Section D:

GENERALIZATION OF NEW THEORY

"…*When a man found it, he hid it again and then in his joy went and sold all he had and bought that field*"

Jesus Christ

(Matthew 13:44, The Bible, New Testament)

Chapter 6

Attempt to Unify the Four Forces by Force Line Elements Theory

6.1 Increases and Decreases of Rest Mass

When a wave function (ψ) of an electron undergoes phase transformation, the expectation value of the momentum <*p*> is changed by as much as $\frac{h}{2\pi}\psi^* \frac{d\Lambda(x)}{dx}\psi$. To remove this value difference and maintain gauge symmetry, we have to insert the momentum of the electromagnetic field $\frac{h}{2\pi}A'$ into the momentum of the electron $\frac{h}{2\pi i}\frac{d}{dx}$.

$$A'(x) \rightarrow A(x) - \frac{d\Lambda(x)}{dx} \qquad \text{6-1-1}$$

The electromagnetic field $A'(x)$ that experiences gauge transformation at this time is expressed as the differentiated function $\frac{d\Lambda(x)}{dx}$, under the conditions that the irrotational vector field can be expressed as a gradient of scalar function and that the quantities of E and B are not changed at this time. This inserted quantity $\frac{d\Lambda(x)}{dx}$ removes the changed expectation value of momentum of the electron $\frac{h}{2\pi}\psi^* \frac{d\Lambda(x)}{dx}\psi$. However, because electrons follow De Broglie's formula $mv = \frac{\hbar}{\lambda}$, it means that expectation value of *mv* is changed as well. Because such changes of expectation values cannot guarantee rest mass invariance, a possible cause of such change of expectation value would be change of rest mass. The important fact here is that such change of rest mass is absorbed by the inserted electromagnetic field $A'(x)$ for gauge symmetry to be kept. The result of the expectation value of momentum after inserting the electromagnetic field $A'(x)$ is

$$< P > = \psi^* \frac{h}{2\pi i}\left[\frac{d}{dx} + iA(x)\right]\psi \qquad \text{6-1-2}$$

In order to view the absorption of the changed rest mass by the inserted electromagnetic field $A'(x)$, we have to expand the calculation process for maintaining gauge symmetry, as follows:

$iA'(x) + \frac{id\Lambda(x)}{dx}$ of

$$\ll \frac{h}{2\pi i}\left[\frac{d}{dx} + iA(x)\right] \rightarrow \frac{h}{2\pi i}\left[\frac{d}{dx} + iA'(x) + \frac{id\Lambda(x)}{dx}\right]$$

$$\rightarrow \frac{h}{2\pi i}\left[\frac{d}{dx} + iA(x) - \frac{id\Lambda(x)}{dx} + \frac{id\Lambda(x)}{dx}\right] \rightarrow \frac{h}{2\pi i}\left[\frac{d}{dx} + iA(x)\right] \gg \qquad 6\text{-}1\text{-}3$$

Here, we can see that the inserted electromagnetic field $iA'(x)$ has the term of $[\frac{id\Lambda(x)}{dx}]$. We can use this to analyze the special case in which the electromagnetic field screens the bar mass of an electron, as discussed in §5 and §4. Because electric field of A' is not constant but a function $A'(x)$, the rest mass m_0 of the electron becomes the function $m_0(x)$. We can therefore think of the electromagnetic field $A'(x)$ as being the change of the rest mass of the electron. In other words, gauge theory says that the "rest mass of an electron (as a particle) can increase or decrease." However, this is in conflict with the classical theory of relativity, which says that the rest mass m_0 in the formula $M = m_0 (1 - \frac{v^2}{c^2})^{½}$ is constant.

According to the force line theory of relativity, a mass change results when electromagnetic force lines accumulate on the vertical plane in the direction of motion according to $k = (1 - \frac{v^2\alpha}{c^2})^{½}$, so each gravitational force line that is connected to an electromagnetic force line would likewise accumulate on the vertical plane in the same direction of motion, thus establishing the formula $M = m_0 (1 - \frac{v^2\alpha}{c^2})^{½}$.

The curved force line theory of relativity, however, shows that when both the electromagnetic force lines and their connected gravitational force lines accumulate to the vertical plane in the direction of motion, the mass increase is transported by the electromagnetic force line elements. This mass increase essentially is not the same mass increase of the classical theory of relativity. Namely, each unit mass of a surface monopole element that is transported by each surface monopole of an electromagnetic force line is itself changed by the principle of the theory of relativity.

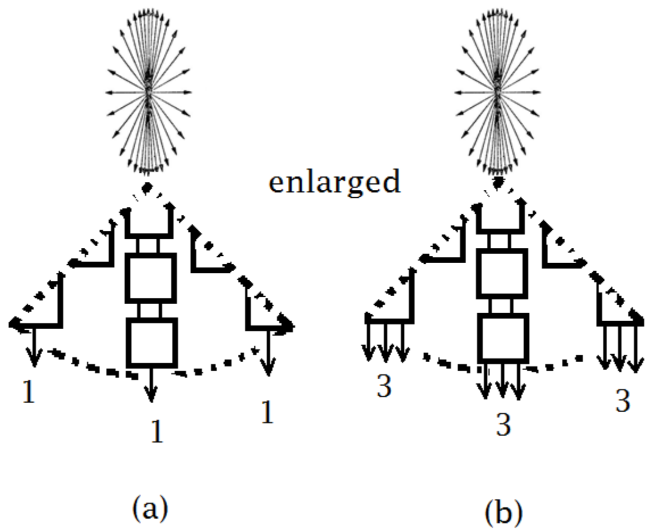


Figure 6-1-1

Figure 6-6-1(a) expresses the kinetic mass increase according to the classical theory of relativity. At this time, the number of gravitational force lines transported by the surface monopole of the electromagnetic force line element is constant, because the classical theory of relativity does not have gravitational force lines. Figure 6-6-1(b), on the other hand, expresses the kinetic mass increase and rest mass increase according to the curved force line theory of relativity. Here, the rest mass m_o is not constant but a function of velocity $m_0(v)$. Because the strength of the electric field $A'(x)$ is a function of velocity, the rest mass m_0 becomes the function $m_0(v)$ that is transported and absorbed by the electric field $A'(x)$. This is very important for understanding the gravitational charge quantization, flyby anomaly, and anomalous positron excess (cf. §18.3, §20, §22). Such rest mass is called the moment rest mass $m_0(v)$. Hence, electrons can exist anywhere deep within the nucleus and subnucleon region according to the formula $\Delta mv\Delta x \geq \hbar$.

When such electrons are ejected from the nucleus and subnucleon region, these electrons rebound to their original state by emitting a definitive electromagnetic wave in definitive time. According to the curve of the force line and force line element, the change in rest mass has a maximum 8 units (cf. §5). The entire area of a force line element is 12 units, 6 units of which are positive (+) and the other 6 are negative (–). Four of the 12 units are straight forces, whereas the other 8 units are neutral forces (called neutrolateral force). The strength of this neutral force is proportional to the angle according to curve. When the curve is $g = 3.772$, the angle θ at this time is

$$\sin\theta = \frac{3.772}{8} = 0.4715 \rightarrow \theta = 28.13^{\circ} \qquad 6\text{-}1\text{-}4$$

For example, for a proton mass without electrons, when $g = 1$, the rest mass is $m_p = 1836m_e$. Therefore, the maximum curve of force line is

$$g = \sqrt[4]{1836} = 6.546 \qquad 6\text{-}1\text{-}5$$

Hence, the angle is

$$\sin\theta = \frac{6.546}{8} = 0.818 \rightarrow \theta = 54.9^{\circ} \qquad 6\text{-}1\text{-}6$$

This means that for a component particle with force line curve $g = 1$, the rest mass is the usual mass, but when g increase from $g = 1$ to $g = 6.546$, the rest mass become $1836m_e$.

Finally speaking, change of force line curve is cause of static charge (rest charge or rest mass) area change same as $\pm\frac{1}{3}e$ and $\pm\frac{2}{3}e$ of quarks fractional static charge (cf§6.3.6)

6.1.2 Solving Origin of Photon Rest Mass in Superconductor

The Meissner effect is the expulsion of a magnetic field from a superconductor during its transition to the superconducting state. The German physicists Walther Meissner and Robert Ochsenfeld discovered this phenomenon in 1933 by measuring the magnetic field distribution outside superconducting tin and lead samples.

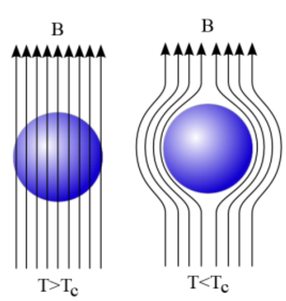


Figure 6-1-2-1

Two years after, by brothers Fritz and Heinz London developed equations, relate current to electromagnetic fields in and around a superconductor. A major triumph of the equations is their ability to explain the Meissner effect, wherein a material exponentially expels all internal magnetic fields as it crosses the superconducting threshold.

The equations is manipulated by applying Maxwell equation as

$$\vec{\nabla} \times \vec{B} = \frac{4\pi}{c}\vec{J} \qquad \text{6-1-2-1}$$

$$\nabla^2 \vec{A} = -\frac{4\pi}{c}\vec{J} \qquad \text{6-1-2-2}$$

Because $\vec{\nabla}\theta$ is almost zero, $\vec{J}$ become as

$$\vec{J} = -\frac{q^2\vec{A}}{mc}\,|\psi|^2 \qquad \text{6-1-2-3}$$

By equation 6-1-2-2 changed $\nabla^2 \vec{A}$ is

$$\nabla^2 \vec{A} = \frac{4\pi q^2}{mc^2}\,|\psi|^2\vec{A} \qquad \text{6-1-2-4}$$

Therefore magnetic field $\vec{B}$ can be

$$\nabla^2 \vec{B} - \frac{4\pi q^2}{mc^2}\,|\psi|^2\vec{B} = 0 \qquad \text{6-1-2-5}$$

Therefore M is

$$M = \sqrt{\frac{4\pi q^2}{mc^2}\,|\psi|^2} \qquad \text{6-1-2-6}$$

When $|\psi|^2 = n_c \sim 10^{22}, m = 2m_{2,} q = 2e$ is, London penetration depth is

$$\lambda \approx \frac{1}{M} \sim 10^{-8}m \qquad \text{6-1-2-7}$$

However, equation of $\nabla^2 \vec{B} - \frac{4\pi q^2}{mc^2}\,|\psi|^2\vec{B} = 0$ say us that photon can have rest mass as gauge particle in superconductor as below.

On the Abelian Higgs model and the static case

$\partial_o \phi = 0$ 6-1-2-8

$\mathcal{L} = -(\nabla - ieA)\phi \cdot (\nabla + ieA)\phi^* - m^2|\phi|^2 - \lambda|\phi|^4 - \frac{1}{2}(\nabla \times A)^2$

6-1-2-9

The Hamiltonian density is given by

$-\mathcal{L} = \frac{1}{2}(\nabla \times A)^2 + |(\nabla - ieA)\phi|^2 + m^2|\phi|^2 + \lambda|\phi|^4$ 6-1-2-10

This in fact corresponds to the Ginzburg-Landau potential.

Setting the potential parameter $m^2 = a(T - T_c)$ near the critical temperature $T = T_c$

When$T < T_c$,$m^2 < 0$ the potential has a minimum with a condition

$|\phi|^2 = -\frac{m^2}{2\lambda} > 0$ 6-1-2-11

The Lagrangian is invariant under the U(1) gauge transformation

$\phi \to e^{i\Lambda(x)}\phi, \quad A \to A + \frac{1}{e}\nabla\Lambda(x)$ 6-1-2-12

This symmetry can be spontaneously broken of Higgs potential.

By conserved vector current

$j = -i(\phi^{*\nabla}\phi - \phi\nabla\phi^*) - 2e|\phi|^2 A$ 6-1-2-13

Because spatial dependence of $\varphi$is weak, it becomes

$j = \frac{em^2}{\lambda}A = -k^2 A$ 6-1-2-14

This is none other than London equation. With the Maxwell equations one can show

$B_x = B_o e^{-kx}$ 6-1-2-15

This indicates the Meissner effect.

Here, because goldstone boson is eaten up by photon as gauge boson (photon absorb goldstone boson), charge screening degree of photon is changed as much as changed Higgs potential.

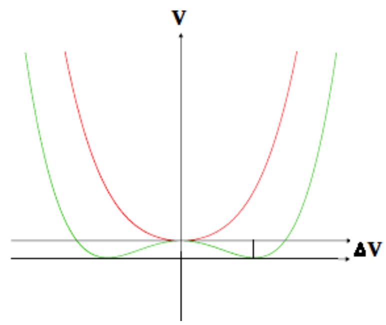


Figure 6-1-2-2

By absorption of goldstone boson can photon obtain rest mass that transported spin angular momentum $\hbar$ as figure 6-2-1 by change of charge screening degree (cf.§12,§14,§17,§18) .

This rest mass is not static rest mass (Newtonian mass) but neutro-lateral rest mass (cf.§18.8).

