as long as their internal high kinetic energy is creating force of inertia. In a "cooling off" due to dissipation of energy composite particles disintegrate. The particle energy is carried away by photons.

Energy transfer at macro material occurs mainly through the change in impulse. The transfer of energy at the vortex particles mainly occurs by changing the angular momentum. When transferring the particle more energy they store them inside it, untwistin vortices neutrino. We say that the particles are in the "excited" state. External excitation of a free particle is shown in the increase of kinetic energy. Excited particle is unstable, especially in clashes in the environment. At some moment the stored energy should transfer to the surrounding energy carrier: photons or neutrinos.

Additional power can be brought to the particles by other particles (including photons or neutrinos). If it is a small power, it will just excited particle receiver, and the incident particle will fly farther. If the energy of bombardment is large, it's possible to form new particles from highly excited elementary vortices target and its surrounding field. New particles are composite. They may exist, mainly, due to a strong counter compression elements having large energy.

Most unstable particles obtained in excess of the energy on the powerful accelerators. There a beam of energetic particles bombard targets. Of course, these methods are not quite correct. After all, we build up the ground state to a state of extreme excitement. The structure of the particles we judge by their decay products. But this does not mean that all the decomposition products were this particle. Part of

the particles decay can be carriers of energy. They came to the particle was taken from her energy and left.

Currently, a huge variety of physical phenomena is studied at collisions of elementary particles. It is determined by four types of interactions: strong, electromagnetic, weak, and gravitational. In quantum theory, the interaction is described in terms of the change of specific quanta bosons associated with this type of interaction. Transmitters interaction considered gluons, photons, Zo-, W +-bosons and gravitons.

The interaction of particles	Interaction carriers	Mass
Strong	Gluon	0
Electromagnetic	Photon	0
Weak	Weak gauge bosons	86,97
Gravity	Graviton	0

These virtual particles are produced and consumed in the process of interaction. They can not be registered as opposed to real particles. Vortex model, however, suggests another, the actual mechanism of interaction between the particles.

The representations of the vortex model can recreate the structure of metastable particles: pions, kaons and hyperons as the excited states of stable particles at higher levels (Figure 2.19).

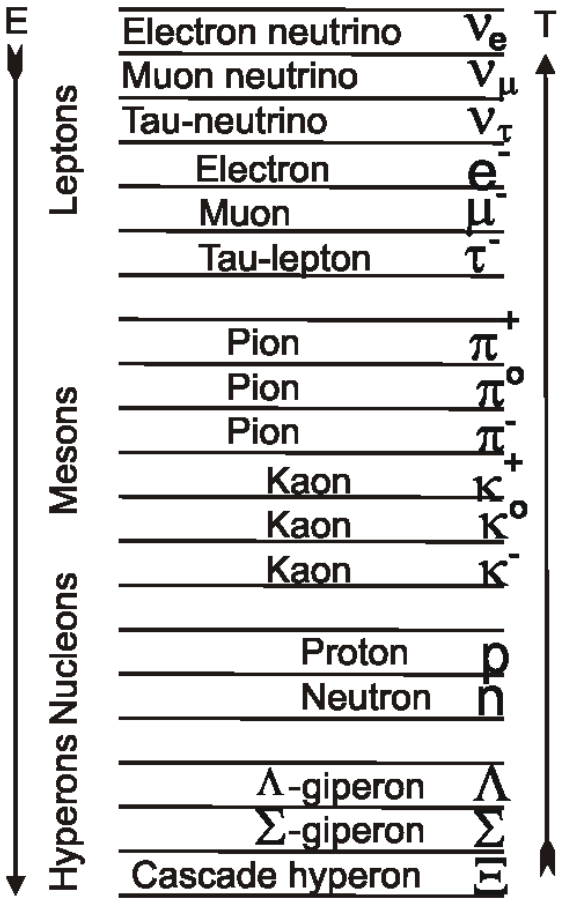


Figure 2.19. Energy levels of metastable particles

2.6. Neutrons

According to modern concepts of neutron contains one u-quark and two d-quark. In Figure 2.20 shows the Feynman diagram for neutron β-decay involving heavy W^- boson. It is believed that this is one of the

d-quark into a u-quark, emitting an electron and an antineutrino. The mechanism of this transformation is not considered.

