Chapter 14

The First Inconsistency of Relativity

14.1 Inconsistency of the Fourth Dimension, Absolute Speed and Absolute Empty Space

As discussed in §4, according to CFLE theory, the orbital magnet field and spin magnet field result by repositioning of the force lines when a particles moves with constant speed $v = k$. In §4, I did not mention how the force lines reposition according to relativity principle, and about the physical reason for and process of force lines repositioning. I will now discuss these processes in greater detail.

One of the established conditions of special relativity is that the frame of relative motion has to be an inertial frame. Another established condition is that light speed must be constant. The inertial frame is one that can satisfy Newton's First Law of Motion. Therefore, everyone can say what the inertial law and inertial phenomena are. But, from Newton's age to today no one can say what the source of inertia is: How is inertia proportional with mass? What is the essence of inertia? Where is the inertial frame in this universe such that $F = ma$ can be in general use? CFLE theory resolves these questions by propositioning that "for force lines to reposition and for every object to have inertia, there must be some resistant material from Higgsfield in the space of the entire universe interacting with the particle force line to create the inertia." In other words, when an object's moving speed is constant ($v = k$), the object's particle force lines and force line elements collide with the resistant material filled in space, and such collisions result in the repositioning of the force lines and force line elements.

This repositioning of force lines is stopped in the spin magnet state (cf. §15). Therefore, every object can maintain the state of its system without electromagnetic radiation. In the viewpoint of gauge theory, we can consider this process as follows: every object can control itself in any way to maintain phase invariance, and it then follows that a particle can maintain gauge symmetry of its system. However, this process will satisfy Newton's First Law only under constant speed, $v = k$. When a particle accelerates, its situation becomes very different, but can be simply expressed as shown in Figure 14-1-1.

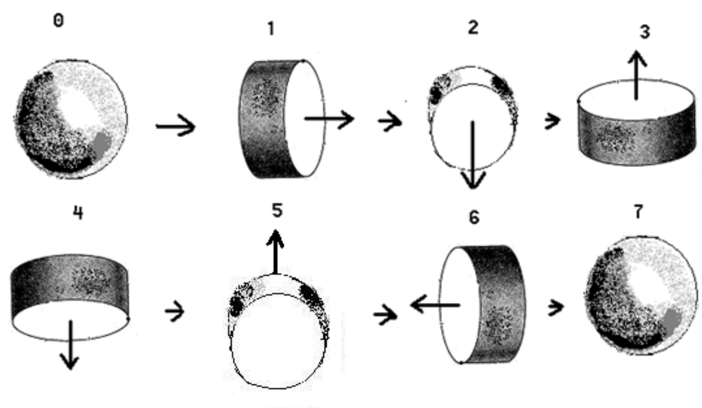


Figure 14-1-1. Length contraction of force lines according to the relativity is expressed is a cylinder form to express clearly the change of force line arrangement (cf. §4, §6, and §15)

As seen in Figure 14-1-1, the movement by the seventh stage is in the opposite direction. According to CFLE theory, this reversed change of direction is inertia. In the viewpoint of gauge theory, it means that when a particle accelerates and its momentum changes rapidly as $p = mv \rightarrow \frac{dp}{dt} = \frac{d}{dt}(mv)$, it uses particle inertia to maintain gauge symmetry. That is, through the property of inertia, the particle emits its force line and its force line elements that are inconsistent with the direction of motion (see Figure 14-1) as electromagnetic waves or gravitomagnetic waves. Because the repositioning of every force line and its force line element in this process is a real physical process, the inertial force of physical existence must also be real. Moreover, although the inertial force and related gravitational force are real physical forces (only the direction of force lines is different), we cannot treat gravitational force and inertial force as apparent forces.

This essential point is what differentiates CFLE theory from "spacesismic" classical general relativity. Classical general relativity can treat gravitational force and inertial force as apparent forces because the effect of the two forces cannot be expressed with force lines and must therefore be expressed with only empty space. But, because CFLE theory asserts that inertia results from a spread of resistant material in the entire space of the universe with force lines, it is impossible for CFLE theory to treat inertia in the same way as classical general relativity. The second established condition of special relativity is the invariance of light speed. Because present-day predictions of time dilatation, length contraction, and mass increase are observed according to predicted values of special relativity, these would naturally confirm the justifications of special relativity. However, because this justification is considered with the viewpoint of light speed invariance, this confirmation satisfies only the minimum necessary conditions. It does not satisfy sufficient conditions; namely, classical special relativity does not or cannot pursue why light speed must be unchanged, and what the physical process of unchanged light speed is. CFLE theory again resolves this problem by propositioning the existence of resistant material in the entire space of the universe. After their emission from any particle, photons collide with the resistant material and take away the energy of the resistant material. Therefore, photons cannot move over a definitive speed according to Maxwell's equation.

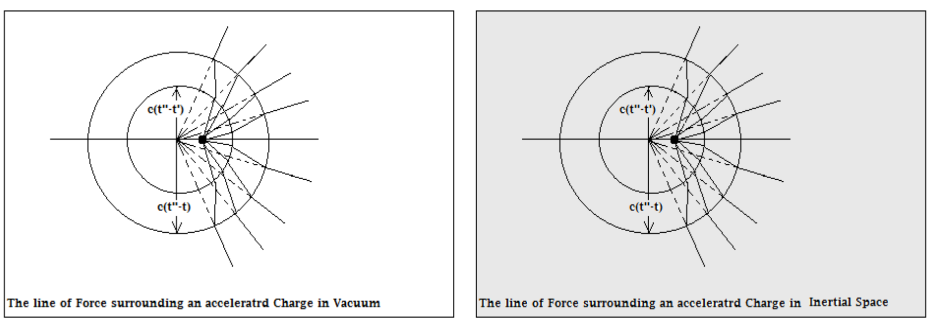


Figure 14-1-2

In figure 14-1-2 we give a largely view of the classical theory of emission of electromagnetic radiation from an accelerated electric charge, restricting ourselves to the case of a stationary electric charge in vacuum as empty space (left of figure 14-1-2) and in Inertial Space (right of figure 14-1-2) as not empty space with resistance material called in vacuum that is suddenly accelerated to a non-relativistic velocity $v \ll c$.

Energy of this stationary charge an associated static field is given by

$$\rho_s = \frac{1}{2}\varepsilon_o E^2 \qquad 14\text{-}1\text{-}1$$

If the charge moves with a uniform velocity, the energy density in this case is given by

$$\rho_s = \frac{1}{2}\varepsilon_o E^2 + \frac{1}{2\mu_o}B^2 \qquad 14\text{-}1\text{-}2$$

Of course for a charge having constant velocity, the electric and magnetic fields are able to adjust themselves in such a way that no energy is radiated, even though these fields are not static for gauge symmetry to keep.

However, for an accelerated charge, the non static electric and magnetic field cannot adjust themselves in such a way that none of the stored energy is radiated. That is gauge symmetry breaking of particle.

We can understand this qualitatively by considering the behavior of electric field. In figure 14-2-1 I describe this field by drawing some of the force line surrounding a charge which was at rest at the initial instant t, suffered a constant acceleration a to the right during the interval t to t', and then continued moving with a constant final velocity. The figure shows the force line at some later instant t'', as viewed from the frame of reference moving at that velocity v. At small distances the force line are directed radially out word from the present position of the charge. At large distance they emanate from where the field would anticipate it to be if unaccelerated. The reason is that information concerning the position of the charge cannot be transmitted to distant locations with infinite velocity, but only with the velocity c(left of figure 14-2-1). Einstein's special relativity cannot explain why light speed is not infinite velocity, but only c =2.99792458$\times 10^8$m/s.

Therefore, in the Einstein's special relativity the law of light speed invariance must be one of the mathematical primaries Axiom without physical base.

