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Space, time, light, and grand unified theories(GUTs)

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Main text

Spinity and impelity (Momentum) in universe

Frame dragging force is a newly identified force. Here, I rename this force “spinity” or “spinnism” because this force is generated by spinning mass. I propose here that “rest mass produces gravity, spinning mass produces spinity; rest charge produces Coulomb electric force, spinning and moving charge produces magnetism”. Frame dragging effect was derived by Dr. Lense and Thirring to describe the procession of an orbiting object using general relativity¹. Nobel prize winner Dr. LD Landau also derived orbiting object’s lagrangian around central spinning mass using general relativity². However, these professors didn’t point out that frame dragging is actually a new basic force which has a close relation with gravity. When an object has mass, it will have gravity to attract its parts to the center. In order to overcome this continuously centripetal force, the object needs to spin to produce centrifugal force to balance gravity. When the object spins, spinity occurs. I propose to call this new force “spinity” because it is a combination of “spin” meaning origin of this force and “ity” meaning basic force. Frame dragging means a spinning mass can drag nearby space-time to rotate around the mass, so it is actually a force which can cause peripheral smaller object to orbit around the central mass according to the basic concept of general relativity. Below is the summary of Professor Landau’s derivation from general relativity:

$$\text{Vector } g = \left(\frac{2G}{c^3}\right) \frac{Jx r'}{r^2}$$

(J:central mass angular momentum ,r'=unit vector, vector g direction=Jxr', vector g is spinity field)

Lagrangian

$$L = -mc * \frac{ds}{dt} = L_0 + L'$$

$$L' = mc * g * V = \left(\frac{2G}{c^2}\right) \frac{mJ}{r^3} * V * r$$

$$V = r * \omega$$

Thus,

$$L' = \left(\frac{2G}{c^2}\right) \frac{mJ\omega}{r}$$

(W= angular velocity of peripheral orbiting mass)

$$L'=F*r$$

Thus, spinity

$$F = \left(\frac{2G}{c^2}\right) \frac{mJxr' * \omega}{r^2} = \left(\frac{2G}{c^2}\right) \frac{mJ * V}{r^3} = \frac{SJ * j}{r^4}$$

(S=2G/c²=spinity constant, J=central mass spin angular momentum, j=peripheral mass orbiting angular momentum, r=the distance between central mass and peripheral mass, r' is unit vector, force direction=vector direction=field direction, the first equation means spinity is also an inverse square law(in N dimensional space, force /intensity is inverse proportional to N-1), the V is scalar speed not a vector here, angular speed ω is also a scalar quantity)

Considering the angle θ between orbiting object and the equator plane of central spinning mass, we should use ωcosθ to replace ω:

How do I know this formula is correct? We can actually confirm it by calculating the moon's moving away from our earth. Our moon is moving away from our earth about 3.8cm each year by using accurate laser measurement. Current tidal force theory cannot calculate the 3.8cm correctly. I think moon's moving away from earth is due to the effect of earth's spinity. Because of earth's spinity on moon, moon is accelerating in its orbiting and is moving away finally. We can use the following values:(S=2G/c²=1.48*10⁻²⁷, Earth mass=5.9736*10²⁴kg, Earth radius=6378km, Earth spinning angular velocity=π/43200(rad/sec), Moon orbiting period=27.5day, Angle θ=20 degree(cosθ= 0.94), Moon's distance from Earth is 384399km). After we get the acceleration a, we can calculate the moving distance by using S'=1/2at²(t=31536000sec=1 year). Because circumference and radius has a relation

$(S' = 2\pi * r')$, so $r' = S' / 2\pi$. If the earth's spin angular momentum is actually rmv (derivation in the later chapter), then we get the new value 3.3cm which is very close to observed 3.8cm. Thus, the spinity formula is correct.