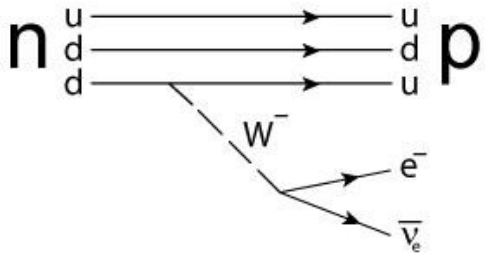


Figure 2.20. Feynman diagram β-neutron decay

In determining the structure of a neutron will consider the following:

- decay scheme: $n \to p + e + \tilde{\nu}$ with energy yield 0.782 MeV;
- neutron charge is zero, the spin s = 1/2;
- magnetic moment = - 1,91$\mu_{яд}$ (for proton μ = 2,79$\mu_{яд}$);
- the value of the mass difference: m_n-m_p = (1,29344 ± 0,00007) MeV;
- the neutron lifetime is (917 ± 14) s, i.e. ~ 15 min.

Of other quantum numbers neutron credited baryon charge equal to 1, the lepton charge and strangeness are zero, isotopic spin -1/2. In the nucleus of the atom nucleon occupy the region of radius about 1,5 • 10^{-15} m. Neutron involved in all types of interactions.

Neutrons are the result of binary collisions of protons with high energetic d-quarks. Energy d-quark should be in a range that the size of the incoming particles would be comparable. Under the action of the rotating field of the proton d-quark rebuilt structure, shown schematically in Figure 2.11. A possible structure of a neutron by this scheme is shown in Figure 2.21. Obviously, part of the neutron proton, an electron and an antineutrino.

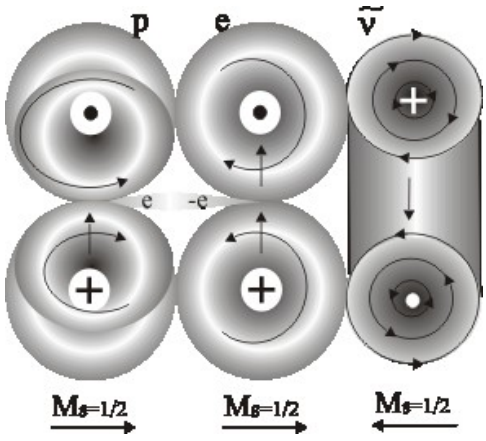


Figure 2.21. Outline of a neutron

The design of the proton is complete nature; it can not build into your "bag" with the quark-pion neutrino additional rings. Joining the electron to the proton is possible due to the electrical connection, as in the hydrogen atom. Then the total electric charge is zero. But the spin will increase to one. Joining antineutrinos with opposite spin reduces the general spin to the value of M_s = 1/2. Antineutrinos can not be placed between the electron and the proton. Electron closed from close interaction with the environment.

Such a block diagram of the neutron is carried out in practice. Velocity of an electron and an antineutrino are opposite proton velocity. Electron and an antineutrino press on proton due to its internal energy.

In the construction of another block diagram (Figure 2.22) it should be understood that the size of the neutron and proton are virtually identical. Therefore, the electron and antineutrino, members of the neutron, have high energy. They could be held in the proton is mainly due to the strong pressure on it.

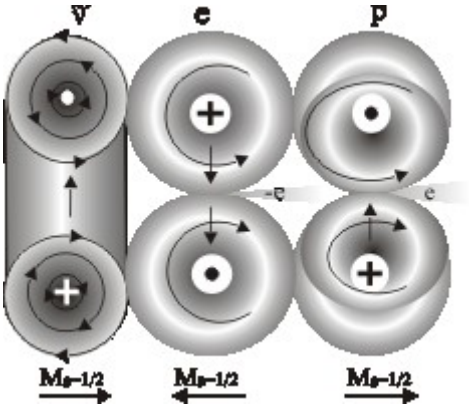


Figure 2.22. Another block diagram of a neutron

Electron and proton are attracted by electrical forces so that their charge and spin compensated. All three particles are attracted to the vortex interaction. The direction of rotation of the toroid flow is the same. In addition, the energetic electron acts on proton inertia. Energetic antineutrinos presses easy electron to massive proton due to its impulse. The magnetic moment of the electron is predominant. The direction of the velocity is the same for all particles. Such a structure will be presented to the neutron interactions as uncharged external proton, only with a greater mass.

This design particles is possible but for a short time. It is held only strength-mi inertia. With the dissipation of the electron energy particles scatter.