Because of this neutro-lateral rest mass penetration depth $\lambda \approx \frac{1}{M} \sim 10^{-8} m$ (~ 100 atoms) in super conductor is, this depth in astronomical scale (cf.§7,§8,§9) according to correspondence principle of CFLE theory is

$$\lambda_{astro} \sim (10^{-8} m)(10^{21}) \sim 10^{13} m \qquad \text{6-1-2-16}$$

Because this scale is bigger than sun's diameter (D =1.4× $10^9 m$), we can expect that such phenomenon so-called massballization of photon (see next section) should be appear by the Sun in cold space of vacuum as by the atom in cold space in superconductor.

6.2 Unification of Gravity and the Weak Force by Introduction of Weak Force Lines and Their Force Line Elements

As discussed in §4, gravity is a very weak electromagnetic force, whereas the electromagnetic force is a strong gravitational force, although qualitatively both forces are the same. Now, because the energy quantum for a photon and graviton is different, because energy quantum is different for different materials, it can act independently both quantitatively and locally. So historically, it has been treated differently. Before 1960, knowledge of weak forces had already progressed through the study of β-decay interaction. Pioneering work had begun with Yang and Mills in 1954, who introduced the equivalent of an isospin for P and N. They defined a weak isospin T_w for a lepton, with ν_e having a $T_{wz} = +\frac{1}{2}$ and e– having a $T_{wz} = -\frac{1}{2}$. This weak isospin has nothing to do with the usual isospin, but from the standpoint of a Yang–Mills type of gauge theory, it makes $(\frac{\nu_e}{e})_L$ equivalent to $(\frac{P}{N})$.

The form of the electroweak gauge theory was set up by Glashow in 1961. Weinberg (in 1967) and Salam (in 1968) independently applied the Higgs mechanism to give mass to the gauge bosons and produced a consistent theory. In 1971, t'Hooft proved the theory was renormalizable. Glashow, Salam, and Weinberg received the Nobel Prize in 1979 for their work on this topic.

Thus, local phase symmetry with U(1) transformation, as in QED, was included as well as a Yang-Mills-like local phase symmetry with SU(2) transformation. This is often referred to as a U(1) × SU(2) theory. To compensate for these local changes, four gauge fields were needed (call them B, W_1, W_2, W_3), and the object to be identified with the massless photon is actually a combination of B and W_3, designated here as A:

$$A = B\cos\theta_w + W_3\sin\theta_w \qquad 6\text{-}2\text{-}1$$

The parameter θ_w is called the weak mixing angle. Another linear combination of the B and the three W_i orthogonal to A is called the Z_0:

$$Z_0 = W_3\cos\theta_w + B\sin\theta_w \qquad 6\text{-}2\text{-}2$$

In another combination, it is

$$W\pm = W_1 \pm iW_2 \qquad 6\text{-}2\text{-}3$$

The standard model consists of an isotriplet of vector field W_μ^i coupled with strength g to the weak isospin current J_μ^i, with a single vector field B_μ coupled to the weak hypercharged current J_μ^y with strength conventionally taken to be $\frac{g'}{2}$. The basic electroweak interaction is therefore

$$-ig(J^i)^\mu W_\mu^i - i\frac{g'}{2}(j^Y)^\mu B_\mu \qquad \text{6-2-4}$$

The field

$$W_\mu^\pm = \sqrt{\frac{1}{2}}\,(W_\mu^1 \mp iW_\mu^2) \qquad \text{6-2-5}$$

describes a massive charged boson $W^\pm$, whereas W_μ^3 and B_μ are neutral fields.

The electromagnetic interaction $-ie(j^{em})^\mu A_\mu$ is embedded in Eq. 6-2-4. Indeed, when we generate masses of the bosons by symmetry breaking the two neutral fields W_μ^2, it must be in such a way that the physical states are

$$A_\mu = B_\mu \cos\theta_w + W_\mu^3 \sin\theta \text{ (massless)} \qquad \text{6-2-6}$$

$$Z_\mu = -B_\mu \sin\theta_\mathrm{w} + W_\mu^3 \cos\theta_w \text{ (massive)} \qquad \text{6-2-7}$$

where θ_w is called the Weinberg or weak mixing angle (although Glashow was the first to introduce the idea). The electroweak neutral current interaction is [1]

$$-igJ_\mu^3 (W^3)^\mu - i\frac{g'}{2} j_\mu^Y B^\mu = -i\left(g\sin\theta_\mathrm{w} J_\mu^3 + g'\cos\theta_\mathrm{w}\frac{j_\mu^Y}{2}\right)A^\mu$$

$$-i\left(g\cos\theta_\mathrm{w} J_\mu^3 - g'\sin\theta_\mathrm{w}\frac{j_\mu^Y}{2}\right)Z^\mu \qquad \text{6-2-8}$$

The first term is the electromagnetic interaction and so the expression in brackets must be

$$ej_\mu^{\mathrm{em}} \equiv e\,(J_\mu^3 + \tfrac{1}{2} j_\mu^Y) \qquad \text{6-2-9}$$

$$g\sin\theta_\mathrm{w} = g'\cos\theta_\mathrm{w} = e \qquad \text{6-2-10}$$

The mass of the gauge boson is

$$\frac{m_\mathrm{w}}{m_\mathrm{z}} = \cos\theta_\mathrm{w}$$

$$m_\mathrm{w} = \frac{37.3}{\sin\theta_\mathrm{w}}\,\mathrm{GeV}$$

$$m_z = \frac{74.6}{\sin\theta_e}\,\text{GeV} \qquad 6\text{-}2\text{-}11$$

The complete Lagrangian of the standard model is

$$\mathcal{L} = -\frac{1}{4}W_{\mu\nu}\cdot W^{\mu\nu} - \frac{1}{4}B_{\mu\nu}B^{\mu\nu} \quad \{W\pm.\gamma \text{ Kinetic energies and self-interactions}\}$$

$$+\, L^{-}\gamma^{\mu}\,(\,i\delta_{\mu} - g\frac{1}{2}\,t.W_{\mu} - g'\,\frac{Y}{2}B_{\mu})L \quad \{\text{Lepton and quark kinetic energies}\}$$

{and their }
{interaction with }

$$+\, R^{-}\gamma^{\mu}\,(i\delta_{\mu} - g'\frac{Y}{2}B_{\mu})R \qquad \{W\pm, Z, \gamma \qquad \}$$

$$+\,|\; i\delta_{\mu} - g\;\frac{1}{2}t.W_{\mu} - g'\frac{Y}{2}B_{\mu}\;\phi)\;|^{2} - V\,(\phi) \quad \{W\pm, Z, \gamma \text{ and Higgs masses and couplings}\}$$

$$-(G_1 L^{-}\phi R + G_2 L^{-}\phi_c R + \text{hermitian conjugate})$$

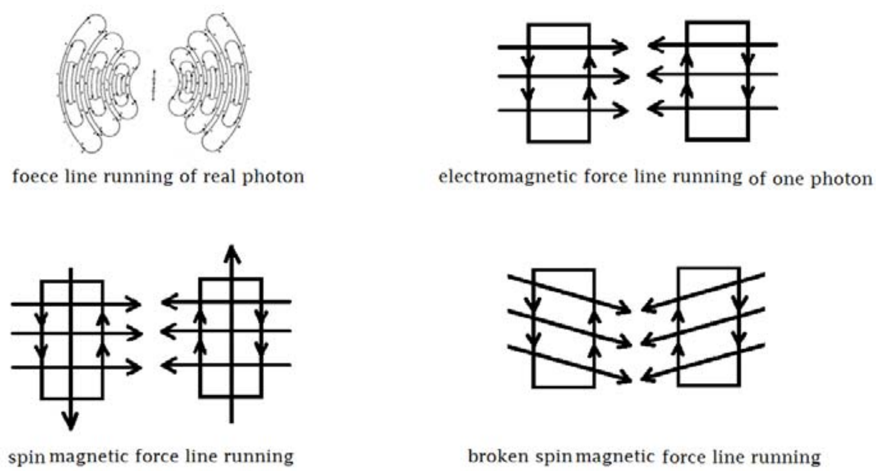
{Lepton and quark masses-and coupling to Higgs} 6-2-12

The important point here is that this formula uses the electromagnetic field and charge for weak isospin and weak hypercharge field$\mathcal{L}_g = -\frac{1}{4}W_a^{\mu\nu}W_{\mu\nu}^{a} - \frac{1}{4}B^{\mu\nu}B_{\mu\nu}$, for gauge particles $W^{\pm}$ and for Gell-Mann-Nishijima formula Q=T_3+$\frac{1}{2}Y_W$to satisfy. As a starting point of the curved force line elements (CFLE) theory, we know that electromagnetic fields form electromagnetic dipole force line elements through which force and momentum are transported. Therefore, this standard theory says that “a weak force line and its force line element should exist as a physical substance to be able to mix with its electromagnetic dipole element that is also a physical substance.” However, because the momentum of the gravitational force is absorbed (or emitted) by electromagnetic force line elements, the gravitational force line elements should mix with weak force line elements too, and in the dipolar force line elements theory is a gauge boson mass less too.

1. Equations 6-2-8 and 6-2-12 from F. Halzen and A.D. Martin. 1983. *Quarks and Leptons*, pp. 333 and 341, respectively. Reproduced with permission from John Wiley & Sons © 1983.

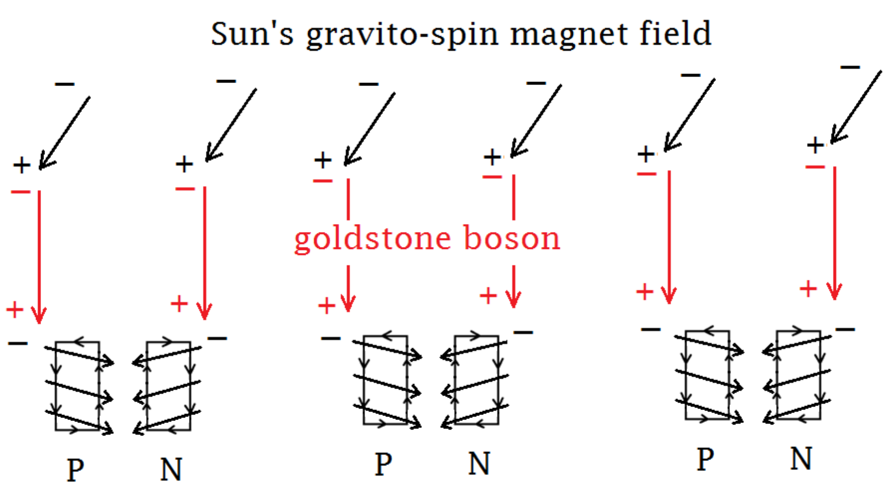
When vacuum expectation value of Higgs field that generally is called inertial field according to CFLE theory is changed by spontaneously symmetry breaking, charge screening degree of gauge boson is changed too by absorbed goldstone boson as much as changed potential ΔV.

This changed degree of charge screening means appearing of neutro-lateral rest mass of gauge boson (cf.§17,§18) with U(1) gauge symmetry as figure 6-2-1-1 and same times with broken NL(z) gauge symmetry as figure 6-2-1-2.



change of charge screening degree of photon's spin by Higgs potential

Figure 6-2-1-1



NL(z) gauge symmetry is now broken Figure 6-2-1-2

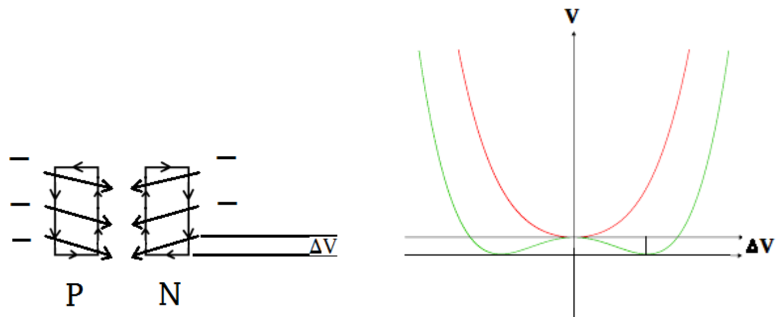


Figure 6-2-1-3

This rest mass transported by force line elements of spin angular momentum ($S = \hbar\sqrt{s(s+1)}$ operator

$$[S_i, S_j] = i\hbar\epsilon_{ijk}S_k,$$

$$\hat{S} = \frac{\hbar}{2}\sigma \qquad \text{6-2-13}$$

However, physical essence of spin angular momentum operator is same general angular momentum operator

$$[L_x, L_y] = i\hbar L_z, [L_y, L_z] = i\hbar L_x, [L_z, L_x] = i\hbar L_y$$

$$L = -i\hbar(r \times \nabla) \qquad \text{6-2-14}$$

The gauge invariant angular momentum that is kinetic angular momentum in electrodynamics is

$$K = r \times (P - eA) \qquad \text{6-2-15}$$

Finally, when describing the motion of a charged particle in an electromagnetic field, the canonical momentum P (derived from the Lagrangian for this system) is not gauge invariant. As a consequence, the canonical angular momentum $L = r \times P$ is not gauge invariant either. Instead, the momentum that is physical, the so-called kinetic momentum is (in SI units)

$$P = mv = P - eA \qquad \text{6-2-16}$$

where e is the electric charge of the particle and A the magnetic vector potential of the electromagnetic field.