$$GMm/r^2 = mrw^2,$$

w = orbital angular velocity of the smaller object

$$SJmW/r^2 = ma$$

The above formula doesn't disobey Kepler's third law of planetary motion: $r^3/T^2 = \text{constant}$. Centripetal gravity balances centrifugal force due to planetary orbiting. It is because spinity is not providing centripetal force, but it provides force to maintain planets in the orbit. Spinity can solve many phenomenon observed in the universe. Spinity can explain the co-moving structure of spiral galaxies. It can well explain the ring formation in the rotating plane of huge planets in solar system such as Saturn or Jupiter. It can explain why the nine planets in our solar system are surrounding the Sun in the same direction and same plane. It can explain why the satellites in our solar system are surrounding the planets in the same direction and same plane except Triton of Neptune. Uranus has special characteristics with its 90° degree axis tilt. And, its ring and satellites are still rotating in Uranus's equator. It has been postulated that an asteroid or comet hit Uranus and caused its axis tilt. Spinity can bring Uranus's ring and satellites to its new equator plane. Gravity cannot explain the phenomenon. In addition, angular velocity W is important due to the observation that small object orbital rotation is decreased when its orbital rotation angular velocity is greater than the angular velocity of the spinning central object. For example, the satellite-Phobos of Mars decelerates about 1.8m per century.

Nebula theory is the dominant theory of solar system formation. However, it faces a difficulty that Sun has only 2% angular momentum of the total solar system and Saturn and Jupiter have the greatest angular momentum in the solar system. Spinity can cause the angular momentum transfer from Sun to planets surrounding it. The Kepler's second law points out the conservation of angular momentum in the solar system, so our Sun rotates in a slow spin velocity and its spinity can be much less than that during the initial formation of solar system. Gravity always attracts smaller objects toward the center and it cannot explain the rotation behavior around central object if only gravity exists. Spinity can explain the initial force causing the planets rotating around the Sun. After the spinity decreases to be much less than gravity, planets can still rotate around the Sun due to inertia. Because the current spinity generated by sun is really small, the second law of Kepler planetary movement is

effective in our solar system. And, gravity can prevent the planets from escaping the solar system. However, the whole planetary movement equation should be:

$$GMm/r^2 + SImW/r^2 = mrw^2 = ma$$

We can see this equation is an elliptical formula which matches our solar system. If we want to have a stable orbit movement and not a simple perfect circle, inverse square law is one of the only two possibilities. (Bertrand theorem $F(r) = -K/r^{3-\beta^2}$, $\beta = 1$ or 2 only). Thus, the planet movement in our solar system is following an elliptical path. However, since the spinity induced by sun is small, the planet movement path in our solar system is nearly a circle.

In addition, spinity can explain why protoplanetary disk can be formed. Once the protostar like sun is formed and it started to spin to counteract inward gravity. The spinity of the protostar can cause the other interspace gas and rocks to rotate around it. Thus, a protoplanetary disk is formed. Then, planets are formed in the disk.

Spinity can explain why huge planets have planet rings in their equator planes such as Saturn, Jupiter, Uranus, and Neptune. Planet rings cannot be explained by gravity. Spinity can help to explain Mercury procession, Venus precession, Earth procession, and artificial satellite procession. Spinity can explain why most planets in solar system spin in the same direction as our Sun. When Sun and one certain Planet spin in the same direction, spinity from Sun and spinity from the planet is synergic. The net spinity will cause the planet to rotate around the sun. When Sun and one certain planet spin in the opposite direction, spinity from Sun and spinity from the planet is subtractive. Thus, the planets' orbiting around our Sun needs to overcome the spinity provided by the planet itself and it will take more energy to do that. Thus, most planets except Venus spin in the same direction as our Sun. Because of spinity, the linear velocity of central spinning mass and peripheral orbiting mass will tend to be the same finally. Spinity is actually the frame-dragging effect caused by spacetime dragging due to central spin mass. This is the reason why spiral galaxy peripheral rotation velocity is equal to its central core velocity. Spinity can well explain many phenomenon in our home-Earth. Spinity can explain why earth's spinning velocity is decreasing because earth uses spinity to transmit angular momentum to our moon. Spinity can explain why retrograde satellites are more difficult to make than prograde satellites because retrograde satellites need to overcome the spinity of Earth. Flight from America to Japan takes longer time than flight from Japan to America, because retrograde flight needs to overcome our Earth's spinity. Some believe that this is due to an air flow called "Jet stream", a constant equatorial west-to-east flow. But, the

formation of jet stream is actually due to earth's spinity. Spinity can explain why free falling object tends to move to east because earth has a west-to-east spinity.