Longitudinal energy neutron rest is the sum of terms:

$$E_{\parallel}^{0} = m_p c^2 + m_e c^2 + U,$$

where m_p - proton mass, m_e-electron mass, U - potential energy of an electron and an antineutrino (their kinetic energy). It is the binding energy, which is released by the decay of the neutron.

Note that the neutron, in contrast to the proton, has a transverse energy of rest:

$$E_{\perp}^{0} = m_\nu c^2 + U_\nu,$$

where m_ν — transverse mass antineutrino equal m_e /2, U_ν — the potential energy of the antineutrino.

As all particles with spin ½, the neutron can decay into three particles only. Eventually the energy of an electron or electron antineutrino dissipates due to entrainment of its photons. Then pressure on the proton is reduced, and the size of the particles increases. Increasing the size will reduce the strength of the vortex adhesion between particles. External forces exceed repulsive force of inertia and neutron decay.

Such interaction of particles called weak interaction. The essence of the weak interaction is the opposing forces of repulsion and attraction between of the parts of composite systems with excess energy. Stability of the composite system of energetic repulsive particles is supported by their push under the forces of inertia. Squeeze factor may be third particles that exert a force on the outside.

With the weakening of the pressure due to the energy dissipation system elements repel. Dissipation of energy determines the threshold below which the decay of particles occurs. Attraction to explain the neutron decay of specific exchange gauge bosons to be redundant. Their role is successfully carrying quanta of the electromagnetic field — gravitons. They provide the attraction and repulsion of the interacting particles.

The electrons in neutrons are in an excited state. They tend to lose the excess energy (to give it to, for example, photons) and to come to the ground state. If compressing force neutrons weakened (extra neutrons in atoms), the neutrons decay. This factor is the cause of the natural radioactivity of the nuclei.

2.7. Peonies

Triplet π-mesons (pions) has the same properties with respect to nuclear interactions. Spin and magnetic moment they are equal to zero. But the structure of these particles is different.

Neutral π^o-meson is almost always decays into two photons through the electromagnetic interaction. But it is known that the energetic electron and positron decay to two photons in the process of annihilation in the collision. Figure 2.23 shows the combination of an electron and a positron, in which the charge, spin and magnetic moment are zero.

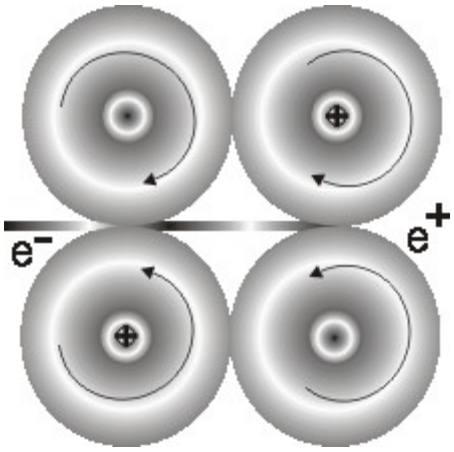


Figure 2.23. Structure π^o-meson

Charge flows from the outside of the pion compensate each other. A similar situation was shown in figure 2.8a. Electron spin, i.e. minimum own momentum, is opposite the back of the positron, so that the total spin of the pion is zero. The magnetic moment creates a closed azimuthal circular flow of gravitons. In this case, the direction of rotation of rings around the axis of the particle is opposite. The total magnetic moment is zero. The particles are held next to each other not only by electrostatic attraction, but also due to the strong interaction.

In the decay of the particle mass becomes zero. Energy 264.3 m_e = 135.057 MeV is distributed between photons. π^o-meson structure similar to the positronium atom.

π^+meson and π^--meson are excited muons, i.e. muons with an associated muon neutrino. The most common particle decay follows:

$$\pi^+ \rightarrow \mu^+ + \nu_\mu \rightarrow \tilde{\nu_\mu}\tilde{\nu_\mu}\nu_\nu ,$$

$$\pi^- \rightarrow \mu^- + \tilde{\nu_\mu} \rightarrow \tilde{\nu_\mu}\nu_\mu\nu_\mu .$$

When reconstructing the structure π^+-meson and π^--meson, we must bear in mind the following:

- they have zero spin and magnetic moment;
- they break down into particles of muon and muon neutrino;
- muon and muon neutrino is relatively well connected.