Because photon has $S_z = \pm\hbar$ spin angular momentum that physical base is same angular momentum, rest mass in this kinetic momentum by force line elements physically is realized as neutro-lateral rest mass for photon as gauge boson in sun's gravitational field and in superconductor by coupling with goldstone boson.

The fact that photon can obtain rest mass(neutro-lateral rest mass)(cf.§18) explains why a photon's path is curved in the gravitational field of the sun, despite that a photon has to have no electric charge, no weak charge, and no gravitational charge.

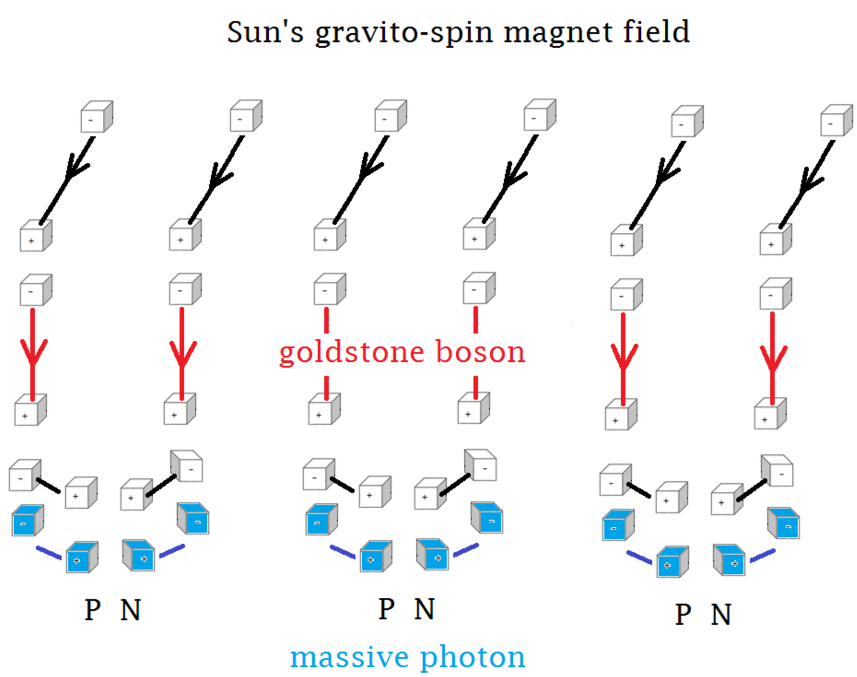


Figure 6-2-2

When a mass less gauge boson $m_{\mathrm{gb}0}$ is emitted from a particle, it moves with the speed of light $v = c$ in a straight line. When this mass less gauge boson $m_{\mathrm{gb}0}$ passes near the sun, however, its force lines and force line elements interact by changed charge screening potential $\Delta V_{c.s}$ (cf.§17.3,§18.8), and as much as magnetic divergence with spin by magnetic monopole occurs as depicted in Figure 6-2-1and Figure 20-3-5. Thus, we can see that the gauge bosons obtain rest mass by another gauge freedom of force line element. With this rest mass from spin angular momentum, the gauge bosons (photons) interact with the sun for gauge symmetry to keep and, according to Newton's gravitation law, the photon's course is curved. In other words, the "sun's strong gravitational field as strong as superconductor creates change of charge screening potential with that the neutral photon can have rest mass by the sun's gravitational field as Meisner effect in superconductor in section 6.1.2.

If charge screening potential breaking of gauge bosons in the inertial field or Higgs field near the any objects were impossible, it would also be impossible for a gauge boson to obtain mass, and then it would be equally impossible to have absorption of any photon (weak gauge boson, photon, gravitational gauge boson) by any particle (electron, quark, weak particle). Likewise, if it were impossible for a gauge boson to maintain rest mass, then it would be impossible to emit any gauge boson (photon, Z_0, A, $\pm W$). This means that without rest mass of the gauge bosons, quantum mechanics would be impossible (e.g., photon emission and absorption by transition of electrons are impossible without gauge symmetry of the gauge boson). Therefore, gauge theory says that "for forces to interact, the existence of any field that forms dipolar force lines and dipolar force line elements is required." Renormalization in the dipolar force line elements theory is always possible regardless of gauge boson mass, because in this theory, all particle are not point-like, so the mechanical electron model mentioned in §4 can be satisfied.

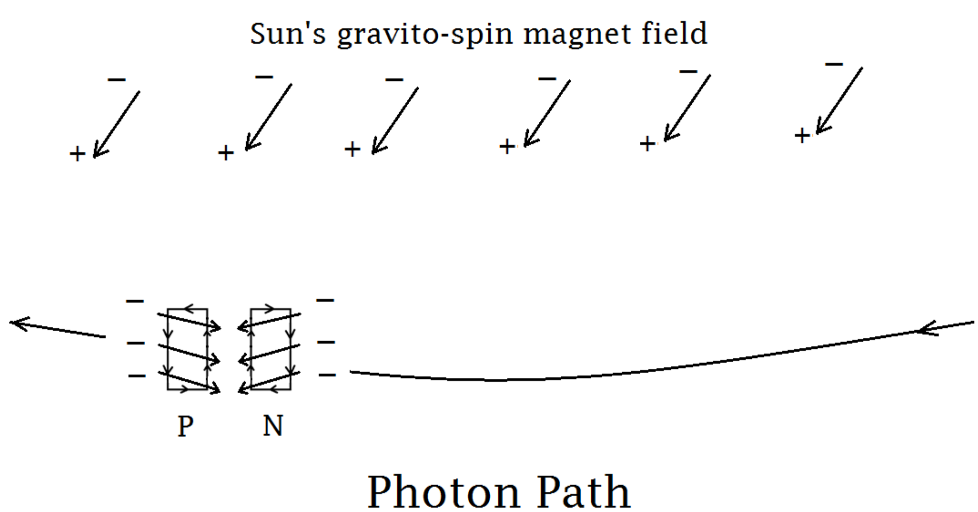
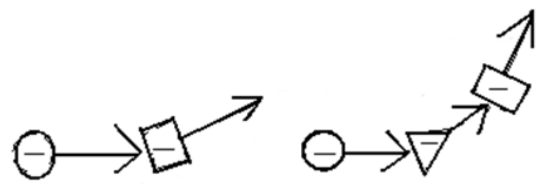


Figure 6-2-3

Because Einstein's special relativity don't permit finite rest mass of photon to have, such theory is ignored by quantum special relativity of CFLE theory.

In §4, I had introduced the concepts of dipolar force lines and their monopole elements as related to electromagnetism and gravity, and now in this chapter, I introduce the weak dipolar force line elements according to the requirements of gauge theory. These can be expressed using Figure 6-2-4.



The dimension of weak forceline elements is 14 U_0Fe.

Gravitational force line elements and weak force line elements.

Figure 6-2-4.

In both the gauge theory and the force line elements theory, the electromagnetic force, gravitational force, and weak force are required to be qualitatively the same, even though each of these forces would be quantitatively different according to the different sizes of their force line elements. Thus, because of their qualitative similarity, it is in principal possible to unify all three different size forces. In a high-energy state, it would be impossible to distinguish the three forces, but in a low-energy level, each force would appear differently according to their different force line monopole elements sizes. Without knowledge of this fact, we would be unable to recognize that the static electric charge, static weak charge, and static gravitational charge, after neutralization of the surface force line elements, are qualitatively different forces of nature. These can be expressed in Figure 6-2-5.

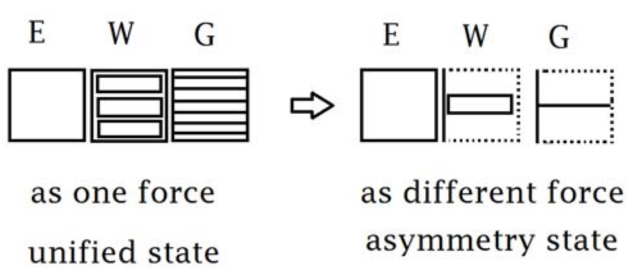


Figure 6-2-5

Conclusion

1.essence of Maxwell's theory is effective in every frame of reference

2.photon can behave as massive particle near strong power source.

3.theory of special relativity and general relativity is not correct and wrong.

4.electromagnetic propellantless thrust is now theoretically possible.

5.R.J. Shawyer's Experiment of electromagetic drive could be direct evidence.

6.massive neutrino can move with speed of light.

6.3 Solving Origin of Nuclear Force and Color Force

As discussed in §4.4, when a positron moves with $v = k$ (where k is a constant) along a positive x-axis, the electromagnetic force line and its dipolar elements gather on the yz plane (the plane vertical to the direction of movement), according to the requirement of relativity theory, and the subsequent rotation of the monopole force line elements of force lines results in a magnetic force and spin magnet moment. Now, upon closer scrutiny, we can actually determine from the rotation of the dipolar force line elements specific quantitative and qualitative physical properties of a color force, as follows.

First, when electric force lines rotate in a plane that is vertical to the direction of movement, a moving particle that has a positive charge can also be partially negatively charged, according to the breaking of monopole symmetry. This situation is expressed in Figure 6-3-1.

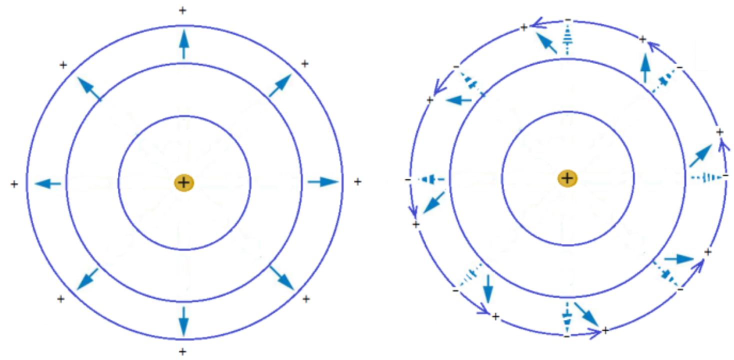


Figure 6-3-1

Thus, depending on the changed angle θ of the curved force line, the strength of the electric charge changes accordingly through to its $\pm$ signs, as mentioned in §5.1. However, the maximum increase of such change to angle θ is 8 times. After a monopole particle changes to a dipolar particle (as mentioned in §4.4), an attractive force occurs between the like-charged particles (e.g., between + + particles and – – particles). If such monopole symmetry breaking occurs not only along a magnetic *yz* plane, but also along another plane and increases the change of the electric charge, then attractive and repulsive forces can appear between the particle as charge-independent forces, regardless of the regular particles' + charge or – charge nature (i.e., attractive forces can occur between + + or – – charges, and repulsive forces between + – charges). Such features apply usually only to a color force, but appear when the electric dipolar force element rotates or curve.

Second, when electric fields of particle move around light speed with$v = 0.8c$, force line arrangement changed as figure 6-3-2.

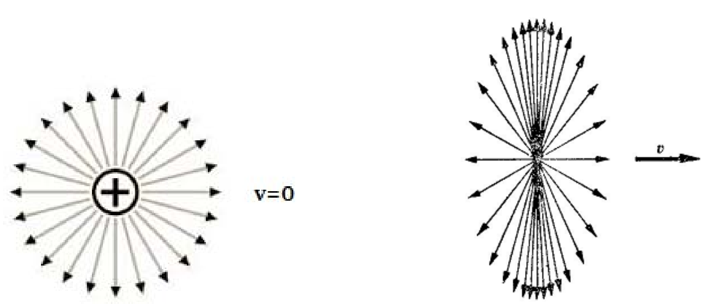


Figure 6-3-2

However, at speed almost light speed permitted electric field is only transversal component as figure 6-3-3

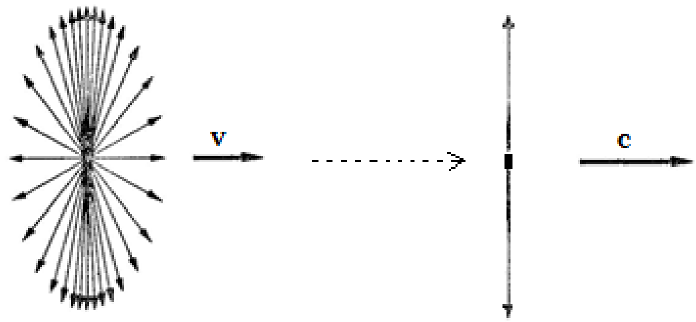


Figure 6-3-3

Such force line arrangement express with three dimension is

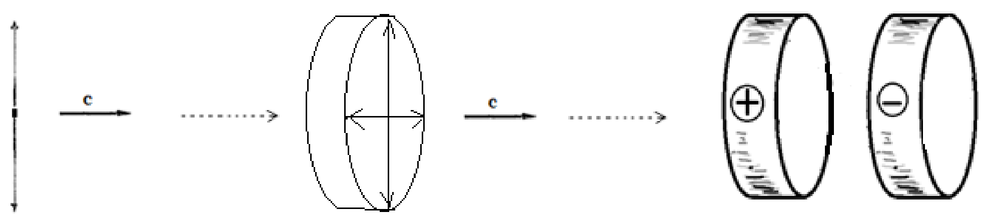


Figure 6-3-4

Possible interaction of particles under such strong relativistic situation is only with transversal force line as figure 6-3-5.