However, CFLE theory can explain why light speed can be limited as c =2.99792458$\times 10^8$m/s. The reason is existence of resistant material with real physical value ε_o and μ_o of inertial space (right of figure 14-1-2). The law of light speed invariance is now secondary axiom by physical base of resistance material in inertial space for establishing of inertial law. As a result, there are kinks in the force line found between a sphere centered on the anticipated position and of radius $c(t'' - t)$, which is the minimum distance at which the field can know the acceleration started, and a sphere centered on the actual position and radius $c(t'' - t')$,whichis the minimum distance at which the field can know that the acceleration stopped. As t'' increases, the region containing the kinks expands out word with velocity c. That is, each kink of adjustment propagates along its force line in much the same way as a kink set up at one end of a long stretched rope propagate along the rope. The electric field in the region containing kinks has components which are both longitudinal and transverse to direction of expansion. But constructing diagrams for several value of t'', it is easy to see that the longitudinal component dies out very rapidly and can soon be ignored, whereas the transverse component dies out slowly. in fact, electromagnetic theory shows, by calculation based upon the same idea of this discussion, that at large distance from the region of the acceleration(large t'') the transverse electric field obey the equation

$$E_{\perp} = \frac{qa}{4\pi\varepsilon_o c^2 r} \qquad 14\text{-}1\text{-}3$$

Similarly, there is a transverse magnetic field moving along $E_{\perp}$, and at large distance from the region of the acceleration its strength, if $v/c \ll 1$, is given by

$$B_{\perp} = \frac{\mu_o qa}{4\pi cr} \sin\theta \qquad 14\text{-}1\text{-}4$$

The pointing vector, which gives the energy flow per unit area is directed along r and has a magnitude

$$S = \rho c = \varepsilon_o c E_{\perp}^2 \qquad 14\text{-}1\text{-}5$$

Notice that no energy is emitted forward or backward along the direction of acceleration ($\theta = 0^o or\ 180^0$) and that the energy emitted is a maximum at right angles to this direction ($\theta = 90^o or\ 270^0$). The radiated energy is distributed symmetrically about the line of accelerated motion and with respect to the forward and backward directions.

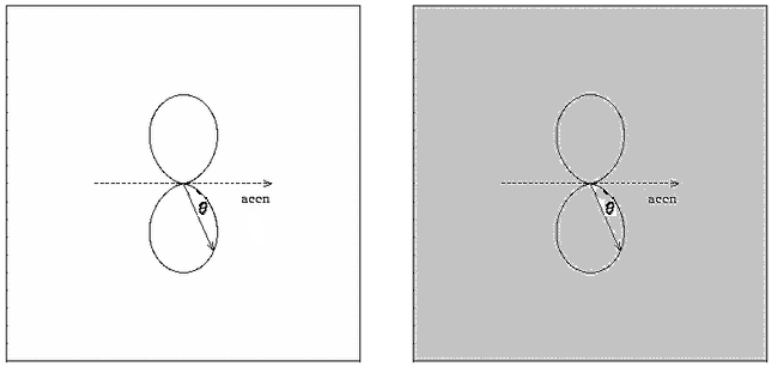


Figure 14-1-3

For such behavior of force lines physically right to understand, we need inertial space with resistance material by $\varepsilon_o\mu_o$ in empty space (right of figure 14-1-3: fulfilled like Higgs boson).

Therefore, light speed by resistance material is given as

$$\nabla^2 f = \frac{1}{V^2}\frac{d^2 f}{dt^2} \implies \nabla^2 E = \varepsilon_0\mu_0 \frac{d^2}{d}\frac{E}{t^2}, \quad \nabla^2 B = \mu_0\varepsilon_0 \frac{d^2}{d}\frac{B}{t^2}$$

$$V = \frac{1}{\sqrt{\varepsilon_0\mu_0}} = 2.99792458 \times 10^8 \text{ m/s}, \quad V^2 = \frac{1}{\varepsilon_0}\frac{1}{\mu_0} \qquad 14\text{-}1\text{-}6$$

Surprisingly, $\varepsilon_o\mu_o$ is only the permittivity of a vacuum. How did ε_o and μ_o come into the theory in the first place? They were constants in Coulomb's law and the Biot–Savart law, respectively. Anyone can measure them in experiments involving charged pith balls, batteries, and wires having nothing whatsoever to do with light. And yet, according to Maxwell's theory, anyone can calculate light speed.

From these two constant values, in linear media

$D = \varepsilon_o E + p$

$= \varepsilon_o(1 + x_{es})\, E$

$= \epsilon E$

$$\epsilon = \varepsilon_o(1 + x_{es}) \qquad 14\text{-}1\text{-}7$$

The constant ϵ is the permittivity of the material. x_e is the electric susceptibility of the medium. In a vacuum, where there is no matter to polarize, the susceptibility x_{es} is zero, and the permittivity is ε_o. That is why ε_o is called the permittivity of a vacuum. However, $\varepsilon_o = 8.854188 \times 10^{-12}\ c^2/\text{Nm}^2$ ($\mu_o = 4\pi \times 10^{-7}$ N/A^2). This means that the vacuum is a special kind of linear dielectric. Of course, in a vacuum, where there is no matter to polarize, x_{es} can be zero. But this fact cannot guarantee that a vacuum must be empty space. The dielectric constant ϵ of helium is 1.000065, ϵ of hydrogen is 1.00025, and ϵ of dry air is 1.00054, and for a vacuum $\varepsilon_o = 1$. How then can we conclude that vacuum must be empty space? How can light speed be decided by a physical property of empty space in which there must be nothing (if so, light speed must be $c^2 = \frac{1}{\varepsilon_o \mu_o} = \frac{1}{0.0} = \infty$ m/s, and not $c^2 = (2.99792458 \times 10^8 \text{ m/s})^2$; here zero comes from the nothingness of empty space)?

Because E and displacement current D of vacuum in capacitor is not zero, result of Eq.14-1-2 cannot change zero without any concern about physical property of vacuum as

$$\varepsilon_o = \frac{D}{E} \neq 0 \qquad 14\text{-}1\text{-}8$$

Because ($\frac{D}{E}$) is term of material property,(ε_o) must be term of material property for physical equality logically to satisfy. This means that vacuum must be not absolute empty space (think Higgs potential and vacuum expectation value $< \Omega|O|\Omega > \neq 0$). Therefore, ε_o is not physical property of absolute empty space but material property in vacuum.

Because universe is huge capacitor as Figure 14-1-4, Maxwell equation is correct in this universe. Therefore, vacuum in this universe is not empty according to $\varepsilon_o \neq 0$. Source of E and D of universe is seed object or remained matter of Big Bang by its super strong gravitational field as strong as electric field like neutron star or magnetar among supernova remnant.

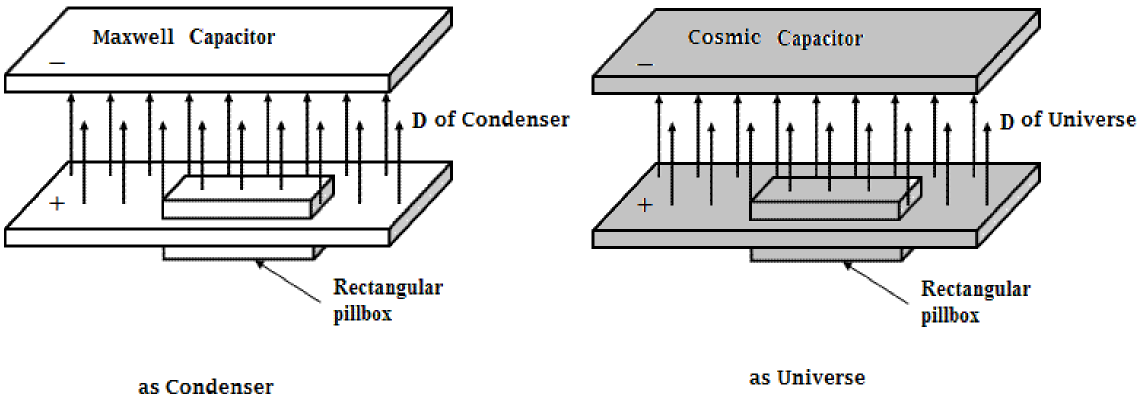


Figure 14-1-4

Therefore, we can conclude that in a vacuum, there must exist electrically and gravitationally neutralized particles (so-called perfect neutralization) by the same or similar process as pair annihilation (every neutral force line element in space).

Because light has a particle property as photon, resistant material (not Maxwell's ether) can break movement of photon as grain. Therefore, light speed can be limited as *c* and for speed of this grain of light to measure resistance material can be frame of reference as absolute coordination system.