These requirements for determining the structure π^--meson satisfies the location of the muon antineutrino ν_μ, as shown in Figure 2.24. In that case μ^--muon has a configuration shown in figure 2.13.

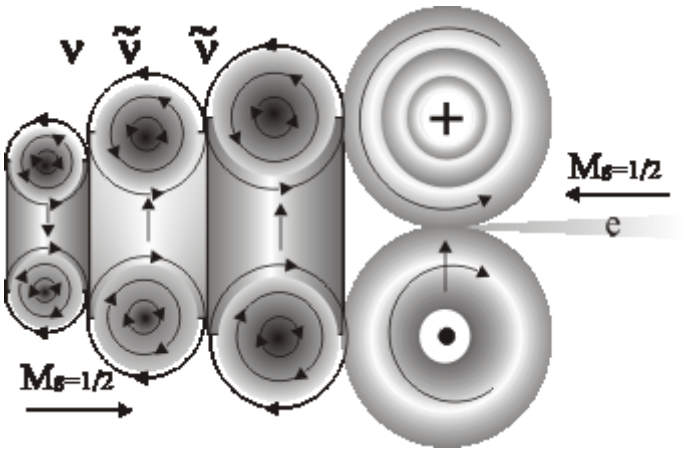


Figure 2.24. Possible structure π^- meson

The attraction of particles to each other is carried out here by the vortex interaction of the muon and muon antineutrinos. Due to the binding energy the longitudinal muon mass increases from 206 m_e to 273 m_e. The charge of the muon is fully preservs.

At zero spin the pion decay into two particles with half the spins. After the decay the muon mass is equal to 206.7 m_e. In the decay of the pion mass decreases to 66.1 m_e = 33.777 MeV. This energy is converted into kinetic energy of the muon and muon antineutrinos.

Structure of charged pions allows asserting that "the law of conservation of the combined parity in weak interactions" is simply the law of conservation of angular momentum.

2.8. Hyperons

Similarly, we can reconstruct any metastable particles on its properties and decay products. Consider, for example, how the collapse of the strange Λ^0-hyperon (charge e= 0, spin M_s= 1/2):

$\Lambda^0 \rightarrow p+\pi^-$

$\Lambda^0 \rightarrow p + \mu^- + \tilde{\nu}_\mu$

$\Lambda^0 \rightarrow p + e^- + \tilde{\nu}_\mu$

$\Lambda^0 \rightarrow n + \gamma$.

As products of the first decay scheme is clear that this particle consists of a proton and π^--meson, as shown in figure 2.25. In the second scheme of decay, we see that the pi-meson has already degenerated into a muon and muon antineutrinos. As usual, the relative strength of the link is less than the strength of elements.

If you just lay down the mass of the proton and π^--meson, we obtain 1836.15 + 272.80 = 2108.95 in units of m_e. The measured mass of Λ^0-hyperon M = 2182.4 m_e. The binding energy of 73.45 m_e = 37.584 MeV. She stands in the decay of a particle in the form of kinetic energy of the proton and π^--meson. With further decay π^--meson is allocated 33.9 MeV. The decay of the muon is allocated 37.6 MeV of energy. The final balance of a total collapse hyperon:

- initial rest mass of 2182,4 m_e or 1115.2 MeV;
- finite rest mass (1836,15 + 1) m_e = 1836,15 m_e = 938.27 MeV;
- released radiation energy 176.93 MeV.