Once Newton was asked that "why earth can orbit around the sun?" If there is only gravity, then all the planets will fall into the sun. Newton didn't know the answer. He said this is the God's first pushing force to let planets move around the sun. If spinity is correct, then it can perfectly explain planetary movement. Spinity will let the planets start to orbit the sun. Besides, it can accelerate the planets in the orbit to increase their orbiting velocity and subsequent centrifugal force. Once planet's centrifugal force is strong enough to balance sun's gravity, then the planet can maintain a homogenous status with a constant moving velocity. Spinnism is an absolute result of general relativity. Thus, many phenomenons such as Mercury precession can be explained. Spinity can also explain the reason of flyby satellites anomaly such as pioneer anomaly because spinity provides force to accelerate these spacecrafts which use orbiting as moving forces.

The second part of this section is to discuss linear frame dragging effect. This effect is due to the linear momentum, and I call this new force: Impelity or Impulsivity.

(Derivation is in latter section)The impelity field formula is:

$$I = \frac{Smv}{r} = \frac{SP}{r}$$

The constant S is still spinity-impelity constant ($2G/c^2$). Impelity field direction is the same as linear velocity direction. This means when an object is moving in a constant momentum P, it will generate a linear frame dragging effect to let its nearby spacetime to move along with the object. If there is a smaller object nearby with a momentum p, this small object will suffer from an inbetween force to let it move along. The force is called impelity. The name impelity is derived from the term: impulse which is the linear momentum change.

$$F_i = \frac{SMVmv}{r^2} = \frac{SPp}{r^2} = \frac{SPm\omega}{r}$$

Linear frame dragging is also a determinative effect of general relativity and was predicted by Einstein. Here, I first propose its definite formula. If we view the small object's linear moving as never-endingly moving around the bigger object, the v is $r\omega$. We need to transform speed into $r*\omega$ (omega is pseudoscalar) to maintain the impelity field direction. However, the linear frame dragging effect is a very fundamental effect as rotatory frame-dragging effect. It can be observed in our daily life. When you drive a small car in the superhighway, a huge truck drives and passes in your left side and you will feel a force to attract your small car. This will make your

small car feel unstable. This is possible impelity.

Another example is the airplane's bird attack. Birds are flying very slowly with their tiny mass. However, bird attack usually causes a huge damage to airplane. It is because airplane has very high velocity and high momentum. Thus, the combined impelity between the bird and the airplane is very huge. If you throw a stone to a high speed train or high speed car in the super highway, it can also cause a severe damage. Another example is moon's orbiting. The moon is orbiting earth, but earth is also orbiting sun. When the earth is orbiting sun with mv momentum, it will let the moon within nearby spacetime also get impelity. Thus, moon will keep on accompanying our earth. The maximal impelity field from earth is SMV/r , so the moon will acquire the same maximal linear velocity V from earth's orbiting velocity V causing spacetime moving with linear velocity V . This phenomenon can be seen in geosynchronous satellites. If there is no impelity, the geosynchronous satellites will easily lose. However, the geosynchronous satellites are the most popular and stable satellites. Moon will move along with earth is not simply due to sun's spinity, earth's spinity, sun's gravity, or moon's centrifugal force. These effects are smaller than impelity from earth, and only impelity can explain why moon's linear velocity is the same as earth's orbiting velocity. These phenomenon all explain that there is impelity.

This is impelity.