In modern physics, to imagine or to accept such an idea should not be that difficult, given the already imagined and accepted ideas of Dirac's electron sea, pair production from a vacuum, Higgs field for mass, etc. The most important point is that the light speed invariant (the main physical property of relativity theory) is decided by the classical constants $\varepsilon_o\mu_o$. However, because the light speed invariant of every inertial frame results in length contraction and time dilatation according to the theory of special relativity, $\varepsilon_o\mu_o$ must be related through any physical method of establishing an inertial frame, length contraction, and time dilatation. Therefore, according to CFLE theory, it is impossible to avoid the conclusion that the $\varepsilon_o\mu_o$ from neutralized material in a vacuum, so-called generally inertialium (cf. §17.4), is the physical reason for inertia, being the resistance material of movement for every object in the universe. Vacuum expectation value is changed by spontaneous symmetry breaking. Because of this energy change must be exist such Higgs boson from Higgs field and mass of particles by absorbed goldstone boson

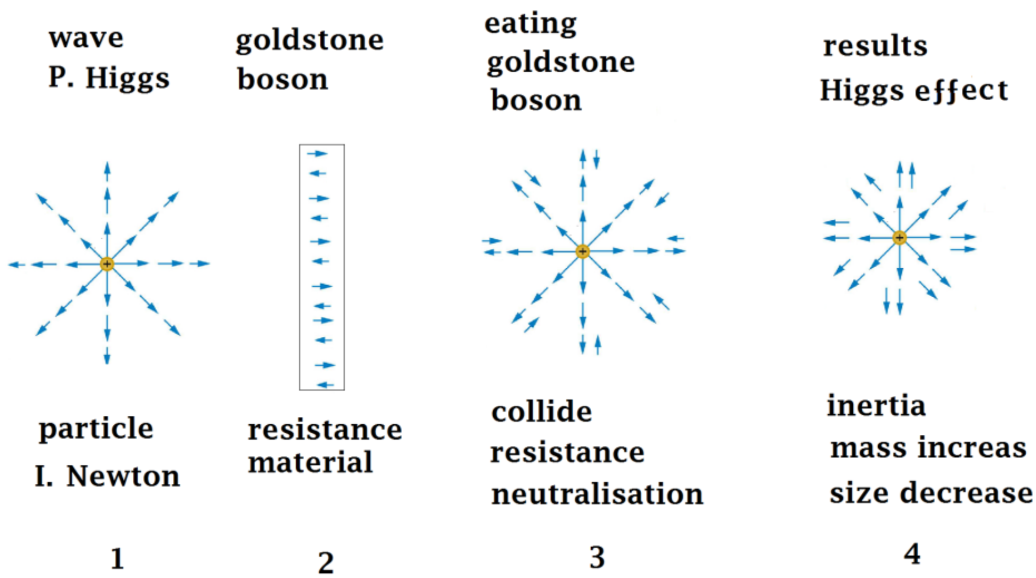


Figure 12-2-4

Because gauge boson is in state of gauge symmetry, gauge boson cannot have static rest (Newtonian) mass. However, spin magnetic divergence from magnetic monopole can give same effect of rest mass (cf.§18.8) as Figure 12-2-6

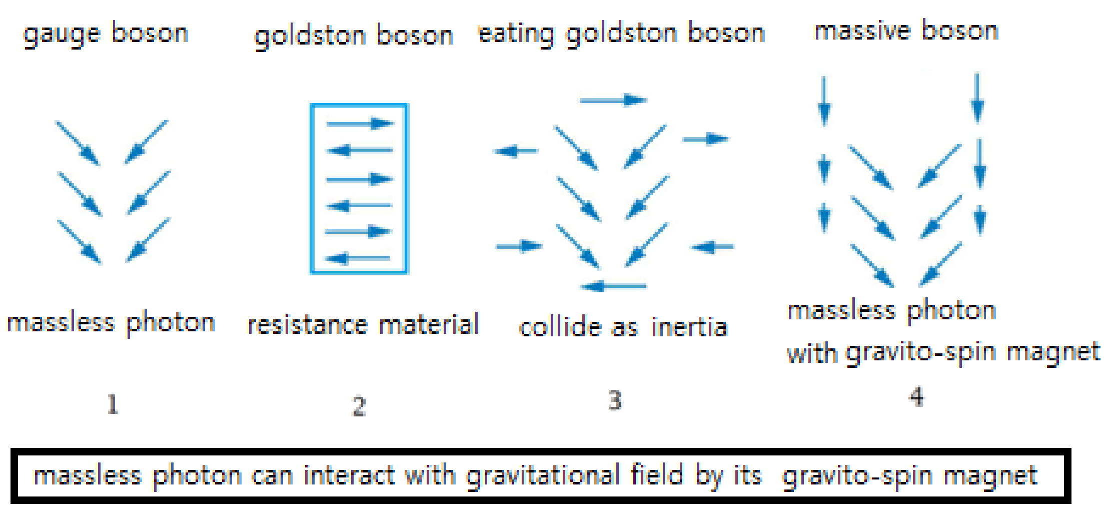


Figure 12-2-6

Such vacuum is called vacuum of neutral emptiness or relative vacuum according to CFLE theory. In the CFLE theory generalized name of Higgs Boson and Higgs field is Inertial Boson and Inertial field.

Inertial Boson constitutes $\pm$inertialino.

When vacuum expectation value cannot be changed by any symmetrical breaking is called vacuum of absolute emptiness, vacuum expectation value is always $< \Omega|O|\Omega > = 0$.

Existences of such particles (Higgs particle) from relative vacuum deny Einstein-Minkowski absolute empty space.

In a surprising turn of events, Britain's Peter Higgs and Belgium's Francois Englert won the Nobel Prize for Physics on 8 October 2013, for predicting the existence of the Higgs boson. This particle was confirmed to exist (5σ!!!)on 14 March 2013 at CERN, where CMS and ATLAS compared a number of options for the spin parity of this particle and all the comparisons preferred no spin and positive party. This, coupled with the measured interaction of the new particle with other particles, strongly confirms the existence of a Higgs boson.

This confirmation is now acknowledged as a physical fact by the bestowment of a Nobel Prize. Therefore, given that the existence of an absolute coordination system (Higgs field) is acknowledged, it should also be accepted as a fact that special relativity is wrong, according to CFLE theory. At the same time, it should be accepted that vacuum is not empty space—a fact now confirmed by CERN's proof of existence of the Higgs boson as inertial boson that is emitted from inertial field according to CFLE theory (cf.§17.4).

Therefore, every phenomenon that occurs by characteristic of an unchanged light speed (viz., time dilatation, length contraction, mass increase) ought to be connected with the resistant material in vacuum. In particular, the analysis of any relative distance contraction should involve a simultaneous analysis of the relative length contraction of the resistant material in space.

Such distance contraction by length contraction of inertial field should not be analyzed as a contraction of space itself. Because the life time of the muon is $T = \frac{2}{10^6\ \mathrm{s}}$, it cannot move over 600 m, but despite that muons occur over 10,000 m above in the sky, they are observed on the

Earth surface or deep under in mines, indicating that the muon's life time is extended. At this moment, classical special relativity analyzes such life-time extensions as being time dilatations and/or distance contractions of space. CFLE theory, however, cannot allow such a mathematical analysis of space. That is, such a phenomenon (life-time extension) should only be analyzed as a time dilatation. If an observer wants a corresponding analysis, the only one possible should be of the length contraction of resistant material or field contraction. Therefore, time is related to the material. Time is not related to space. Space, therefore, becomes only the third dimension, and the space−time continuum as a fourth dimension cannot occur. Because time can mix only with matter according to CFLE theory, problems between arrow of time and entropy can be connected physically easy and solve simple problem of time in general relativity too (cf.§16).

Because the Einstein's special relativity is only electromagnetic special relativity, light speed is not absolute speed in the universe.

Furthermore, because the principle of relativity has an established limit, outside of this limit there should be no relativistic effects. Namely, because the principle of relativity gives rise to a coupling of space–time, outside of the established limit this space–time coupling must be separate from each other. At this moment, however, how the space–time mixture can be separated is a big mystery. In other words, because of the inevitability of singularity as established by Hawking and Penrose, space–time cannot be separated. Yet, in order for consistency to be kept even within the established limit, space and time should be independent of each other.

The space–time continuum was introduced by Hermann Minkowski in his book *Raum und Zeit*, which was presented at the German Mathematician Conference in Leipzig in 1909 under condition of inertial coordination system in empty space and mathematical axiom of absolute speed of light. In this book, he wrote,

> "Nun ist die frage, welche umstände zwingen uns die veränderte Auffassung von Raum und Zeit auf, wiederspricht Sie tatsächlich niemals den erscheinungen, endlich sie gewährt sie Vorteile für die Beschreibung der erscheinungen?" … "Die in einen beliebigen weltpunkte vorhandene substanz kann stets bei geeigneter Festsetzung von Raum und Zeit als ruhende aufgefaßt werden. Das Axiom bedeutet, dass in jedem weltpunkte stets der Ausdruck positive ausfällt,

$$c^2dt^2 - dx^2 - dy^2 - dz^2 > 0$$

> Order was damit gleich bedeutet ist, dass jede geschwindigkeit v stets kleiner als c ausfällt. Es würde danach für alle Substantielle geschwindigkeit c als obere grenze bestehen und hierin eben die tief Bedeutung der gröss c liegen…"

Essentially, Minkowski had put forth that space and time as separate entities could forever be "reduced to mere shadows," so a measurement of space and time as a continuum is needed such that it can never be contradicted by actual observed natural phenomena. If one gives a suitable setting for space and time, then arbitrary points existing in a world of matter will appear to be at rest. Thus, the axiom that $c^2dt^2 - dx^2 - dy^2 - dz^2$ must always be positive (>0) seems to fail, because it follows that any velocity v is always smaller than c, making c the upper limit. Minowski acknowledges the limit of c seems flawed, but he fixes this by including a square root of this differential expression, rendering any velocities greater than c as being like "imaginary coordinates in geometry."