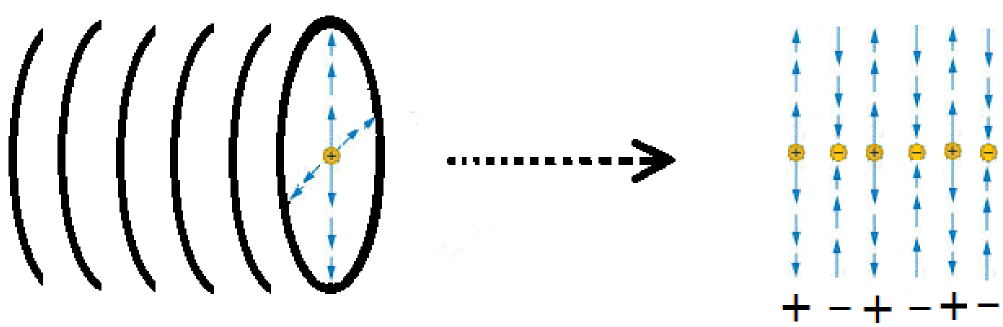


Figure 6-3-5

From such disk we can express only one force line as figure 6-3-6

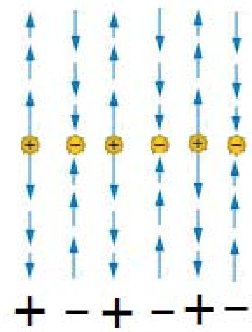


Figure 6-3-6

Because according to CFLE theory force line constitute monopole force line elements figure 6-3-6 can be re expressed as figure 6-3-7

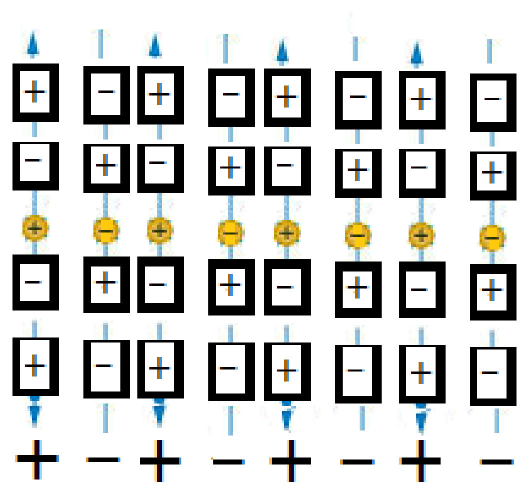


Figure 6-3-7

Figure 6-3-7 can be reconstructed as force lines as figure 6-3-8

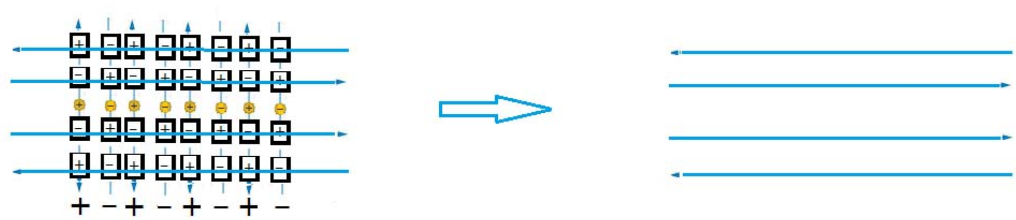


Figure 6-3-8

Now, force becomes constant as

$$F_{transe} = 1 \qquad 6\text{-}3\text{-}1$$

Potential becomes

$$V = kr \qquad 6\text{-}3\text{-}2$$

In three dimension force line arrangement is

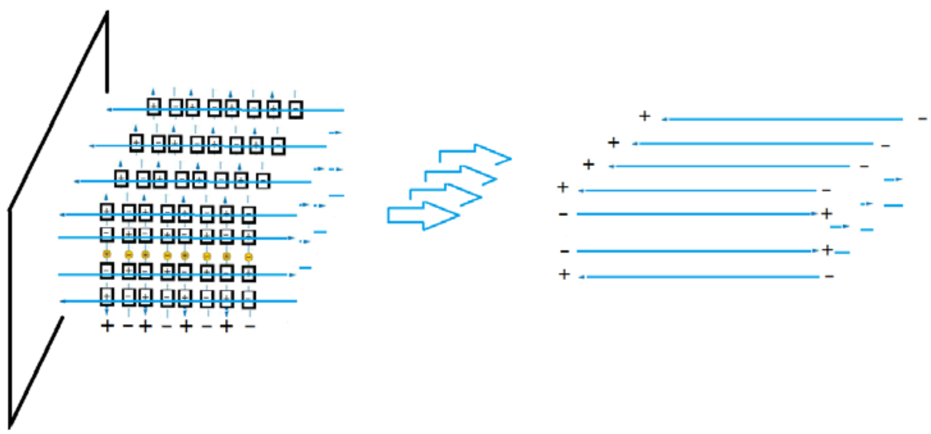
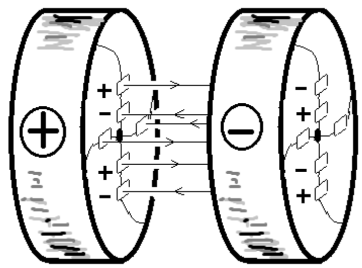


Figure 6-3-9

This force line arrangement can apply to confinement interaction as Figure 6-3-10.

Therefore, because the distance increases, the length of the dipolar neutrolateral force line elements that join the interaction increases as well, as in Figure 6-3-10 and 6-3-11 (cf. §14 and §15 about the shape of the particle. Only 12 force line elements and its 6 neutrolateral force lines are expressed.)

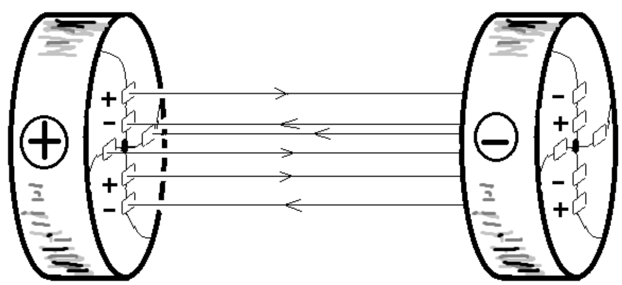


Force line arrangement is under very strong relativistic effect.

Distant between two particles must be close by distant contraction.

Neutron lateral force line elements between two particles interact weakly

Figure 6-3-10



For relativistic effect to keep by strong force, force line elements from two particles start very strong interaction along relativistic movement direction only. Therefore, force line must be run only along relativistic movement direction as line of one dimension. This means that force must be only constant $F = 1$, potential must be only $V = r$

Figure 6-3-11

Thus the potential becomes $V = kr_2$. Alternatively, when the distance between particles decreases, the length of the dipolar neutrolateral force line elements that join the interaction between particles also decreases, and the regular potential of the linear interaction becomes $V = -\frac{k}{r_1}$. Thus, when the distance is smaller, particles gain more freedom (asymptotic freedom). Therefore, the total potential by transversal force lines and their elements is $V = -\frac{k}{r_1} + kr_2$. Again, such feature of total potential (asymptotic freedom and as infrared slavery) is only possible for a color force, but the same feature occurs when the electric force line is curved.

Third, when an electromagnetic force line curves, neutral dipolar force line elements appear more frequently in proportion to the increase in distance between particles that join the interaction. The cause of the force line curve is a deficiency of attractive forces between the force lines and seeds. This deficiency of attractive forces means there is a decrease of charge screening ability, which in turn means there is an effect of anti-charge screening. This effect of anti-charge screening is usually a special feature only of a color force, and yet also occurs when electromagnetic force lines are curved.

Fourth, when an electric charge is static, the electromagnetic force line elements diverge as the static electric field *E*. The electromagnetic force line elements at this time have only repulsive interactions, because each monopole element is in point symmetry. Thus, it would appear as though there are no attractive interactions between every force line element by the neutrolateral force line, as shown in Figure 6-3-12.

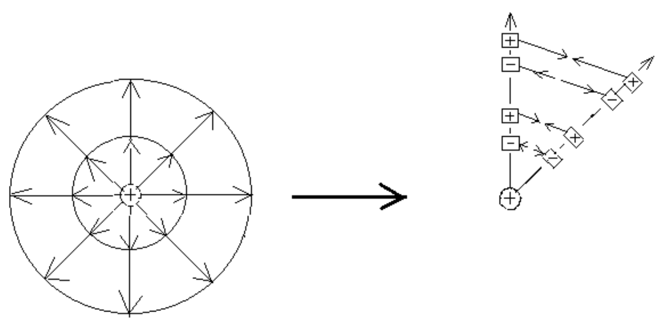


Figure 6-3-12

However, when the monopole position of the electric force line elements is changed by bending of the force line, as shown in Figure6-3-8 and 6-3-13, interaction starts between different monopole signs from different force line elements. That is, there is attractive interaction between the force line elements and force lines. Such interaction between force lines is usually a feature only of color forces, but occurs also when the electromagnetic force line is bent.

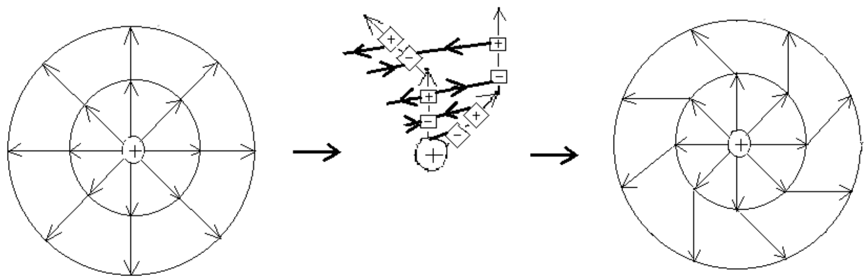


Figure 6-3-13

Such physical process is called “photonization” in the viewpoint of gauge theory.

Inversely, when gluons or photons are in such strong field, the arrangements of the force line elements change (Figure 6-3-14). Such first physical process is called “massballization,” or generally “fermioballization,” and second physical process is called glueballization in the viewpoint of gauge theory.

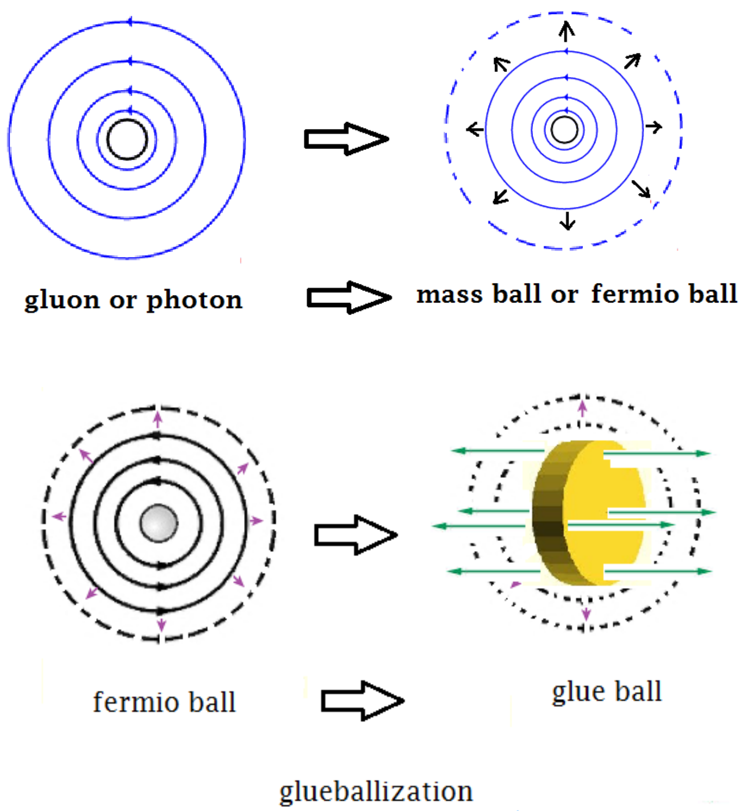


Figure 6-3-14

Because of magnetic monopole motion for usual magnet and spin magnet by special relativity, occurs charge independent confinement as figure 6-3-15

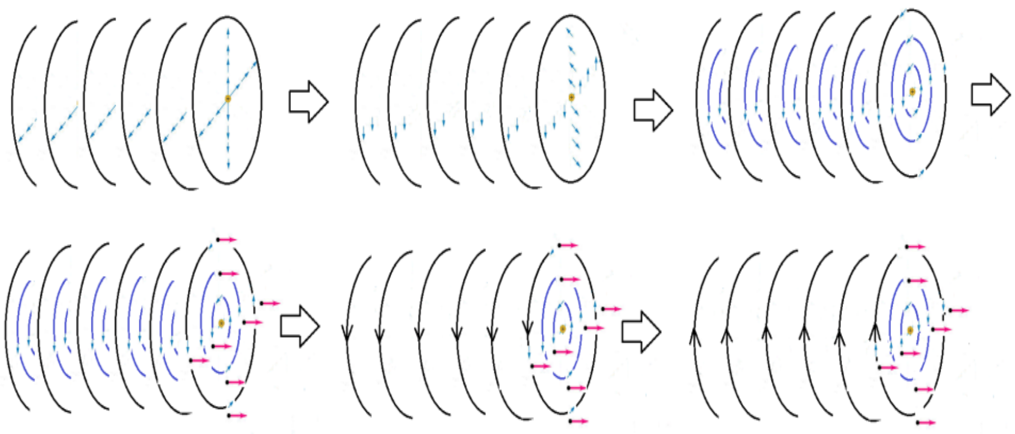


Figure 6-3-15

Here, important point is that direction of spin of plus charge and minus charge is same. This means that between two same charge or different charge their exist attractive confinement interaction by strong same spin angular momentum as figure 6-3-16. Symbol ✧$_c$ in figure 6-3-16 means confinement interacting.