If we combine spinity and impelity together, we can call it momentity. The name is derived from angular "momentum" and linear "momentum". This means that momentum can generate force. This is simply due to the special relativity effect of moving mass. The field direction of momentity is its vector direction.

Gravitospinnism Maxwell equations

Gravitomomentism has the same characteristics as electromagnetism. In classical electromagnetism, Maxwell equations play the central roles. Maxwell equations clearly point out the relationships between electric field and magnetic field. I will check if gravity field and spinity field also have the same Maxwell-like equations. First of all, we need to define what spinity field is:

Spinity field

$$s = \frac{S \times r'}{r^2}$$

The direction of spinity field is the same as angular momentum direction of nearby huge mass.

Spinity force

$$F = \frac{S \times m \omega}{r^2} = m s \omega$$

By the definition, we can have a Lorentz force-like formula:

$$F = m(g + 1/2 s \omega)$$

From the scalar potential E and vector potential A, we can give the Lorentz force-like formula as:

$$F = m \left(-\nabla\phi - \frac{dA}{dt} + V * \text{curl}A \right)$$

(V=orbit linear velocity of mass m)

Comparing the two formulas, we can get:

$$g = -\nabla\phi - \frac{dA}{dt}$$

$$\frac{1}{2} * s * \omega = V * \text{curl}A$$

Thus,

$$s = 2r * \text{curl}A$$

We can use these two definitions to derive the possible gravitomomentism or gravitospinnism Maxwell-like equations:

First, gravity Gauss law:

$$\text{Div } g = -4\pi G\rho$$

(G=gravity constant, p=mass density)

This first equation has been derived previously by many researchers. Detail deduction is not provided here.

Second, momentiity Gauss law:

$$\text{Div } s = 0$$

The reason for magnetism gauss law is zero (Div B=0) is because there is no magnetic monopole. However, the reason for momentiity gauss law is zero (Div s=0) is because

there is no momentity momopole and spinity is merely a moving effect of mass.

We can also deduct is as below:

$$\text{Div } s = \text{Div}(2r * \text{curl}A) = 0$$

Third, gravitmomentity Faraday's law:

$$\text{Curl } g = \text{Curl} \left(-\nabla\phi - \frac{dA}{dt} \right) = -d \left(\frac{\text{Curl}A}{dt} \right) = -d \left(\frac{S/2r}{dt} \right) = \frac{1}{2dt} \left(\frac{ds * r - dr * s}{r^2} \right)$$

Fourth, gravitomentity Ampere's law:

$$\text{Curl } s' = -uj + \left(\frac{2}{c^2} \right) \left(\frac{dg}{dt} \right) = \frac{r\nabla_{xs} - \nabla_{rxs}}{r^2}$$

$$\text{Curl } s = r * \left[-uj + \left(\frac{2}{c^2} \right) \left(\frac{dg}{dt} \right) \right] + \frac{\nabla_{rxs}}{r}$$

(let $S=u/4\pi$, j =mass current density, $H*u=s'=SJ/r^3$, $\epsilon=2/uc^2$)

It is based on

$$\nabla * (\nabla_{xH}) = -\nabla J + \frac{d\rho}{dt}$$

$$\nabla * (\nabla_{XH}) = \nabla * \left(-J + \frac{dD}{dt} \right)$$

We can also apply this to the gravity-impelity relationship. From the above deduction, we can there is no Maxwell-like equations in gravitomentitism. At least, there is no beautiful linear form Maxwell-like equation. Thus, the direct linear relation of spinity and gravity is not likely.

Thus, the linear gravitomentitism Maxell equations are:

$$F=m(g+1/2s\omega)$$

$$\text{Div } g=-4\pi G\rho$$

$$\text{Div } s=0$$

About gravitational wave

Maxwell used the propagation of electric field and magnetic field to derive the electromagnetic wave: light. Light is ELeetric Wave Crossing MAgnetism. Since there is also interaction between gravity field and impelity field, I am curious if there is

gravitomomentum wave. Einstein was also curious if there is gravity wave. Here, I will discuss this issue here.