But this theoretical mathematical condition of space–time is undermined by experiments of ultra-high energy cosmic rays (cf. §12), because light speed cannot be absolute speed in the universe.

Therefore, a space–time continuum cannot exist theoretically and physically.

The Abstract of Minkowski's *Raum und Zeit* can be found in the proceedings of the 80th Assembly of German Natural Scientists and Physicians held in Köln on 21 September 1908, which was 1 year before the book *Raum und Zeit* was published and 3 years after the publishing of the special theory of relativity, but 7 years before the publishing of the general theory of relativity. This Abstract date implies that the concept of the space–time continuum was not developed directly for the special theory of relativity. In the proceedings Abstract, we can in fact find the statement,

> "…in diesen Vortrag führt Minkowski die mathematischen notation ein. Mit denen die spezielle relativität theory Einstein zur allgemeine relativität theory erweitert werden kann. Die grundlegende Idee ist das 4-dimensionalen Raum-Zeit continuum." [Loosely translated: "*… this paper leads to a Minkowski mathematical notation, with which the special general relativity, the Einstein relativity theory, can be extended. The basic idea is the 4-dimensional space–time continuum.*"]

Simply put, to prepare for the basis of curved space, Minowski introduced the space–time continuum. At this moment $\frac{dx}{dt} = v$ is not regular speed. By this speed, space is not only an independent structure, but also a function of speed $S_{pace}(v)$ and contracted. Likewise, in the general theory of relativity, acceleration $a = \frac{dv}{dt}$ is not regular acceleration. By this acceleration, space is not only an independent structure, but also a function of acceleration $S_{pace}(a)$ and curved. According to these results, space of the universe must be expanded or contracted. However, the experimental result of WMAP reveals that the universe is flat, and the experimental finding of ultra-high energy cosmic rays further confirms that special relativity is wrong. Thus it is disclosed that Minkowski's idea of the space–time continuum and curved space-time is wrong, because time is an emergent phenomenon from quantum entanglement with matter.

This means that in the universe, according to CFLE theory, a space–time continuum is not allowed, but a material−time continuum is possible. This condition is a very important prerequisite for maintaining gauge symmetry and for establishing the general conservations laws. In conclusion, the established limits of special relativity and general relativity require the existence of an absolute frame. In CFLE theory, such absolute frame is the resistant material that fills the entire space of the universe, and is not four-dimensional.

The CFLE theory is in striking contrast to Einstein's relativity theory. Namely, matter and time make up an inseparable mixture regardless of the established limits of the relativity principle. Therefore, within such limits, the size of matter and the related time interval become functions of speed, but outside of the established limit, the matter–time continuum does not make any logical sense and is physically improbable. Because inertial space in that inertial coordination system can establish is not empty space, space cannot mix time, time can mix with matter only otherwise we arrive at the conclusion that there is no time in general relativity according to prediction of Wheeler-Dewitt equation and unitarity violation by permanent information disappearing in a black hole**.**

Minkowski had further stated in his book,

> "Die mit der Anzahl 4 verbundene etwas grössere Abstraktion tut dem mathematiker nicht Wehe." [Loosely translated: *The slightly greater abstraction associated with the number 4 does not cause the mathematician woe*].

On the contrary, 100 years after Minkowski's quotation, the current mathematicians of our generation are mired in unthinkable endless woe, and wasting time and money resolving this dispute. But now according to CFLE theory we can finally declare that the idea of Matter, by itself, and Time, by itself, is doomed to "fade away into mere shadows," and only the union of the two will preserve an independent reality.

In Euclid geometry invariant quantity is

$$(\Delta s)^2 = (\Delta x)^2 + (\Delta y)^2$$

$$= pythagoras\ invariance$$

$$= (space\ components)^2 \qquad 14\text{-}1\text{-}9$$

In Minkowski geometry invariant quantity is

$$(\Delta s)^2 = (\Delta x)^2 + (\Delta y)^2 - (c\Delta t)^2$$

$$= Lorentz\ invariance$$

$$= (space\ components)^2 - (time\ component)^2$$

$$= four\ dimensional\ invariance \qquad 14\text{-}1\text{-}10$$

Eq 14-1-10 is quantitatively right, but qualitatively wrong. This means that time component cannot mix with space components.

Because when coulomb's law is changed by special relativity as

$$F = QE \rightarrow F = QE + QVB \rightarrow F = QE + QVB + QVB_s \qquad 14\text{-}1\text{-}11$$

This spin magnet B_s cannot explain by change of space components or time component that can be mixed into space components or change of twisting space-time components as figure 4-4-14.

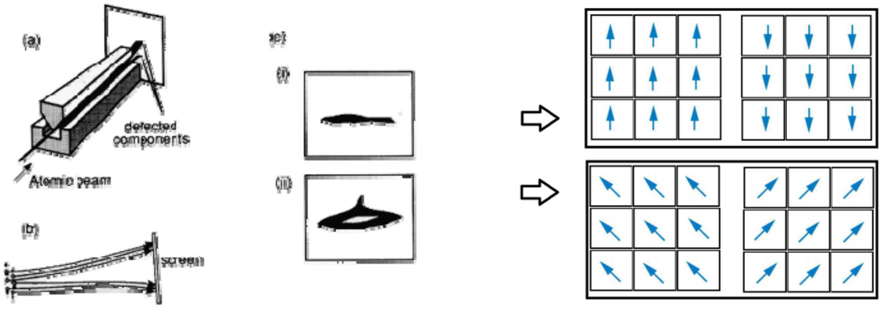


Figure 4-4-14

Because usual magnet B and spin magnet B_s is relativistic change of force line elements as material, relativistic length contraction as relativistic correspondence quantity of time dilatation can exist, but distance contraction or space contraction as relativistic correspondence quantity of time dilatation cannot exist.

Therefore, distance contraction or space contraction (ex: Muon life time lengthening) is not contraction of empty space, but contraction of resistance material that is fulfilled in empty space for solving the problem of time in Einstein's general relativity**.**

Conclusion: because light speed invariant in inertial space is result between resistant material and photon, quantity of $(c\Delta t)^2$is not quantity of time component, but quantity of maximum component of inertial space. Lorentz invariant = $(c\Delta t)^2 - (\Delta x)^2 - (\Delta y)^2$is not 4 dimensional invariant of space-time, but invariant of 3 dimensional inertial space by maximum component of inertial space.

14.2 Solving the Yang–Mills Existence and Mass Gap Problem

In early 1954, Chen Ning Yang and Robert Mills developed a modern formulation in an effort to extend the original concept of gauge theory for the abelian gauge group (e.g., quantum electrodynamics) to non-abelian gauge groups to provide an explanation for strong interactions. This initial idea was not a success, since the quanta of the Yang–Mills field had to be mass-less in order to maintain gauge invariance. The mass-less particles should have long-range effects, but these effects were not seen in experiments, so the idea was set aside until 1960, when the concept of particles acquiring mass through symmetry breaking in mass-less theories was put forward by Jeffrey Goldstone, Yoichiro Nambu, and Giovanni Jona-Lasinio. But the Yang-Mills gauge theories were generally acknowledged in the physics community after Gerard ’t Hooft, in 1972, proved that they were renormalizable. This applies even if the gauge bosons described by this theory are massive, as in the electroweak theory. However the mass is only an acquired one; namely, as suggested, by the Higgs mechanism.

Yang–Mills theories are a special example of gauge theory with a non-abelian symmetry group, with one of most important results obtained being asymptotic freedom. These results can be obtained assuming the coupling constant g is small, as occurs to high energies, and applying perturbation theory. The relevance of these results is due to the fact that a Yang–Mills theory that describes strong interaction and asymptotic freedom permits proper treatment of experimental results coming from deep inelastic scattering. But currently this theory can describe only a single dimension, making this its most important defect.

With the infrared limit, the situation is quite the opposite, as the coupling is large enough for perturbation theory to be reliable. Indeed, most of the difficulties that current researches meet is in managing the theory at a low energy limit, because the beta function is unknown in this limit. This is another important defect of Yang–Mills theory. These problems are known as the *Yang–Mills Existence and Mass Gap Problem*, which is one of the seven millennium problems defined by the Clay Mathematics Institute.