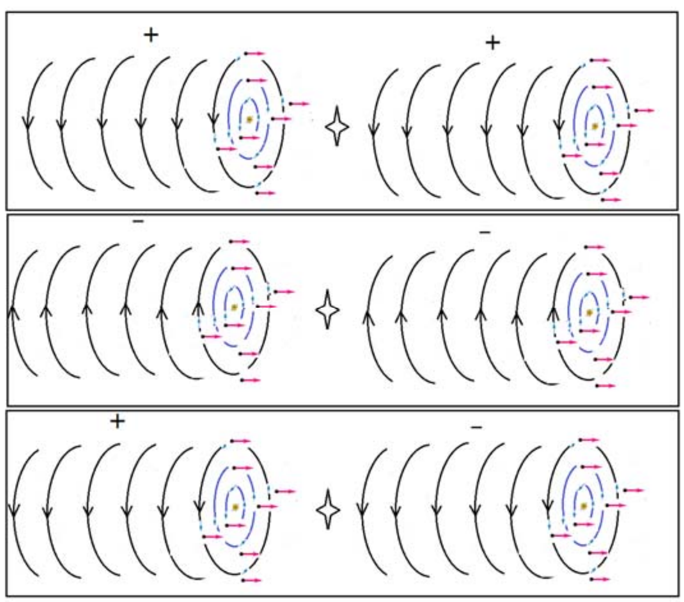


Figure 6-3-16

Figure 6-3-16 shows charge independent attractive confinement interaction.

Figure 6-3-17shows that any kind of interaction is same effect by same direction of spin angular momentum.

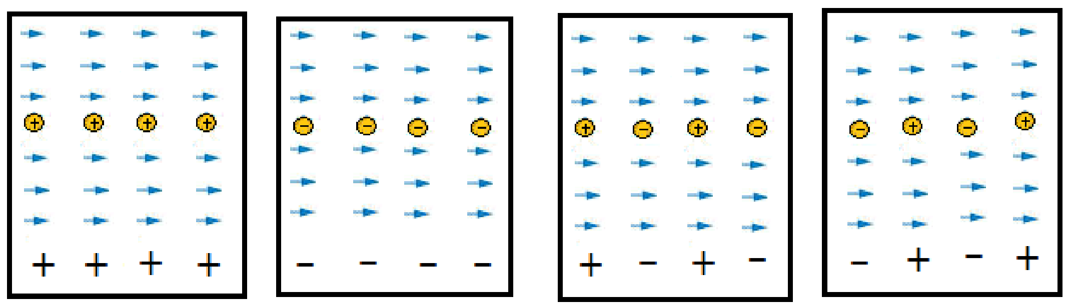


Figure 6-3-17

Such magnetic monopole direction by rotation of monopole can be expressed electric monopole direction by electromagnetic duality (cf,§17) as figure 6-3-18.

Force line is running only transversal without divergence.

Under the such condition potential must be $V = kr$.

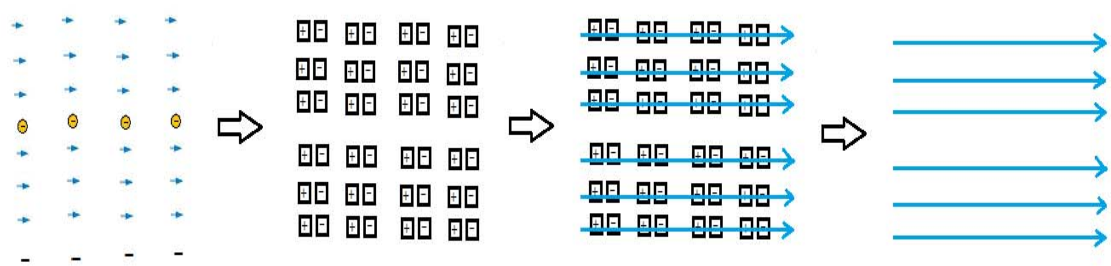


Figure 6-3-18

Such force line running of all related force line monopole elements in three dimensional spaces is transversal without divergence as figure 6-3-19.

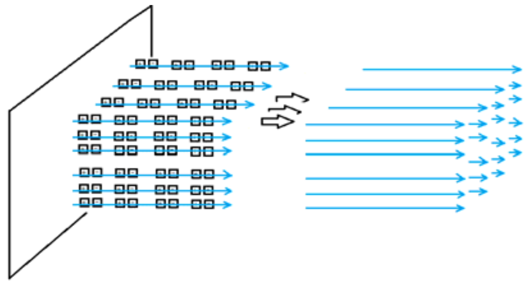


Figure 6-3-19

That is none other than physical reason of 3 dimensional color confinements.

Fifth, when an electromagnetic force line is curved, the static charge for the vertical force (Coulomb force) is decreased, as shown in Figure 6-3-20, and appears as a fractional electrostatic charge $\pm\frac{1}{3}e, \pm\frac{2}{3}e$ that is proportional to the angle of bending. Again, such feature is usually only a feature of color forces.

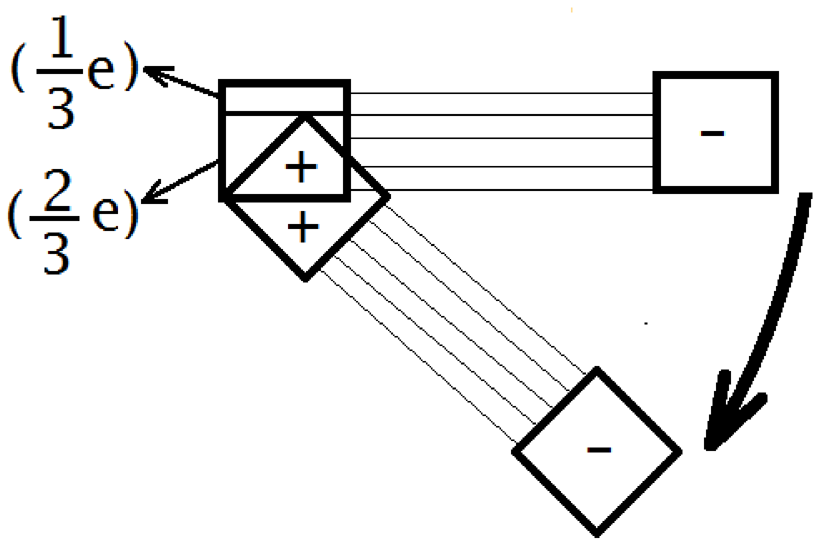


Figure 6-3-20

Source of nuclear force is result of curve of electric force line and source of color force is curve of strong force line.

6.4 Unifying the Electromagnetic Force and Color Force by CFLE Theory

As discussed in the previous section, five qualitative features of a color force and nuclear force occur by curved force line and its monopole element of an electric force and strong force. If these five same features can agree both qualitatively and quantitatively for curved force line elements of an electric force and for a strong force, then we can confidently say that a "nuclear force qualitatively is the same as a curved electric force by rotation of its electromagnetic force lines and its force line elements." The following paragraphs investigate whether these features do agree quantitatively.

First, assuming the postulate that a nuclear force and a curved electric force are quantitatively the same force, the minimum strength of the color force can be calculated using uranium (U_{92}^{238}) as an example:

A) The atomic number of uranium (U_{92}^{238}) is 92, giving the uranium nucleus 92 protons for maintaining balance with its electromagnetic force. But, because uranium (U_{92}^{238}) has as many as 283.08 nucleons, the minimum strength of its residual color force as nuclear force is

$$s_m = \frac{238.03}{92} = 2.587 \qquad 6\text{-}4\text{-}1$$

That is, the nuclear force is minimally $(2.587)^2$ times stronger than the electromagnetic force.

B) However, there are many neutrons in the nucleus too, and therefore we ought to consider the neutrons' force as well. (Despite the neutron is electrically neutral, it can interact strongly like a proton.) The predicted and expected ratios of the magnetic moment between a proton and a neutron are well known from prediction by the quark model and experiments, respectively. The predicted value is [2]

$$\frac{\mu_n}{\mu_p} = -\frac{2}{3} \qquad 6\text{-}4\text{-}2$$

The experimental value is

$$\frac{\mu_n}{\mu_p} = -0.68497945 \pm 0.00000058$$

Thus, the strength of a nuclear force can be inferred, because the electrical force is proportional to the magnetic moment; that is,

$$\frac{1}{x} = \frac{1}{-(-0.68497945)}$$

$$= 1.459898 \qquad 6\text{-}4\text{-}3$$

That is, the nuclear force is charge-independent despite being electrically neutral, and is $(1.460)^2$ times stronger than the electrical force. The electrical permittivity of air at g = 2 gives

$$Q_e = (0.000589)\,(2) = 0.001178$$

$$x_e = 1.001178$$

Because the neutron is electrically neutral, its interaction strength is weak by as much as this electrical permittivity, so the real difference is

$$s_m = \frac{1.460}{1.001178} = 1.458 \qquad 6\text{-}4\text{-}4$$

This is the hidden difference of a neutron, being electrically neutral despite interacting with another nucleon charge independently with the same color force. Therefore, the total difference between the residual force and the electromagnetic force in uranium U_{92}^{238} is

$$s_m = (2.587)\,(1.458) = 3.772 \qquad 6\text{-}4\text{-}5$$

That is, the residual color force (nuclear force) in uranium U_{92}^{238} is $(3.772)^2$ times stronger than the electromagnetic force.

Now, because the increase of such neutrolateral force occurs by as much as curving of the electric force lines and their force line elements, the curvature angle θ is

$$\sin\theta = \frac{3.772}{8} = 0.472 \qquad 6\text{-}4\text{-}6$$

Hence, we can obtain the angle

$$\theta = 28.13^{\circ} \qquad 6\text{-}4\text{-}7$$

Moreover, because a neutron decays as a β-decay (weak decay) outside of the nucleus, this angle can be said to be a weak mixing angle. Now, because the angle curves as $\theta = 28.13^{o}$, $\sin\theta = 0.472$, we can use the CFLE theory to predict the value for $\sin^2\theta$, because when $g = 1.458$, the gravitational permittivity (x) of air (cf. §10.2) is

Hence,

$$\sin^2\theta = (0.472)^2 = 0.222 \qquad \text{6-4-8}$$

The experimental value about $\sin^2\theta$ from the electroweak theory (standard model of particle physics) by 2014 CODATA is

$$\sin^2\theta_W = 0.2223 \qquad \text{6-4-9}$$

Because the experimental value and predicted value agree quite well, we have our first assurance that the postulate of the CFLE theory is correct.

Second, assuming again the postulate that a color force and neutro-lateral force of an electromagnetic force are the same, we can use the CFLE theory to predict the color coupling constant α_s as follows:

$$\alpha_s = \frac{g^2}{4\pi\hbar c} \rightarrow \text{ postulate } \alpha_s = \frac{g^2 e^2}{4\pi\varepsilon_0\hbar c} \qquad \text{6-4-10}$$

But, because $g^2 = (3.772)^2$, and the related usual ($g = 1$) coupling constant α_E is

$$\alpha_e = \frac{e^2}{4\pi\varepsilon_0\hbar c} = \frac{1}{137.036}$$

therefore, the predicted value for α_S by the CFLE theory is

$$\alpha_s = \frac{(3.772)^2(1)^2}{137.036} = \frac{14.228}{137.036} = 0.104 \qquad \text{6-4-11}$$

The value of α_s by the standard model[2] is

$\alpha_s = 0.1$ 6-4-12

This value agrees well with that predicted by the CFLE theory. So, here, we obtain a second assurance that the postulate of the CFLE theory is correct.

Third, according to the standard model, a neutron is made of 3 quarks.

Namely,

$N \rightarrow udd, \quad u = +\frac{2}{3}e, \; d = -\frac{1}{3}e, \; d = -\frac{1}{3}e$

$e_n = +\frac{2}{3}e - \frac{1}{3}e - \frac{1}{3}e = 0$ 6-4-13

According to the postulate of the CFLE theory, such fractural static charge should be formed by rotation of force line elements in curved force line system, as shown in Figure 6-4-1.

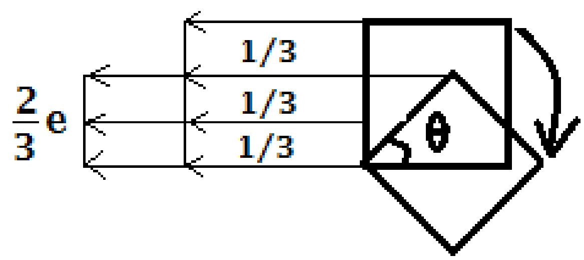


Figure 6-4-1

Now, the sinθ of this angle θ is

$\sin\theta = \frac{3.772}{8} = 0.4715$ 6-4-14

$\theta_W = 28.13°$ 6-4-15

This angle is none other than Weinberg mixing angle θ_W by CFLE theory.