Gravity field is:

$$\mathbf{g} = \frac{GM}{r^2} \mathbf{r}'$$

Spinity field is:

$$\mathbf{s} = \frac{S\mathbf{J}}{r^2} \mathbf{x}\mathbf{r}'$$

However, gravitomomentum Maxwell-like equations should be rewritten for free space since there is no source of mass. These equations become:

$$\begin{aligned} \text{Div } \mathbf{g} &= \nabla \cdot \mathbf{g} = 0 \\ \text{Curl } \mathbf{g} &= \nabla \times \mathbf{g} = \frac{1}{2dt} \left(\frac{d\mathbf{s} \cdot \mathbf{r} - d\mathbf{r} \cdot \mathbf{s}}{r^2} \right) \\ \text{Div } \mathbf{s} &= \nabla \cdot \mathbf{s} = 0 \\ \text{Curl } \mathbf{s} &= \nabla \times \mathbf{s} = \mathbf{r} \cdot \left[-\mathbf{u}_j + \left(\frac{2}{c^2} \right) \left(\frac{d\mathbf{g}}{dt} \right) \right] + \frac{\nabla \times \mathbf{s}}{r} \end{aligned}$$

Thus, we can derive the gravitomomentum wave from the free space Maxwell-like equations:

$$\begin{aligned} \nabla \times (\nabla \times \mathbf{A}) &= \nabla (\nabla \cdot \mathbf{A}) - \nabla^2 \mathbf{A} \\ \nabla \times (\nabla \times \mathbf{g}) &= \nabla \times \left(\frac{1}{2dt} \left(\frac{d\mathbf{s} \cdot \mathbf{r} - d\mathbf{r} \cdot \mathbf{s}}{r^2} \right) \right) \\ \nabla \times (\nabla \times \mathbf{g}) &= \nabla (\nabla \cdot \mathbf{g}) - \nabla^2 \mathbf{g} = -\nabla^2 \mathbf{g} \end{aligned}$$

We know wave equation is:

$$\nabla^2 f = \left(\frac{1}{c^2} \right) \left(\frac{d^2 f}{dt^2} \right)$$

The electromagnetic wave equations are:

$$\begin{aligned} \nabla^2 \mathbf{E} &= \left(\frac{1}{c^2} \right) \left(\frac{d^2 \mathbf{E}}{dt^2} \right) \\ \nabla^2 \mathbf{B} &= \left(\frac{1}{c^2} \right) \left(\frac{d^2 \mathbf{B}}{dt^2} \right) \end{aligned}$$

Since the gravitomomentum equations are not linear, we cannot deduct light wave equation from these non-linear equations. It seems that there is no gravitoimplicity

wave saying that gravity/impelity field is amplitude. In addition, we need to consider the energy density of the possible gravity wave. If there is gravity wave propagating in spacetime without any medium. The gravity wave will need a transmission particle called graviton. Graviton which is proposed as a spin-2 particle is never observed in nature. This is based on the second rank of energy-momentum tensor. However, electromagnetism is closely related to photon which is spin-1 particle. It is due to electromagnetic four current is first rank tensor. Here, I propose that gravity wave is actually light, too. The photon is spin-1 particle because the four energy-momentum tensor (E, P_xC, P_yC, P_zC) is also a first rank tensor. It is misled that graviton is spin2 boson because the 4x4 energy-momentum curvature matrix. We should be aware that electromagnetic faraday torsion tensor is also 4x4 matrix. The four current or four energy-momentum tensor is actually the source of electromagnetism or gravitomomentism. The 4x4 matrix is actually the effect of force on spacetime. We should not mislead. Besides, massless photon can mediate electromagnetism as well as gravity in infinite range.