The goal is to

> “*Prove that for any compact simple gauge group G, a non-trivial quantum Yang–Mills theory exists on* $\mathbb{R}^4$ *and has a mass gap* $\Delta > 0$. *This includes establishing axiomatic properties that are at least as strong as those previously cited in [45,35]*.” [1]

In Yang–Mills theory, the lagrangian is given by

$$\mathcal{L}_{gf} = \frac{1}{4} Tr(F^2) = -\frac{1}{4} F^{\mu\nu a} F^a_{\mu\nu} \qquad \text{14-2-1}$$

1. From Arthur Jaffe and Edward Witten. *Quantum Yang-Mills Theory*. Available at http://www.claymath.org/millennium/Yang-Mills_Theory/yangmills.pdf. The reference [45,35] refers to *PCT, Spin Statistics and All That*, by R.F. Streater and A.S. Wightman (1964), and *Axioms for Euclidean Green’s Functions*, by K. Osterwalder and R. Schrader (1973), respectively.

$$\mathcal{L} = \bar{\psi}(i \not{D})\psi - \frac{1}{4}(F^a_{\mu\nu})^2 - m\,\bar{\psi}\,\psi \qquad 14\text{-}2\text{-}2$$

With the F-quantities (the curvature or field strength form) satisfying

$$[T_a, T_b] = if^{abc}T_c$$

and $D_\mu = I\partial_\mu - igT_aA^a_\mu$ 14-2-3

where I is an identity for the group generator, A^a_μ is the vector potential, and g is the coupling constant. In four dimensions, the coupling constant g is a pure number and for a SU(N) group, one has

$a,b,c = 1 \ldots . N^2 - 1$ 14-2-4

The relation

$$F^a_{\mu\nu} = \partial_\mu A^a_\nu - \partial_\nu A^a_\mu + gf^a_{bc}A^b_\mu A^c_\nu \qquad 14\text{-}2\text{-}5$$

can be derived by the commutator

$$[D_\mu D_{\nu]} = -igT_aF^a_{\mu\nu} \qquad 14\text{-}2\text{-}6$$

From the given lagrangian, one can derive for equations of motion given by

$$\partial^a F^a_{\mu\nu} + gf^a_{bc}A^{\mu b}F^a_{\mu\nu} = 0 \qquad 14\text{-}2\text{-}7$$

Putting $F_{\mu\nu} = T_aF^a_{\mu\nu}$, we can rewrite as

$$(D_\mu F_{\mu k})^a = 0 \qquad 14\text{-}2\text{-}8$$

A Bianchi identity holds

$$(D_\mu F_{\nu k})^a + (D_k F_{\mu\nu})^a + D_\nu F_{k\mu})^a = 0 \qquad 14\text{-}2\text{-}9$$

A source J^a_μ enters into the equation of motion as

$$\partial^\mu F^a_{\mu\nu} + gf^a_{bc}A^{\mu b}F^c_{\mu\nu} = J^a_\nu \qquad 14\text{-}2\text{-}10$$

The Yang–Mills lagrangian is

$\mathcal{L} = \bar{\psi}(i\not{D})\psi - \frac{1}{4}(F_{\mu\nu}^{a})^2 - m\,\bar{\psi}\,\psi$

The most appropriate method to quantize for the Yang–Mills theory is

$$Z[j,\bar{\varepsilon},\varepsilon] = \exp(-ig\int d^4x \frac{\delta}{i\delta\bar{\varepsilon}_\alpha(x)} f_{abc}\, d^4x \partial^\mu \frac{i\delta}{\delta j_{\mu b}(x)} \frac{i\delta}{\delta \varepsilon_c(x)})$$

$$\exp(-ig\int d^4x f_{abc}\, \partial^\mu \frac{\delta}{i\delta j_{\nu a}(x)} \frac{i\delta}{\delta j_{\mu b}(x)} \frac{i\delta}{\delta j_c^\nu(x)}) \times$$

$$\exp(-ig\frac{g^2}{4}\int d^4x f_{abc}\, f^a \frac{i\delta}{\delta j_{\mu b}(x)} \frac{i\delta}{\delta j_{\nu c}(x)} \frac{i\delta}{\delta j_\nu^\mu(x)} \frac{i\delta}{\delta j_s^\nu(x)}) Z_0[j,\bar{\varepsilon},\varepsilon]$$

14-2-11

with

$$Z_0[j,\bar{\varepsilon},\varepsilon] = \exp(-\int d^4x\, d^4y \bar{\varepsilon}_\alpha(x) C^{ab}(x-y)\varepsilon_b(y))$$

$$\exp(\frac{1}{2}\int d^4x\, d^4y j_{\nu a}(x) D^{\mu\nu ab}(x-y) j_{\nu b}(y)) \qquad 14\text{-}2\text{-}12$$

Now the theory is renormalizable.

The fundamental physical object in the Yang–Mills equation is the connection that is denoted as *D*. Mathematically, the connections *D* tell us how to move things around from point to point on the manifold, the so-called "parallel transport" on the manifold. Physically, the connection is the fundamental physical field of the theory. Together with the current *J*, the connection completely determines all the physical properties of the system. In the case where the Yang–Mills theory is Maxwell's equations, the connection is just the electromagnetic vector potential. In Yang–Mills theory, the Faraday tensor is generalized to the curvature *F*. Mathematically, the curvature is derived from the connection *D* essentially by taking commutators of certain differential operators related to *D*. Physically, the curvature can be thought of as generalizing the Faraday tensor in electromagnetism, where operator d_D is known as the exterior covariant derivative. The quantity $d_D x$ is a measure of how fast x is changing as it is moved around in various directions on the manifold. Therefore, the Yang–Mills equations tells us that, in a certain sense, *F* is not changing as we move around the manifold, and the way ${}^*F$ changes is determined by the current, J_ν. After all, in electromagnetism, the Faraday tensor *F* certainly can change. In fact, in some sense, the Yang–Mills equation

d_{DF}= 0 is telling us that with respect to this twist, F is not changing in the way we have seen. The Yang–Mills equations generalize the Maxwell equation for electromagnetism.

However,according to Arthur Jaffe and Edward Witten : ′classical non abelian gauge theory is very different from the observed world of strong interactions; for QCD to describe the strong force successfully, it must have at the quantum level the following three properties, each of which is dramatically different from the behavior of the classical theory:

(1) It must have a "mass gap;" namely there must be some constant Δ

>0 such that every excitation of the vacuum has energy at least Δ.

(2) It must have "quark confinement," that is, even though the theory is

described in terms of elementary fields, such as the quark fields, that

transform non-trivially under SU(3), the physical particle states such as the proton, neutron, and pion are SU (3)-invariant.

(3) It must have "chiral symmetry breaking," which means that the vacuum is potentially invariant (in the limit that the quark bare masses vanish) only under a certain subgroup of the full symmetry group that acts on the quark fields.

The first point is necessary to explain why the nuclear force is strong but short ranged.

The second is needed to explain why we never see individual quarks.

The third is needed to account for the "current algebra" theory of soft pions that was developed in the 1960's.′

Their inevitable three necessities arouse sympathy.

However, under the condition of as ′Prove that for any compact simple gauge group G, a non-trivial quantum Yang–Mills theory exists on $\mathbb{R}^4$ and has a mass gap $\Delta > 0$′, inevitable three necessities cannot be sufficient.

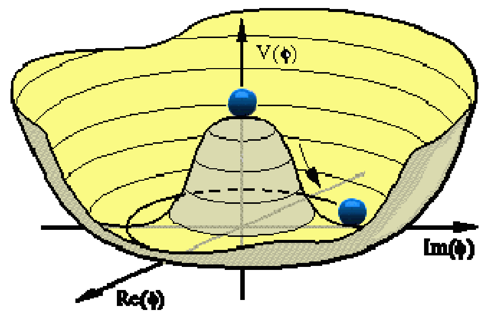


Figure 14-2-1

Because Einstein's special relativity don't permit that quantum Yang-Mills theory have non-zero vacuum expectation value $< \Omega|O|\Omega > \neq 0$ as figure 14-2-1 ,first excite state from effective vacuum expectation value for mass gap $\Delta > 0$ cannot be calculated.

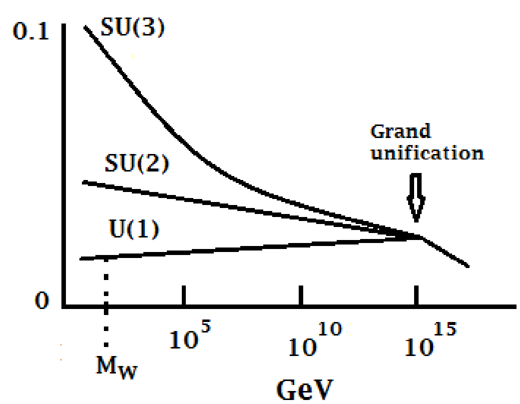


Figure 14-2-2

Figure 14-2-2 show lowest energy limit of coupling constant $\alpha_s = 1$ above$\alpha_s = 0.1$.

Because result of Einstein's special relativity $K = \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$ demand coupling constant $\alpha_s = 1$ to have according to color confinement by $= 1, V = kr$, lowest energy state must be stay always in zero.