$sin^2 28.13^o_W = 0.222$ 6-4-16

2. Predicted and experimental values from F. Halzen and A.D. Martin. 1983. *Quarks and Leptons*, p. 55. Reproduced with permission from John Wiley & Sons © 1983.

2014 CODATA value is

$sin^2\theta_W$=0.2223 6-4-17

With this angle we can get theoretical prediction mass of M_Z *and* M_W

Because a weak force line element is smaller than an electro-magnetic force line element by as much as N = $(1.190208 \times 10^7)^2$as force quantization constant, when particles approach the speed of light, a weak force of this particle should be similar to the electromagnetic force according to the CFLE theory of relativity, because as the density of a weak force line increases, it becomes the strength of the electromagnetic force.

That is, because $e_W = \frac{e}{2\sqrt{2}\,\sin\theta_w} = 0.751$, the weak charge is

$e_W = \frac{0.751}{1.068282} = 0.703e \approx \frac{2}{3}e$ 6-4-18

Where 1.068282 is from 6-4-22

This static charge $\frac{2}{3}e$ is the charge of the u quark in Eq. 6-4-13.

Therefore, from this proportion, we can calculate the mass of $W^{\pm}$, Z_0 by the CFLE theory. That is,

$M = (0.511 \times 10^6 \text{ eV})(1.190 \times 10^7) = 6.08 \times 10^{12} \text{ eV} = 6080 \text{ GeV}$

But, because the maximum curve of the force line is $g = 8$, the mass is

$\frac{6080 \text{ GeV}}{(8 \times 8)} = 95 \text{ GeV}$ 6-4-19

Because $\cos\theta_w = \frac{M_w}{M_z}$ ($\theta = 28.13°$)

$M_Z = 95$ GeV

$M_W = \frac{95\text{GeV}}{1.134} = 83.78$ GeV 6-4-20

Because the permittivity is $\frac{x_g}{x_e} = \frac{1.025161}{1.003856} = 1.021223$, the effective mass is

$M_W = \frac{83.78\text{GeV}}{1.021223} = 82.04$ GeV ≈ 82 GeV 6-4-21

$M_Z = \frac{95\text{ GeV}}{1.021223} = 93.03$GeV ≈ 93GeV 6-4-22

where x_g = 1.025161 is the gravitational permittivity of air at g = 1.5, and x_e = 1.003856 is the electrical permittivity of air at g = 6.545979.

In 1983 the W and Z bosons were discovered at the CERN P^-P collider via the process [3]

$P^-P \longrightarrow W^{\pm}X \longrightarrow (e^{\pm}\nu)X$ 6-4-23

$P^-P \longrightarrow Z\,X \longrightarrow (e^+e^-)X$ 6-4-24

The masses were

$M_W = 81 \pm 2$ GeV 6-4-25

$M_Z = 93 \pm 2$ GeV 6-4-26

The predicted values of M_Z = 93 GeV, M_W = 82 GeV by CFLE theory agree quite well with the observed values, so here we can final quantitative assurance that the postulate of CFLE theory is right. Lastly we can explain why in the particle nature appear $\frac{1}{3}e$ fractional charge. Because the gravitational permittivity of air at g = 3.772 is

$Q_g = (0.016774)(3.772) = 0.063272$

$x_g = 1.063272$ 6-4-27

The electrical permittivity of air at g = 8 for a neutrolateral force gives

$Q_e = (0.000589)(8) = 0.004712$

$x_e = 1.004712$

$x_g x_e = (1.063272)(1.004712) = 1.068282$ 6-4-28

3. Equations 6-4-23 and 6-4-24 from F. Halzen and A.D. Martin. 1983. *Quarks and Leptons*, p. 21. Reproduced with permission from John Wiley & Sons © 1983.

Thus, because the neutron is electrically neutral, the real static electric charge of quark d = $-\frac{1}{3}e$ by postulate of the CFLE theory should be as follows:

$$e = \frac{0.472e}{1.458} = 0.324e \qquad 6\text{-}4\text{-}29$$

where $0.472\ e$ is come from EQ 6-4-14

$$e_d = \frac{0.324e}{1.068282} = 0.303e \approx 0.3e \qquad 6\text{-}4\text{-}30$$

This predicted value agrees quite well with the value of the standard model, so we have here a third assurance that the postulate of the CFLE theory is correct.

Fourth, continuing the postulate that a color force is a curved electromagnetic force, we can predict the quantity of the fine structure constant α_e theoretically. The possible maximum change of a neutrolateral force is from the g = 8 state to the g = 1 state. Therefore,

$$\alpha_e = \frac{1}{(8 \times 8)} = \frac{1}{64} \qquad 6\text{-}4\text{-}31$$

Because the force difference between a gravitational force and an electromagnetic force is the correspondence number c_c= 1.5 (cf. §24), the total possible maximum change is

$$\alpha_e = \frac{1}{(8 \times 8 \times 1.5 \times 1.5)} = \frac{1}{144} \qquad 6\text{-}4\text{-}32$$

But, because the gravitational permittivity of air at g = 1.5 gives

Q_g = (0.016774) (1.5) = 0.025161

x_g = 1.025161

$$x_g^2 = 1.050955 \qquad 6\text{-}4\text{-}33$$

The electrical permittivity of air at $g = \frac{1}{8}$ for a neutrolateral force gives

$Q_{e1} = \frac{0.000589}{8} = 0.000074$

x_{e1} = 1.000074

$x_{\mathrm{e1}}^2 = 1.000148$ 6-4-34

With an electrical permittivity of air at $g = \frac{1}{(8 \times 8)}$, $g = \frac{1}{(8 \times 8 \times 8 \times 8)}$, $g = \frac{1}{(8 \times 1.5 \times 8 \times 1.5 \times 8 \times 1.5 \times 8 \times 1.5)}$ we have

$Q_{\mathrm{e1}} = \frac{0.000589}{64} = 0.000009$

$x_{\mathrm{e1}} = 1.000009$

$x_{\mathrm{e1}}^2 = 1.000018$ 6-4-35

$g = \frac{8}{1.025161} = 7.8036652$

$Q_{\mathrm{e2}} = \frac{0.000589}{(7.803652)^2} = \frac{0.000589}{3708.443} = 0.000000159$

$x_{\mathrm{e2}} = 1.000000159$

$x_{\mathrm{e2}}^2 = 1.000000318$

$Q_{\mathrm{e3}} = \frac{0.000589}{20736} = 0.000000028$

$x_{\mathrm{e3}} = 1.000000028$

$x_{\mathrm{e3}}^2 = 1.000000057$ 6-4-36

Therefore, the theoretical predicted value of the fine structure constant by CFLE theory is

$$\alpha_e = \frac{1}{[(144)(1.000148)]/[(1.050955)(1.000018)(1.000000318)(1.00000057]}$$

$$= \frac{1}{137.035997} \qquad \text{6-4-37}$$

The observed value according to 2006 CODATA is

$$\alpha_e = \frac{1}{137.035999} \qquad \text{6-4-38}$$

Both results agree quite well, so we get here the fourth assurance that the postulate of the CFLE theory is correct.

Because color coupling constant is $\alpha_{color} = 1$is, strength of color force should be

$$F_{color} = \frac{\alpha_{color}}{\alpha_{elect}} = 137.035997 \qquad 6\text{-}4\text{-}39$$

Needed force strength of quake interaction in quantum chromo dynamics is calculated only at least as much as 137 times stronger than electromagnetic force according to standard model of particle physics.

From 137 time strong strength start normal strong force to 10^7 to lowest energy state.

Maximum electric field strength $\alpha_e = \frac{1}{137}$ meets lowest strong field strength $\alpha_s = 1$

6.5 Solving Problem of the Generation of Matter by CFLE Theory

After all, present standard model of particle physics cannot explain why there are three generation of quark and leptons. Same times there is a theory that can explain the masses of particular quark and leptons in particular generations from the first principle (a theory of Yukawa couplings).However, Because CFLE theory is quantum theory of relativity; CFLE theory can answer immediately such questions.

Because color coupling constant $\alpha_{color} = 1$is, given maximum mass increase according to charge interval constant (c.f.§3) $N = 1.190208 \times 10^7$ is

$$IN_m = 1.190208 \times 10^7$$

However, because particle's force line should be curved as much as $g = 1.5 \times 8$, particle lose its energy for mass increase as much as

$$E_{curve} = \frac{(1.5 \times 8)^2}{k}$$

$$= 137.035997$$

Therefore remain possible force for maximum mass increase is

$$IN_{remain} = \frac{1.190208 \times 10^7}{137.035997}$$

$$= 8.685368\times 10^4 \qquad 6\text{-}5\text{-}1$$

Observed top quark mass is

$$m_{top} = 172.9 \text{ GeV} \qquad 6\text{-}5\text{-}2$$

Therefore possible lowest mass of up quark is

$$m_{up} = \frac{172.9\ GeV}{8.685368\times 10^4}$$

$$= 1.99 \text{ MeV} \qquad 6\text{-}5\text{-}3$$

Observed up quark mass is

$$m_{up} = 1.7{\sim}3.1 \text{ MeV} \qquad 6\text{-}5\text{-}4$$

This result means that from top quark to up quark there can be only 3 generation of quarks and over top quark there cannot be another heavy quark. It is permitted only 3 generation.

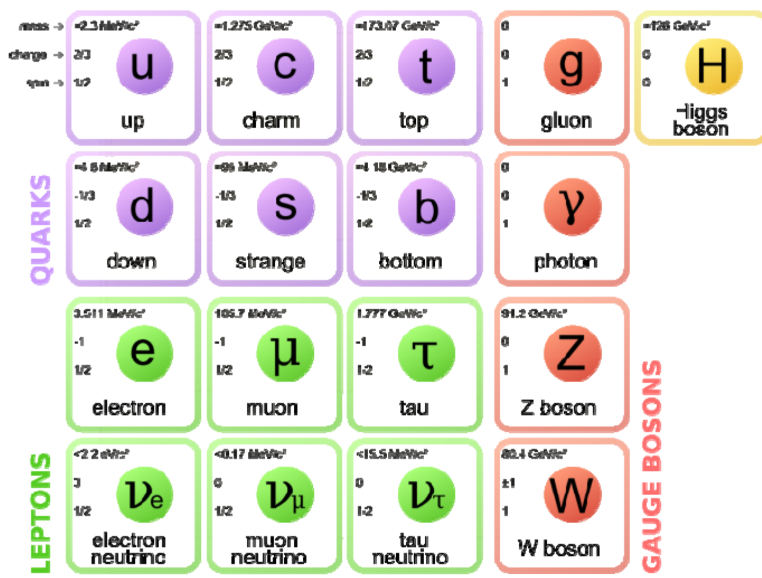


Figure 6-5-1

Needed total force for quark –anti quark in proton to deconfinement around $\alpha_s = 0.999\ldots$ is

$$F_{tot} = \frac{e^2}{4\pi\varepsilon_o}(1.190208 \times 10^7\ )^2$$

Therefore needed force strength of quark interaction is not force of 137 times stronger than electromagnetic force.

This force strength gives real answer why there are color confinement and asymptotic freedom in quantum chromo dynamics.

In neutronic seed nova (cf.§7.3.6) as gamma-ray buster such quark separate is really occurred by galactic force that $\sim 10^{14}$ times stronger than color force.