Gravity wave means that an acceleration in spacetime will emit radiation wave propagating in spacetime. We know the Unruh-Hawking relation: $T=ah'/2\pi ck$. Thus, acceleration a directly causes temperature T . The temperature T will cause radiation KT^4 (Stefan's law). Thus, it fulfills the definition of gravity wave that an acceleration causes a radiation wave. Thus, light itself is also gravity wave. It can explain why gravity is transmitted in lightspeed.

Based on the book: Gravitation, the wave equation of gravitational wave is actually indistinguishable from the wave equation of electromagnetic wave. The wave equation of gravitational wave is:

$$L'' + (\beta')^2 L = 0$$

The wave equation of electromagnetic wave is:

$$L'' + (4\pi T_{uu})L = 0$$

Besides,

$$\left[\beta'^2 / 4\pi \right] = [T_{uu}] = \text{constant}$$

The two wave equations are indistinguishable! That means the two waves are the same.

It is worth noting that gravity is caused by mass energy mc^2 . Thus, the energy causes spacetime curvature. Light is also an energy. Thus, light has effective mass. The momentum of photon is $E/c=hf/c$. Thus, the frequency of photon is closely related to

mass. In addition, the amplitude of photon is closely related to charge. I will discuss this in the later chapter.

Light is a plane wave, and it can be expressed as:

$$A(x, t) = A_0 \cos(\omega t - kx)$$

We differential the above equation by t and get:

$$V(x, t) = -A_0 \omega \sin(\omega t - kx)$$

We differential it again by t and get:

$$a(x, t) = -A_0 \omega^2 \cos(\omega t - kx)$$

If the wave is moving a full wavelength 2π , the above equation can reduce to:

$$a(x, t) = -A_0 \omega^2$$

This means the light wave is a simple harmonic oscillation wave. Since acceleration can be equal to gravity field, we can introduce the gravity field formula from gravitational energy density to see if there is a constant maximal amplitude A_0 to see if light is gravity wave.

Gravity wave and electromagnetic wave are both light(photon). The definition of gravity wave is that it can carry gravity field. Thus, light can also carry gravity field.

We know the gravity plus momentum energy density is:

$$E = \frac{-g^2}{8\pi G} * 2$$

If a light has energy $E=hf$, its energy density is:

$$E = \frac{hf/r}{4\pi r^2}$$

(r is photon radius= $\lambda/2\pi$, and $r*\omega=c$)

We combine the above two formula, and get.

$$g = -\sqrt{\frac{h'G}{c^3}} \omega^2$$

Since the first term of the right side is planck length, we can re-write the formula as:

$$g = -l_p \omega^2$$

The gravity field carried by photon is in direct proportion to the square of its angular frequency. And, the displacement of oscillation is a constant called planck length.

When a light is moving through spacetime, it will cause the smallest unit of spacetime(the medium) to oscillate in angular frequency ω . This oscillation causes acceleration which is gravity field. Thus, light does have gravity field. It can explain why light can be attracted by a huge mass such as black hole or star or super moon because of mutual gravity force.

We also know that spinity/impelity field $s=2g/\omega$. Thus, light can also carry spinity/impelity field as:

$$s = -2l_p * \omega = 2v$$

$$X = l_p$$

Thus, the spinity/impelity carried by photon is in direct proportion to its angular frequency with a constant: planck length. Thus, a photon can carry four fields including electric field, magnetic field, gravity field, and momentity(spinity/impelity) field.