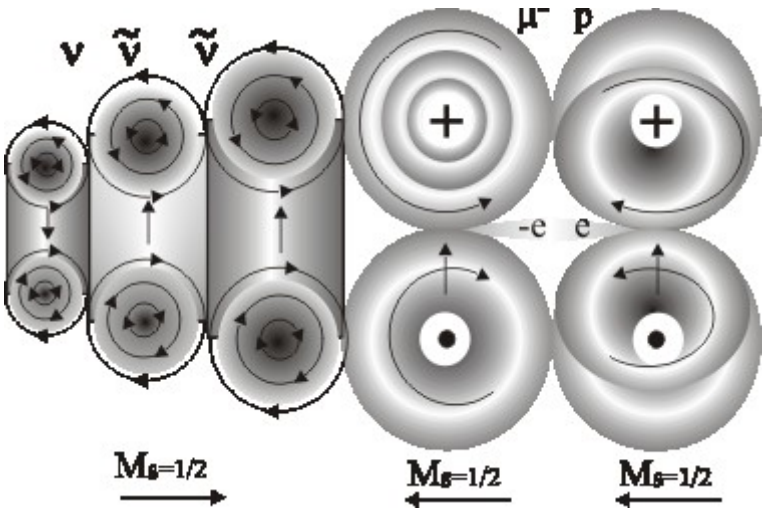


Figure 2.25. Structure of hyperon

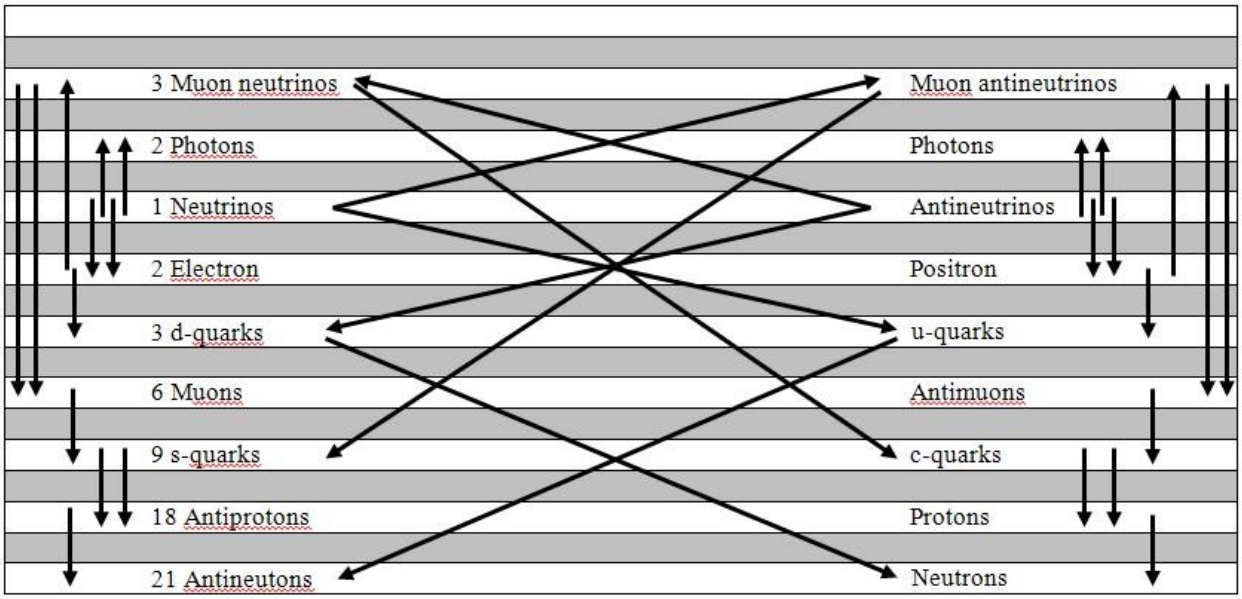
Thus, analyzing the decay scheme of particles, one can reconstruct their structure. All metastable particles are sets of stable fundamental particles: neutrinos, electrons, protons and their antiparticles. These sets are kept for some time mainly due to inertial forces. The more complex the constituent particles (the more they have internal energy), the more they are unstable. Estimated particles with very large mass (e.g. the hypothetical Higgs particle) are unlikely there could be some significant time available for their observations.

2.9. Scheme of the particles

The formation of particles from the neutrino is schematically represented. Each has its own stable particle antiparticle. On the left shows the number of vortex elements neutrino particles. Neutrinos and antineutrinos are the simplest high-energy vortex formations in a continuous medium of gravitons. All other particles are composed of a neutrino from the elements.

In the formation of the fundamental particles of neutrinos were the most likely pair collisions. Electrons and positrons are formed as a result of pair interactions of neutrinos or antineutrinos. Protons are formed by binary collisions with quarks. Binary collisions of protons with muon neutrinos led to the formation of neutrons.

Note that there is symmetry between the number of particles and antiparticles. Neutrinos and antineutrinos, left-polarized and right-polarized photons - they are all contained in the radiation in equal amounts.



People often ask where the antimatter is. Where anti Galaxy to look? Now we should be clear that antimatter contained in ordinary matter and find it anywhere does not. Proton has eight neutrinos and antineutrinos ten. Therefore, it is more "anti". In the hydrogen atom — the most common element — contains the same number of neutrinos (10) and an antineutrino (10):

Electron	$\nu\nu$
Proton	10ν~8ν