6.6 Solving Problems of CP Violation in Weak Interaction

Until 1956, charge and party conservation was believed to be one of the fundamental conservation lows. However, in 1956 theoretical physicist Tsung-dao Lee and Chen Ning Yang revealed that such conservation low was not tested in the weak interaction and they propose several possible direct experimental tests. In 1964 James Cronin, Val Fitch with coworkers provided clear evidence that CP-symmetry in decay of neutral kaon could be broken. This work won them the 1980 Nobel Prize. In 2001 BarBar Experiment and Belle Experiment observed direct CP-violation in decay of B meson. In 2011, a first indication of CP-violation in decay of neutral D meson was reported LHCb experiment at CERN. Before going in to details, It is listed here 12 independent CP violating observables where a signal has been established

•Indirect CP violation in $K \to \pi\pi$ decay and $K \to \pi l \nu$ decay

$$|\epsilon| = (2.228 \pm 0.011) \times 10^{-3} \qquad \text{6-6-1}$$

•Direct CP violation in $K \to \pi\pi$ decay

$$Re\left(\frac{\epsilon'}{\epsilon}\right) = (1.65 \pm 0.26) \times 10^{-3} \qquad \text{6-6-2}$$

•CP violation of interference mixing and $B \to \psi K^0$decay

$$S_{\psi K^0} = +0.673 \pm 0.023 \qquad \text{6-6-3}$$

•CP violation of interference mixing and $B \to \eta' K^0$decay

$S_{\eta' K^0} = +0.60 \pm 0.07$ 6-6-4

•CP violation of interference mixing and $B \to K^+K^-K_s$decay

$S_{(K^+K^-K_0)_+} = -0.074^{+0.12}_{-0.10}$ 6-6-5

•CP violation of interference mixing and $B \to \pi^+\pi^-$decay

$S_{\pi^+\pi^-} = -0.61 \pm 0.08$ 6-6-6

•CP violation of interference mixing and $B \to \psi\pi^0$decay

$S_{\psi\pi^0} = -0.94 \pm 0.29$ 6-6-7

•CP violation of interference mixing and $B \to D^+D^-$decay

$S_{D^+D^-} = -0.87 \pm 0.26$ 6-6-8

•CP violation of interference mixing and $B \to D^{*+}D^{*-}$decay

$S_{D^{*+}D^{*-}} = -0.70 \pm 0.16$ 6-6-9

•Direct CP violation in $B^{-0} \to K^-\pi^+$ decay

$A_{K^\mp\pi^\pm}$ = -0.098$\pm$0.013 6-6-10

•Direct CP violation in $B^0 \to \eta K^{*0}$ decay

$A_{\eta K^{*0}}$ = +0.19$\pm$0.05 6-6-11

•Direct CP violation in $B^- \to K^-\rho^0$ decay

$A_{\rho^0 K^\mp}$ = +0.37$\pm$0.10 6-6-12

In “A Search for time–integrated CP violation in$D^0 \to h^-h^+$decays by Angelo Carbone for LHCb collaboration in university of Bologna, Italy” in 5.Nov.2012 was reported that CP asymmetry between $D^0 \to K^-K^+$ and $D^0 \to \pi^-\pi^+$, $\Delta A_{cp} = A_{cp}(K^-K^+) - A_{cp}(\pi^-\pi^+)$ is defined as

$$A_{cp}(f;t) \equiv \frac{\Gamma(\mathrm{D^o}(t) \to f_{cp}) - \Gamma(\mathrm{D^{o-}} \to f_{\mathrm{cp}})}{\Gamma(\mathrm{D^o}(t) \to f_{cp}) + \Gamma(\mathrm{D^{o-}} \to f_{\mathrm{cp}})} \qquad 6\text{-}6\text{-}13$$

and is measured to be as

$$\Delta A_{cp} = [-0.82 \pm 0.21(stat) \pm 0.11(sys)]\% \qquad 6\text{-}6\text{-}14$$

Because static charge from area of force line element is changed by curved force line why the strong nuclear interaction force is CP invariant and why the universe have so much more matter than antimatter. Physical essence of CP violation is that change of force line curve and related change of static (rest) charge area of force line element. By this process, matter's structure system (system of Atom) adapts itself to its physical cosmic environment. Therefore it is called adaptability of matter to changed asymmetric physical environment.

Because gravitational asymmetric quantity is enough to break charge conjugation symmetry of weak interaction,That is

: By fractional electric charge of $+\frac{2}{3}e$ up quark is rotated gravitational force line element too and same time is curved force line from degree of curve from $g = 1$ to $g = 6.545979$(cf.§7)too. From this curvature change of force line produced gravitational rest charge (rest mass) asymmetry between proton and electron is

$$m_{ays} = (g)^4 = (6.545979)^4 = 1836.11 \qquad 6\text{-}6\text{-}15$$

This result means that proton is 1836 time heavier than electron.

Fraction of gravitational asymmetry between proton and electron should be

$$A_{cp} = \frac{1}{1836} = 0.00054 \qquad 6\text{-}6\text{-}16$$

: For fractional electric charge of $-\frac{1}{3}e$ down quark gravitational force line element should be curved and same time gravitational force line element too and same time should be curved force line from $+\frac{2}{3}e$ of up quark state to $-\frac{1}{3}e$ of down quark state. Therefore needed force line curve is

$$d_e = {}^{+\frac{2}{3}e}\Big/_{-\frac{1}{3}e} = -2 \qquad 6\text{-}6\text{-}17$$

$$g = {}^{6.545979}\!/_{-2}$$

$$= -3.272989 \qquad 6\text{-}6\text{-}18$$

From this curvature of force line produced gravitational rest charge (rest mass) is

$$m_{ays} = -(g)^4 = (3.272989)^4 = -114.7567 \qquad 6\text{-}6\text{-}19$$

Fraction of charge asymmetry between related particles is

$$\Delta A_{cp} = -\frac{1}{114.7567} + \frac{1}{1836}$$

$$= -0.0087 + 0.00054$$

$$= -0.00816$$

$$= -0.816\% \qquad 6\text{-}6\text{-}20$$

Observed value is

$$\Delta A_{cp} = [-0.82 \pm 0.21(stat) \pm 0.11(sys)]\% \qquad 6\text{-}6\text{-}21$$

However, because such fraction of CP violation is related force line curvature change, real CP-violation in weak interaction is started $g = 3.772$ that is force line curve of $\mu^{\pm}(cf.\S7)$.

Therefore, degree of CP-violation for only weak interaction of weak particle is started

$$m_{ays} = -(g)^4 = -(3.772)^4 = -202.4 \qquad 6\text{-}6\text{-}22$$

Fraction of gravitational asymmetry between related particles is

$$\Delta A_{cp} = -\frac{1}{202.4}$$

$= -0.0049$

$= -0.49\%$ 6-6-23

Effective value is

$\Delta A_{cp} = -0.436\% \sim -0.816\%$ 6-6-24

CP violation from kaon [$g = 5.658$(cf.§7)] to pion [$g = 4.006$(cf.§7)] is

$m_{ays} = -(g)^4 = (5.575)^4 = 966.34$ 6-6-25

$m_{ays} = -(g)^4 = (4.066)^4 = 273.19$ 6-6-26

Fraction of charge asymmetry between related particles is

$A_{cp} = \frac{1}{966.334} = 0.001 = 0.1\%$ 6-6-27

$A_{cp} = \frac{1}{273.19} = 0.0037 = 0.37\%$ 6-6-28

$A_{cp} = 0.1\% \sim 0.37\%$ 6-6-29

Therefore is needed new definition about antimatter and antiparticle (cf. §5).Without gravitational mass and anti mass such old definition of matter and antimatter make confuse. CP violation is not asymmetry between ordinary matter and antimatter. Theory of CP violation and experimental results of CP violation cannot apply to baryon asymmetry of cosmos. Theory of CP violation and experimental results of CP violation means only gravitational asymmetry between positive proton mass and negative electron mass. In other wold physical essence of CP violation is rest charge (mass) change by curvature of force line change. More detail is broken electric rest charge of quark influence direct to weak charge and gravitational charge.

Conclusion

1. In the nature there exist gravitational mass and anti mass.
2. Existence of direct CP-violation is direct evidence of existence of gravitational monopole.
3. Einstein’s general relativity by universal equivalence principle that cannot be accepted existence of anti mass is wrong.

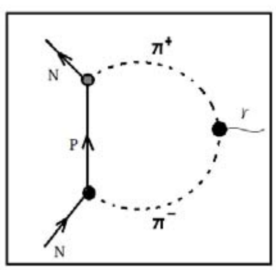
4. In the universe there cannot exist curved space – time.
5. In the universe there is no extra dimension.
6. There is not dark energy. Cause of accelerating expansion of universe is any kind of anti charge that interact with gravitational charge(mass)(cf.§24)
7. Results of AMS 2 are clear evidence for gravitational charge asymmetry (cf.§22) and Strong CP violation .
8. There is no majorana fermion(cf.§7.7).
9. Origin of three color is three different force and its force lines (electromagnetic force line, weakomagnetic force line and gluomagnetic force line)

6.7 Strong Force and Color Force in CFLE Theory, Solving Problem of Strong CP Violation.

According to standard model theoretically exists strong CP violation, because there are natural terms in the quantum chromo dynamic Lagrangian that are able to break the CP-symmetry

$$\mathcal{L} = -\frac{1}{4}F_{\mu\nu}F^{\mu\nu} - \frac{n_f g^2\theta}{32\pi^2}F_{\mu\nu}F^{\mu\nu} + \psi^-(i\gamma^\mu D_\mu - me^{i\theta'\gamma^5})\psi \quad 6\text{-}7\text{-}1$$

For a nonzero choice of the θangle and the chiral quark mass phase θ'one expects the CP-symmetry to be violated.



The mechanism of generating the neutron EDM. The black blobs are the usual CP conserving hadronic coupling. The grey blob show the CP violating $\pi^+ np$ vertex generated by $\delta\mathcal{L}_{cp}$

Figure 6-7-1

Then a direct computation of the diagram in the figure above gives

$d_n \equiv D_n(k^2 = 0) = \frac{g_{\pi}NNg_{\pi}^{-}N^{-}N^{-}}{4\pi^2 M_N}\text{In}\,(\frac{M_N}{m_\pi})$ 6-7-2

which equals numerically $\sim \theta^- \times 2 \times 10^{-16} e \cdot cm$

However, the numerical value of neutron EDM given above is far above the experimental upper bound$|d_n| < 10^{-25} e.cm$.this means that the effective QCD vacuum angleθ^- should satisfy $|\theta^-| < 10^{-9}$ .this requires a huge fine tuning of the pure QCD angle of θ^- and the phase of quark mass matrices. That one has such a small value for θ^- instead of the expected order unity pose the well known strong CP problem as a CP hierarchy, or a fine tuning, or a naturalness problem. In order to generate a finite neutron EDM one needs processes that violate CP symmetry. However, the amount of CP violation is very small and therefore also the contribution to the neutron EDM prediction value by standard model is$|d_n| < 10^{-32} e.cm.$ θ^- should be $|\theta^-| < 10^{-15}$!!!

In §6.6 real strong force is not color force that only 137 time stronger than electromagnetic force.

With such force can bind gravitational object as much as

$F_{color} = [\frac{\{(10^{21})m_{obj}(10^{21})(137)\}}{r^2}]m_p$

$M_{obj} = (10^{21})m_{obj}(10^{21})(137)$

$=(10^{44})(10^{-27})kg$

$=10^{17} kg$ 6-7-3

However, solar mass is

$M_{\odot} = 1.989\times 10^{30}$kg 6-7-4

Therefore real strength of color force must be

$N_{strength} = (1.686044 \times 10^{21})(1.190208\times 10^7)$

$= 2.006742\times 10^{28}$ 6-7-5

Not is

$N_{strength} = (1.686044 \times 10^{21})\ (137)$

$=2.310487\times 10^{23}$ 6-7-6

Now we can answer why there has never has been measured a free quark or gluon, but only objects that are built out of them, like meson and baryon, How does this phenomenon emerge from QCD and why invariant Strong CP violation and why the universe have so much more matter than antimatter.

However, because force strength of rear strong force is very huge strong as much as $(2.006742\times 10^{28})^2 = 4.027013\times 10^{56}$, cannot be observed lowest energy state under Einstein's special relativity.By real strong force (1.416595×10^{14} time stronger electromagnetic force) we can predict possible neutron EDM from the value of SM $|d_n| < 10^{-32} e.cm$ to value of possible CP violation of QCD. That is

$$\left|d_{nQCD}\right| < 10^{-32+K} e.cm = 10^{-32+14} e.cm = \ |d_n| < 10^{-18} e.cm$$

6-7-7

θ^- should be only $|\theta^-| < 10^{-2}$.Under the condition of strong force (10^{14})vanish fine tuning problem. Therefore it is possible with the real strong force CP-violation of QCD. Positron excess is good evidence (cf.§22) of CP violation from universe. Because very precise data of AMS-2 direct from ISS (international space shuttle), we can solve this problem of strong CP violation by static (rest) area of electric force line element and strong force line element. However, because by real strong force is combined constituent quarks, CP-violation in electromagnetic interaction and strong interaction cannot appeared. When particle that accelerated by giant strong force [galactic force (cf.§11)], collide to proton, than can appear CP violation of electromagnetic interaction and strong interaction as positron excess in the space. This positron excess that is observed exactly by AMS-2, is theme of §22. In this chapter we are talking about only force line curve change for electromagnetic CP violation. That is

$$g_e = \frac{3.772}{1.5}$$

$=2.515$ 6-7-8

From this quantity we can predict and explain all of why positron fraction is lowest in energy range 7.16-7.80 GeV with positron fraction of 0.0506 and increase to 275 GeV with positron fraction 0.1590 from

2014 data of AMS-2.Because there exists real strong force, there can establish real confinement and asymptotic freedom of quantum chromo dynamics. Therefore, with enough given strong energy can be decayed quark too. Good observational evidence is origin of gamma ray burst. (cf. §7.6.3 neutronic seed nova) and positron excess (cf.§22).

When we consider only qualitative character of CP violation, we can understand simply physical base of CP violation. In figure 6-7-2 is depicted one particle system O_{sys} include particle- anti particle pair $D^{\pm}$ and omitted force line of particle system O_{sys}. For particle- anti particle pair $D^{\pm}$ is depicted only one force line with two force line element for exact behavior of force line element to emphasize. Before decay, in particle system O particle-anti particle pair $D^{\pm}$ can exists with CP symmetry in constant physical condition. However, after decay of particle system O particle-anti particle pair $D^{\pm}$ cannot stay same physical condition. In figure 6-7-2 force line of D^{-} is curved instead curved space time (cf.§ 3 curved rocket) for given physical environment to adapt. For observer on base line of reference frame only static charge (rest charge) of particle $D^{-}$is reduced and observer on base line of reference frame concludes that this is CP violation.