Einstein and Minkowski mixed relative time and absolute vacuum of empty space under condition of light speed invariant without physical justice.

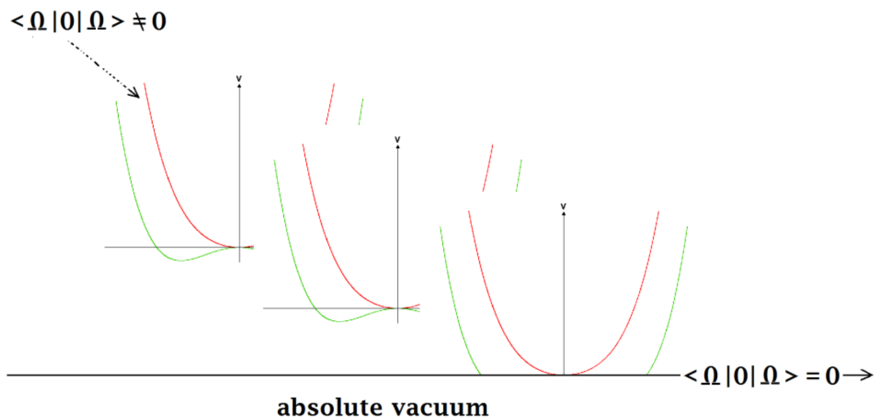


Figure 14-2-3

Therefore, theory of Einstein's special relativity is appeared here itself in physical true colors with justice less physical demand.

Because they employ absolute empty space, they have to pay here infinite energy with zero vacuum expectation value. Therefore,

Spontaneously symmetry breaking cannot occur by absolute vacuum symmetry.

Because symmetry breaking cannot exist, cannot exist calculable Yang-Mills theory.

Namely, symmetry of Einstein's absolute empty vacuum cannot be broken. Vacuum expectation value $< \Omega|O|\Omega >$ must be zero by infinite relativistic energy by $\alpha_s = 1$ with color confinement as figure 14-2-3.

$$[< \Omega|O|\Omega > \neq 0]_1 > [< \Omega|O|\Omega > \neq 0]_2 > \text{---} > [< \Omega|O|\Omega > = 0]_b$$

14-2-13

Nevertheless Einstein and Minkowski mixed relative time and three dimensional spaces under condition of absolute empty space of vacuum with relative time and absolute invariant speed of light.

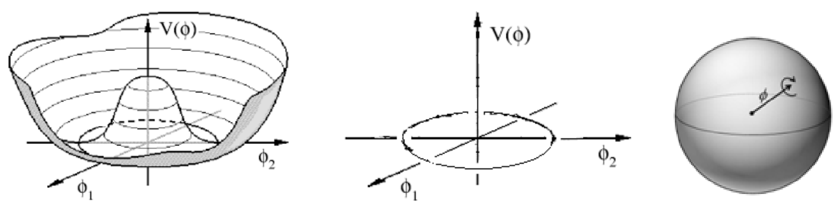
Therefore, universe is only three dimensions and all of theory of extra dimension is meaningless metaphysical theory.

Furthermore, Einstein's relativity doesn't permit existence of magnetic monopole for color confinement to have.

Of course, quantum Yang-Mills theory can have magnetic monopole by the ’t Hooft–Polyakov monopole for ability of color confinement to have.

However, this magnetic monopole is effect only three dimensions.

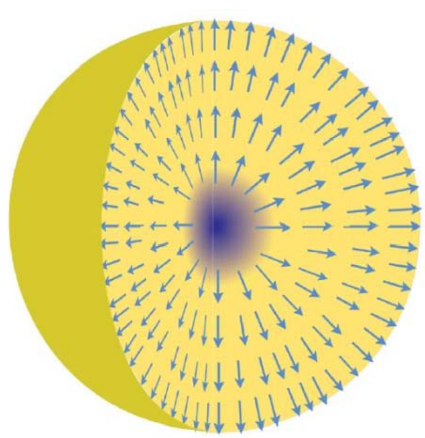
Because ’t Hooft–Polyakov used the Georgi-Glashow model of electroweak unification that has an SO(3) gauge symmetry which correspond to rotations in the three-dimensional internal space.



Spontaneous symmetry breaking

Figure 14-2-4

However, the Higgs field has a non-zero length, and therefore its possible values lie on a sphere in the internal space, corresponding to different possible vacuum states. Because of the SO (3) symmetry, all vacuum states are identical, but once the vacuum state has been chosen, only rotations around the Higgs field axis are possible. Therefore the full SO (3) symmetry is spontaneously broken to a smaller U (1) symmetry, which gives rise to electromagnetism.



The hedge hog configuration

Figure 14-2-5

In the 't Hooft-Polyakov monopole solution, the Higgsfield has a fixed length, but its direction (indicated by the arrows)is different in different direction, in such a way that it always points away from the origin. This configuration cannot be turned continuously into the uniform vacuum state, so it is topologically stable. In order for the field to be continuous, it cannot be in the vacuum state at the origin, and therefore there is a localized lump of energy or a particle at the origin. Finally 't Hooft-Polyakov magnetic monopole can exist.

However, when this monopole applied in to $\mathbb{R}^4$, this monopole mixed with Minkowski's relative time inevitably and 't Hooft-Polyakov magnetic monopole become meaningless by infinite relativistic energy.

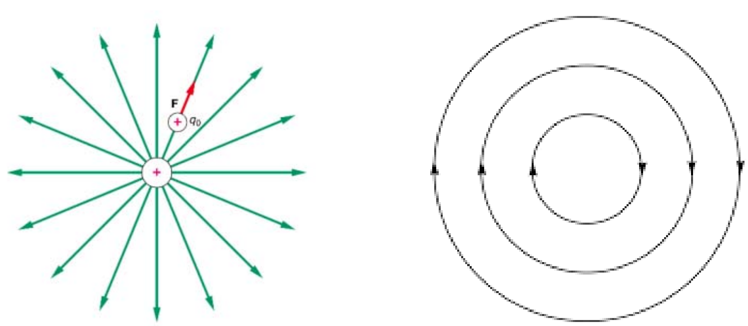
Therefore, in the time- space continuum by Einstein-Minkowski cannot exist quantum Yang –Mills theory as non abelian gauge theory.

When Yang-Mills theory want to have color confinement that can have effective vacuum expectation value $< \Omega|O|\Omega > \neq 0$and related mass gap$\Delta > 0$, this theory can be mixed Maxwell theory.

However, because the Maxwell equations have a mortal defect, the Yang–Mills theory could not but inherit the same defect; that is, the negative existence of magnetic monopoles in the Maxwell equation

$$\nabla \cdot B = 0 \qquad 14\text{-}2\text{-}14$$

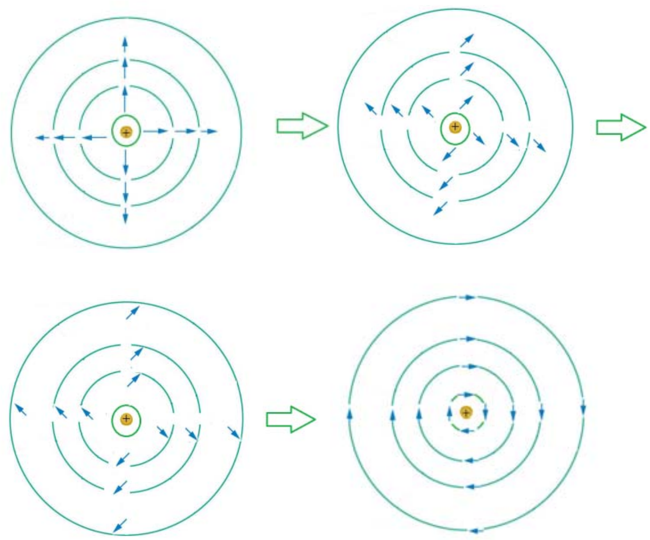
This means that a magnetic monopole in the rest state cannot exist in Maxwell's theory. Therefore, in the whole Maxwell equation, force lines exist as shown in Figure 14-2-6



Divergence of E **Curl of B**

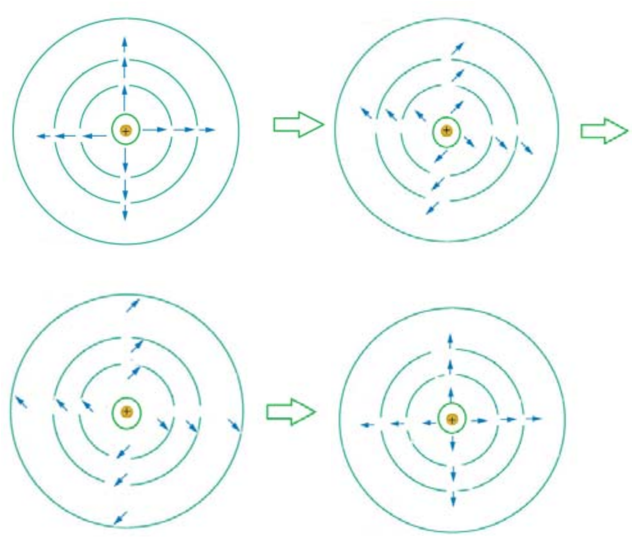
Figure 14-2-6

However,because the magnetic monopoles that exist in the $\pm$electric monopolar force line elements of CFLE theory can exist, divergence of magnetic fileld $\nabla \cdot B=\frac{v}{c^2}\times E \neq 0$ is not zero as Figure 17-3-2, 17-3-4(cf.§17) .