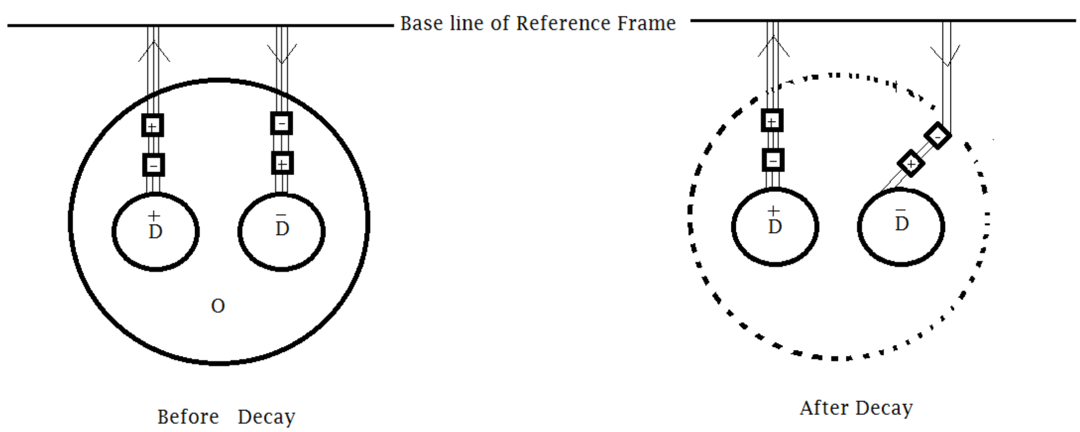


Figure 6-7-2

In order to such situation clear express, Figure 6-7-3 is given.

Rest charge of $D^{+}$is not changed as

$C_{rest} = 1$ 6-7-9

Now, number of force line of D^- for static charge is changed as

$C_{rest} < 1$ 6-7-10

However, original area of static charge of force line elements of $D^-$is not changed as

$C_{original} = 1$ 6-7-11

Only number of force line of D^- is changed

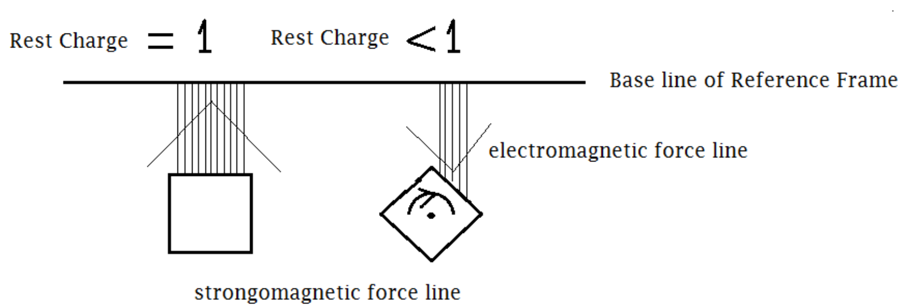


Figure 6-7-3

As given figure above, this strong force interacts with electrical charge $\frac{1}{3}e \; or \; \frac{2}{3}e$ of quarks. Therefore, we see here that we can unify such forces through force line elements theory. However, because an electromagnetic force works as an electromagnetic force line (introduced by M. Faraday) and its force line element, we need a physical entity for the force line and monopole force line element in order for a strong force to be able to interact with the curved electromagnetic force line as a physical entity. The unit area of a strong force line elements is defined as $28U_0F_e$, which is the quantity obtained from quantized constants (mentioned in §4) as increase constant by strong force

$k = (1.686044 \times 10^{21})\,(1.190208 \times 10^{7}) \Rightarrow 10^{28} \;\rightarrow\; 28U_0F_e$ 6-7-12

This number can be distributed to the three forces of gravitational force, weak force, and electromagnetic force, and the base factor of this charge interval constant becomes

$$\sqrt[3]{k} = \sqrt[3]{1.686044 \times 10^{21}} = 1.190208 \times 10^{7} = N_S \qquad 6\text{-}7\text{-}13$$

This constant is called the universal charge interval constant. N_S= $(1.190208 \times 10^{7})^2$ is called force

interval constant. Thus, if we can say the strength of every force is quantized, then the unit area of a gravitational force line element becomes

$$A_g = 1.190208 \times 10^{7} \Longrightarrow 7U_0F_e \qquad 6\text{-}7\text{-}14$$

The unit area of a weak force line element is

$$A_w = (1.190208 \times 10^{7})^2 \Longrightarrow 14U_0F_e \qquad 6\text{-}7\text{-}15$$

The unit area of an electric force line element is

$$A_E = (1.190208 \times 10^{7})^3 \Longrightarrow 21U_0F_e \qquad 6\text{-}7\text{-}16$$

The unit area of a strong force line element is

$$A_s = (1.190208 \times 10^{7})^4 \Longrightarrow 28U_0F_e \qquad 6\text{-}7\text{-}17$$

Conclusion:

1. CP-violation of QCD exists.

2. CP-violation is real violation of conservations law, neverthress results of curve of force line and its force line elements.

3. CP-violation and matter-antimatter asymmetry of the universe is deeply related. There is important relation between CP-violation and matter-antimatter asymmetry of the universe.

4. Standard model of particle physics should be accepted general theory of relativity of CFLE theory for its wide spread contradictions and problems to solve.

6.8 Unification of the Four Forces by CFLE Theory

If instead of curved space theory we use the CFLE theory, we can see that the electromagnetic force is a strong gravitational force, and the curved electromagnetic force is a weak strong force. Therefore, in the CFLE theory, we can see that the strong force, the gravitational force, and the electromagnetic force are qualitatively one force. However, because the weak force and the electromagnetic force are unified by the force line elements theory and by introducing monopole force line elements to the basis of Weinberg–Salam theory, we can see that the gravitational force, weak force, electromagnetic force, and strong force are qualitatively one force. When in a high-energy state, the four forces cannot be distinguished qualitatively and quantitatively, but in a low-energy state, the four forces are separated quantitatively by each different size of the force line elements.

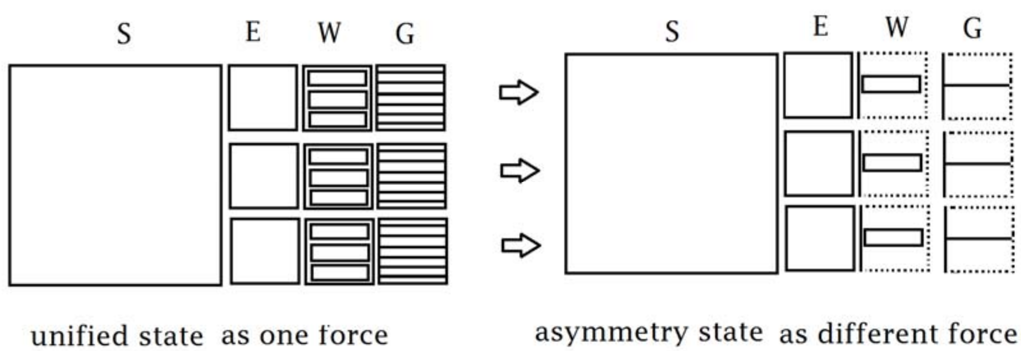


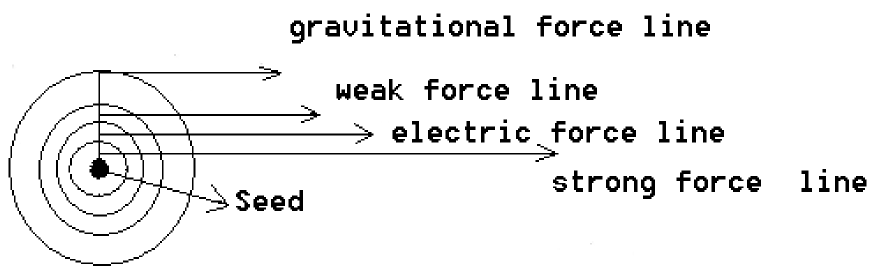
Figure 6-8-1

6.9 Elementary Particles in Nature

As discussed in §6.1, the rest mass m_0 of an electron is a function of speed v; namely, M_0 is $m_0(v)$. However, electrons and positrons form the seeds, the force lines, and the force line elements. The seeds have a large bar rest mass, because this tremendous big rest mass is screened by its force lines and force line elements, and these massive seeds can have various gauge conditions according to how the force lines are curved by various situations. So we can see that the elementary particles of nature are only electrons and positrons. For example, the quark is a complex object that is made up of different moment rest masses of positrons and electrons under different gauge conditions.

Likewise, every different lepton is a complex object composed of different moment rest masses of positrons and electrons with different gauge conditions. Every baryon is also a complex object of leptons and quarks, only with different gauge conditions.

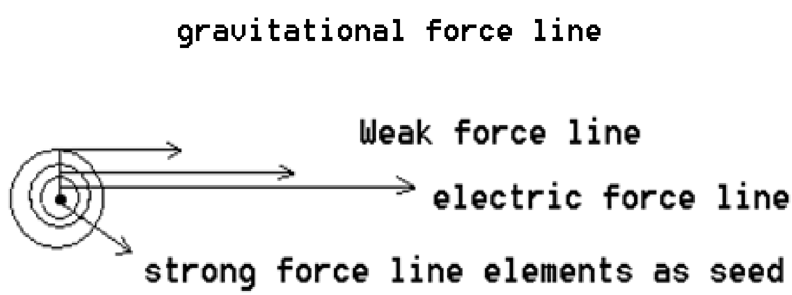
However, because of what the force line elements theory says about the four different force line elements, we can see that the 5 elementary symmetric particles can in fact exist in nature like positron and electron coupled particles. These are shown in Figures 6-9-1 through 6-9-5.



Rest mass: $M = 9.109534 \times 10^{-31}$ **kg**

Seed mass: $M = 1.535908 \times 10^{-9}$ **kg × Z = 1 kg (cf. §18)**

Figure 6-9-1. Electrons and positrons as strongtrinos



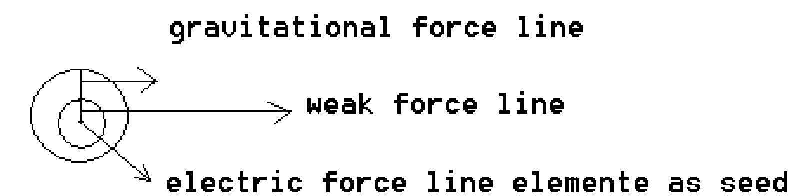
Rest mass: $M = 9.109534 \times 10^{-31}$ **kg /** 1.190208×10^{7}

$= 7.653733 \times 10^{-38}$ **kg**

Seed mass: $M = (7.653733 \times 10^{-38}\ \text{kg})(1.190208 \times 10^{7})^{3}$

$= 1.290453 \times 10^{-16}$ **kg**

Figure 6-9-2. Neutrinos and anti neutrinos as electrinos and positrinos



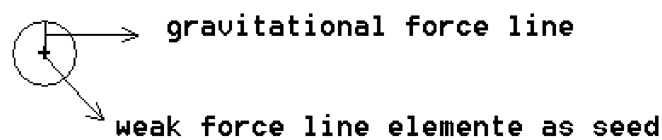
Rest mass: $M = 7.653733 \times 10^{-38}$ **kg / 1.190208** $\times 10^{7}$

$= 6.430584 \times 10^{-45}$ **kg**

Seed mass: $M = (6.430584 \times 10^{-45}$ **kg**$)(1.190208 \times 10^{7})^{2}$

$= 9.109534 \times 10^{-31}$ **kg**

Figure 6-9-3. ±Weaktrinos



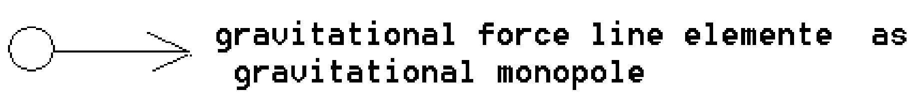
Rest mass: $M = 6.430584 \times 10^{-45}$ **kg / 1.190208** $\times 10^{7}$

$= 5.402908 \times 10^{-52}$ **kg**

Seed mass: $M = (5.402908 \times 10^{-52}$ **kg**$)(1.190208 \times 10^{7})$

$= 6.430584 \times 10^{-45}$ **kg**

Figure 6-9-4. ±Gravitrinos



Rest mass: $M = 5.402908 \times 10^{-52}$ **kg / 1.190208** $\times 10^{7}$

$= 4.539465 \times 10^{-59}$ **kg**

Figure 6-9-5. ±Gravi monopole

Thus, such 5 elementary coupled particles of nature are predicted by the CFLE theory. Any object of the universe is only a complex object of these 5 elementary symmetrical particles.

If it were true that the four kinds of natural forces were unified at the high-energy state of the early universe (or we assert this, as most present scientists agree), logic dictates that there should be positive mass and negative mass in gravitational force. The existence of the positive electric charge and negative electric charge in the electromagnetic force is an established fact, and no-one has yet found any physical dipolar substitute in existence in the universe. Therefore, a unification theory should conclude that all forces in the universe must have the same dipolar nature as the electromagnetic force. That is, every force carries a positive charge component and a negative charge component. Consequently, Einstein's universal equivalence principle asserting that there can exist only one attractive gravitational force and mass is wrong, no matter his theory is curved space-time theory or not. Therefore, the main reason for the accelerating expansion of the universe is logically only one possibility; that is, the existence of positive mass and negative mass, as G. Gamov contemplated in his book "Gravity".