$\nabla \times B = \mu_0 J + \varepsilon_0\mu_0 \frac{dE}{dt}$ by magnetic monopoles

Figure 17-3-2



$\nabla \cdot B = \mu_0\eta \neq 0$ by magnetic monopoles

Figure 17-3-4

Therefore, in Yang–Mills theory, the related neutrolateral force and its force lines from dipolar forceline elements also needed be with maxwell theory, as Figures 6-3-8 show (reproduced here from Chapter 6)

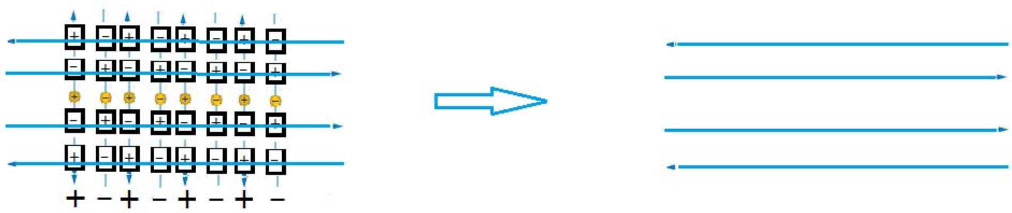


Figure 6-3-8

At this moment, the force line arrangement of a particle is changed by the special relativity of CFLE theory.

From this change appear the neutrolateral force and its monopolar force lines elements between two particles, as shown in Figures 6-3-10 and Figure 6-3-11 (cf. Chapter 6).

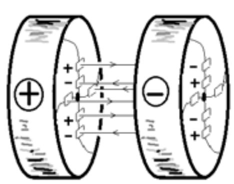


Figure 6-3-10

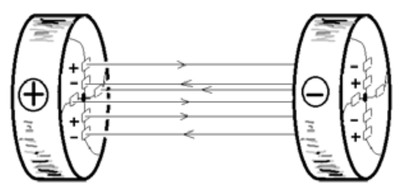


Figure 6-3-11

This neutrolateral force line is three-dimensional, without divergence.

Therefore, when the distant between two particles is short, the related potential becomes

$$V = Kr_{\text{short}} \qquad \text{14-2-15}$$

When the distant between two particles is far, the related potential can be

$$V = Kr_{\text{far}} \qquad \text{14-2-16}$$

Therefore, the strength of the relation between these two potentials is

$$(V = Kr_{\text{far}}) > (V = Kr_{\text{short}}) \qquad 14\text{-}2\text{-}17$$

This is none other than the typical potential of asymptotic freedom.

In the low energy limit, the possible maximum strength of this force and mass is

$$F_{strong} = \left(\frac{e^2}{4\pi\varepsilon_0 r^2}\right)(1.190208 \times 10^7)^2$$

$$m_{strong} = (1.22 \times 10^{19} GeV)(1.190208 \times 10^7)$$

$$= 1.33 \times 10^{26} GeV \qquad 14\text{-}2\text{-}18$$

From this force strength, the monopole quark can be separated from the quark pair.

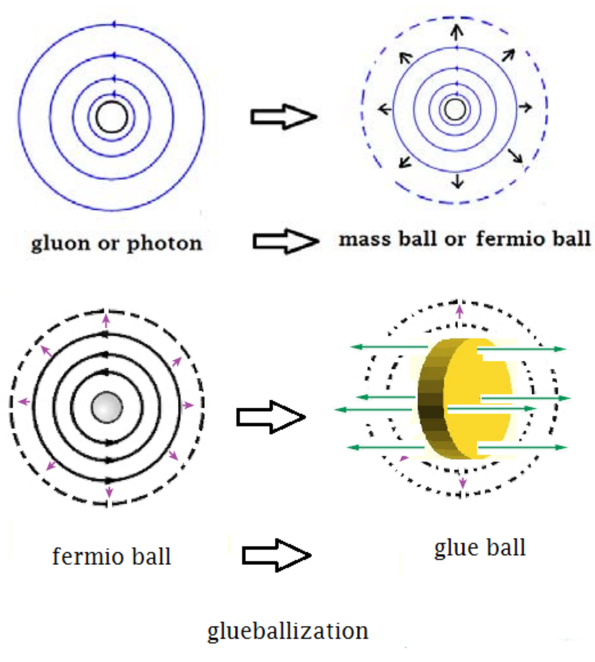


Figure 6-3-14

In this potential, mass-less and any kind of charge-less gluons are emitted, and the force line arrangement of such a gluon is changed by the neutrolateral force lines from monopolar force line elements, as Figure 6-3-8 ~6-3- 14shows.

Because of this Glueballization, a gluon can have its own charge once more and a related mass in particle. In this potential, a Photoballized particle has its force line arrangement changed as in Figure 6-3-14. Therefore, gluons and quarks can interact strongly by this charge and mass.

This is none other than gluon confinement and quark confinement of CFLE theory.

Under such potentials, gluons emitted just after radiation cannot have any kind of charge (strong charge and gravitational charge (mass)), but after glueballization, the gluon is changed to a quantized massive gauge boson by magnetic monopole force line element according to the special relativity of CFLE theory. That is none other than the mass gap$\Delta > 0$ from CFLE theory.

Finally, because physically and mathematically, the universe is not four-dimensional, the idea that "…for any compact simple gauge group G, a non-trivial quantum Yang–Mills theory must exist on $\mathbb{R}^4$ and have a mass gap $\Delta > 0$" becomes implausible. Therefore, the original proof goal cited in p. 390 becomes the wrong mathematical and physical goal to achieve.

The only pertinent point to make here is that because of the $\nabla \cdot B \neq 0$ of the Maxwell equation, there can exist a quantum Yang–Mills theory according to CFLE theory.

It is only in the CFLE theory that we can find the existence of a quantum Yang–Mills theory and with a mass gap$\Delta > 0$.

14.3 Solving the Semi-empirical Mass Formula Problem

Physics is one of the scientific fields that always holds a guiding principle, namely, "*Physics studies only phenomena, quantities, propositions, and theories that can be observed, measured, calculated, and experimentally verified and repeated*." Therefore, physicists can discriminate between problems that are knowable and unknowable, verifiable and unverifiable, deferred and imminent, excepted and comprised, and calculable and incalculable. Thus, physics as a science should be one of the most believable on planet Earth with the acquired knowledge being the most believable too.

Unfortunately, current physicists do not keep this important guiding principle and do not follow the important discriminations. Therefore, part of modern physics has become mathematical Meta physics, which is even more dangerous than sophistry.

One such field that falls into this category is none other than high-dimensional theories about super-high energy. The assertion about extra-high dimensions is that these are curled up into very small areas under $\sim 10^{-35}$ m, corresponding to $\sim 10^{28}$ eV. However, the highest possible energy currently attainable in the laboratory is only $\sim 10^{14}$ eV. Furthermore, this theory cannot predict any phenomena of low energy state.

Already, 50 years have passed since scientists made this assertion, and they still have not produced any physical results that we can experimentally verify. Instead, supporters of this high-dimensional theory use new mathematics, the so-called topology, homotopy, cohomology, Calabi–Yau spaces, Riemann surface, and moduli spaces, to make their assertion look useful, noble, authoritative, and omnipotent. It is even claimed by one corner of the physics community that this is the Theory of Everything that will soon see the end of physics. However, this theory cannot even explain the problem of the semi-empirical mass formula that was first formulated in 1935, despite that the physical basis of this problem is very simple, and surprisingly holds the same problem about protons and neutrons as Yang–Mills theory (where they sought to make a local symmetry out of the global symmetry of isospin invariance from protons and neutrons). In fact, to this day, an international conference is held every year, dedicated to solving this problem.

Therefore, I find it inconceivable that there are physicists that can excuse this theory, given its unreality, incalculability, and unified impossibility. Given that Physics is a science based on calculable facts and data, how could we be expected to believe in and wait for the proof of a Theory of Everything that to this day is still unsolvable, and with the energy of 10^{28} eV still unattainable experimentally?

CFLE theory is in striking contrast to high-dimensional theory, because CFLE theory can explain easily about the problem of the semi-empirical mass formula (SEMF). The SEMF or Bethe–Weissäcker formula is used to approximate the mass and various other properties of an atomic nucleus. It was first formulated in 1935 by German physicist

Carl Friedrich Von Weissäcker, and although refinements have been made to the coefficient over the years, the structure of the formula remains the same to this day. The SEMF gives a good approximation for atomic masses and several other effects, but contradictions appear between calculations and measurements in the asymmetric term.

The liquid drop model in nuclear physic treats the nucleus as a drop of incompressible nuclear fluid. It was first proposed by George Gamow. This fluid is made of nucleons (protons and neutrons) that are held together by strong nuclear force. This is a crude model that helps to explain the spherical shape of most nuclei, as well predict the binding energy of the nucleus. Mathematical analysis of the theory gives an equation that predicts the binding energy of a nucleus in terms of the numbers of protons and neutrons it contains. This equation has five terms on its right-hand side that correspond to the cohesive binding of all the nucleons by a strong nuclear force, the electrostatic mutual repulsion of the protons, a surface energy term, an asymmetric term (derivable from the protons and neutrons occupying independent quantum momentum states), and a pairing term.

The mass of an atomic nucleus is given by

$$m = Zm_p + Nm_n - \frac{E_b}{C^2} \qquad 14\text{-}3\text{-}1$$

where m_p and m_n are the rest mass of a proton and a neutron, respectively, and E_b is the binding energy of the nucleus. The semi-empirical mass formula gives the binding energy as follows:

$$E_b = a_V A - a_S A^{\frac{2}{3}} - a_C \frac{Z(Z-1)}{A^{\frac{1}{3}}} - a_A \frac{(A-2Z)^2}{A} + \delta(A, Z) \qquad 14\text{-}3\text{-}2$$

Each of the term in this formula has a theoretical basis.

- $a_V A$ is called a volume term. The expected value of a_V in this model is $E_b - \frac{3}{5}\epsilon_F \sim 17$ MeV, which is not far from the measured value. ϵ_F is the Fermi energy, which is estimated to be 38 MeV.
- $a_V A^{\frac{2}{3}}$ is known as the surface term, and does not conflict with the measured value.
- $a_C \frac{Z(Z-1)}{A^{\frac{1}{3}}}$ is called the coulomb term, where a_C is an approximate theoretical value at 0.691 MeV, not far from the measured value.

- $\delta(A, Z)$ is called the pairing term, also known as the pairwise term; it also does not conflict with the measured value.

Calculating the coefficients given in the book *Atomic Masses of Nuclides*, by A. H. Wapstra (Springer, 1958) gives

a_V = 14.1, a_S = 13, a_C = 0.595, a_P= n/a, δ (even–even) = –33.5,
δ (odd–odd) = +33.5, δ (even–odd) = 0, a_A = 19 14-3-3

The problematic term $a_A \frac{(A-2Z)^2}{A}$ is known as the asymmetric term.

Note that as $A = N + Z$, the parenthesized expression can be rewritten as $(N - Z)$. The form $(A - 2Z)$ is used to keep the dependence on A explicit, which is important for a number of uses of the formula.

The theoretical justification for this term is more complex. The Pauli Exclusion Principle states that no two fermions can occupy exactly the same quantum state in an atom. At a given energy level, there are only finitely many quantum states available for particles. Therefore, as more particles are “added” to a nucleus, such particles must occupy higher energy levels, thereby increasing the total energy of the nucleus. This effect is not based on any of the fundamental forces (gravitational, electromagnetic, etc.), only the Pauli Exclusion Principle. Protons and neutrons can be thought of as occupying different “pools” of quantum states. Given, for example, a condition where there are significantly more neutrons than protons in a nucleus, some of the neutrons will be higher in energy than the available states in the proton pool. If particles from the neutron pool could be moved to the proton pool, by changing some neutrons into protons, the energy could be decreased. In other words, the imbalance between the number of protons and neutrons causes the energy to be higher than it needs to be, for a given number of nucleons. This is the basis for the asymmetry term. The actual form of the asymmetry term can again be derived by modeling the nucleus as a Fermi ball of proton and neutrons, with total kinetic energy

$$E_k = \frac{3}{5}(N_p \epsilon_{F_p} + N_n \epsilon_{F_n}) \qquad \text{14-3-4}$$

where N_p and N_n are the number of protons and neutrons, respectively, and ϵ_{F_p} and ϵ_{F_n} are their respective Fermi energies. Since the Fermi energies are proportional to $N_p^{\frac{2}{3}}$ and $N_n^{\frac{2}{3}}$, one gets

E_k= C ($N_p^{\frac{5}{3}}$+$N_n^{\frac{5}{3}}$) for some constant C

The leading expansion in difference of $N_n - N_p$is then

$$E_k = \frac{C}{2^{\frac{2}{3}}}(N_p + N_n)^{\frac{5}{3}} + \frac{5}{9}\frac{(N_n - N_p)^2}{(N_p + N_n)^{\frac{1}{3}}} + \text{O}\left((N_n - N_p)^2\right) \quad 14\text{-}3\text{-}5$$

At the 0th order expansion, the kinetic energy is just the Fermi energy

$\epsilon_F \ \equiv \epsilon_{F_p} = \epsilon_{F_n}$multiplied by $\frac{3}{5}(N_p + N_n)^{\frac{2}{3}}$.

Thus, we get

$$E_k = \frac{3}{5}\epsilon_F \ (N_p + N_n)^{\frac{2}{3}} + \frac{1}{3}\epsilon_F \ \frac{(N_n - N_p)^2}{(N_p + N_n)} + \text{O}\left((N_n - N_p)^4\right)$$

$$= \frac{3}{5}\epsilon_F \ A^{\frac{2}{3}} + \frac{1}{3} \quad 14\text{-}3\text{-}6$$

The first term contributes to the volume term in the semi-empirical mass formula, and the second term is minus the asymmetry term

Calculating the value of a_A from the equation above gives 19 MeV. But the measured value is 38MeV. This discrepancy between calculated and measured values has never been explained 77 years long by any theory, even the so-called Theory of Everything. But CFLE theory can explain easily about this age-old discrepancy.

According to CFLE theory, the binding force of protons and neutrons is a strong force. Therefore, the mass difference between the proton and neutron is

$R = m_p : m_n$= 938.272046 MeV: 939.565378MeV = 1:1.001378

But most outer surrounding particles of the two nucleons and their electric charge are very different. One is the kaon K and the other is the muon μ.

According to CFLE theory, the force line curve of the kaon is g = 5.658 and that of the muon is g = 3.773. The difference is

$$d = \frac{5.658}{-3.772} = -1.5 \quad 14\text{-}3\text{-}7$$

The quark model and experimental value by QED is

$d = \frac{\mu_n}{\mu_p} = -0.68497945 \pm 0.00000058$ 14-3-8

$-\frac{1}{d} = 1.45989781$ 14-3-9

However, effect of asymmetric term is not based on any of the fundamental forces (gravitational, electromagnetic, weak, etc.), only the Pauli Exclusion Principle, must be used correspondence number C_c from accelerating Universe (cf.§5,§24,§TB25)

$C_c = 1.5$ 14-3-10

Because the Pauli term is energy term by the term of

$t = a_A \frac{(N-Z)^2}{A}$ 14-3-11

this difference should be squared.

This means that the mass of the proton and the neutron is increased according to mass number A = 1, but the Pauli energy increase of 1 interval between every quantum state is not $(1)^2$, so to speak but $(1.5)^2$ from the curve of force lines instead of a curve of space.

Hence,

$d^2 = (1.460)^2$

$= 2.132$ 14-3-12

Because the gravitational permittivity difference of air by the force line curvature difference of g_d = 1.5 is

Q = (0.016774) (1.5) = 0.025161, x = 1.025161, x^2 = 1.050955

The nett difference is

$d^2 = \frac{2.132}{1.051} = 2.029$ 14-3-13

Because of the gravitational permittivity of air by x = 1.016774, this observed value is

$$d^2 = \frac{2.029}{1.017} = 1.995 \quad 14\text{-}3\text{-}14$$

Therefore, the expected experimental value of Fermi energy from the asymmetry term by CFLE theory is

$$\epsilon_F = (19 \text{ MeV})\ (1.995)$$

$$= 37.905 \text{ MeV} \approx 38 \text{ MeV} \quad 14\text{-}3\text{-}15$$

The measured energy value is

$$\epsilon_F = 38 \text{ MeV} \quad 14\text{-}3\text{-}16$$

Thus, here we find that CFLE theory explains quite well, both qualitatively and quantitatively, the age-old discrepancy from the semi-empirical mass formula.

Conclusion: universe is not 4 dimensional and space is not curved.