In addition, the space has a smallest unit. It should be quantized. In a famous Zeno paradox: if a turtle is 100 meters ahead of Achilles. When Achilles moves 100 meter, and the turtle can only moves 10 meters. But, when Achilles moves 100 meter, the turtle again moves 10 meters. When Achilles moves 10 meters again, the turtle again moves 1 meter. Thus, Achilles never catches the turtle. This didn't really happen in real world. The underlying principle of Zeno paradox is spacetime should be continuity which can be divided infinitely. However, since Zeno paradox never happens, it means that our space should be discontinuity. Its smallest length(unit length) is planck length. We can view spacetime as build by small boxes(pixel or grid). But, in large scale such as galaxy, the spacetime will appear smooth and continuity to allow the validity of general relativity. Based on the above light-gravity formula, we know planck length is the smallest oscillation unit. If time or space can be divided infinitely, then light can be stopped or variable which disobey constant lightspeed. In addition, we know uncertainty principle is $E t \geq 1/2h'$ and $P x \geq 1/2h'$. If the time t or space x is infinite small, then the energy or momentum will be infinite large. This disobeys physic principles. Thus, spacetime should be quantized. Since planck length is the smallest unit of spacetime, we cannot use light pressure or Casimir force to calculate the zero point energy for this spacetime unit. Even in absolute zero, this unit has smallest energy $E=1/2h'w$ which allows the unit to oscillate in angular frequency w . This solves why current calculation for zero point energy from Casimir effect is much larger than experimental observations. Since oscillation frequency is in inverse proportion to time, the origin of time can be due to space (planck volume) oscillation. The derivation of minimal possible planck length is from the inequality of Schwartzchild radius and fermion radius in the chapter: beginning of universe.

What is time? It is still a confusing question. Einstein put time as the fourth dimension of the united spacetime. However, we still cannot understand what the

actual fourth dimension of united spacetime is. Based on the above theory, time is actually the inverse of oscillation frequency of planck volume. The simple harmonic oscillation of the unit space decides the physical characteristics of time. Because time is due to space oscillation, time should be put as the fourth dimension of spacetime. In the early universe with maximal possible planck frequency from planck energy, the unit space oscillation is very frequent. The frequency is largest and the time is the shortest. The shortest time period is called planck time in the beginning epoch. It is due to the the maximal photon energy passing the small early universe space with the huge photon frequency. As the universe expand, the universe background temperature decreases with the decreasing photon frequency. Thus, the time period which is inverse to frequency is prolonged. Thus, time is depended by light. When the total light density in our universe decreases to near absolute temperature zero, the time will prolong to near maximal which will be decided only by the baseline oscillation frequency from the very small zero point energy. Thus, if we know the zero point frequency, we can know the maximal time period of our final universe. Time is not a psychological or phantom phenomenon. It is due to the unit space vibration surrounding of us. This decided the metabolism rate of bio-organism. We cannot directly observe the unit space oscillation frequency, so we use rhythmic watch, orbiting moon, or orbiting earth to link the periodic oscillation to the actual universe time: unit space oscillation. However, the earth orbiting sun may not totally reflect the prolonging unit space oscillation. Thus, the life expectancy counting as earth years will be prolonged as our real universe unit space oscillation time prolonged. The passing photon frequency causing unit space oscillation decides time. If we can travel as lighspeed, we won't be able to detect the time/frequency change of surrounding space due to the passing light (time cease). Thus, it is the reason of Einstein's time dilation phenomenon derived from special relativity.

Origin of inertia

We can examine the relationship between universal gravitation and universal momentism. I think gravity and momentism should be called gravitomomentism like electromagnetism. I propose: rest mass causes gravity, moving mass causes momentism; rest charge causes electricity, moving charge causes magnetism. Since magnetism is the effect of moving charge, I don't think there is magnetic monopole. We can examine these four fundamental force formulas:

Electricity:

$$F_e = \frac{KQq}{r^2} = \left(\frac{\mu}{4\pi}\right) \frac{qcQc}{r^2}$$

Magnetism:

$$F_m = qvB = qv * \left(\frac{\mu}{4\pi}\right) \frac{QV}{r^2}$$

Spinnism:

$$F_s = \frac{SJ\omega m}{r^2} = \left(\frac{2G}{c^2}\right) \frac{J\omega m}{r^2}$$

Impellism:

$$F_i = \frac{SPmv}{r^2} = \left(\frac{2G}{c^2}\right) \frac{Pmv}{r^2}$$

Gravity:

$$F_g = \frac{GMm}{r^2} = \left(\frac{2G}{c^2}\right) \frac{\frac{1}{2}Mc^2 * m}{r^2}$$

Thus, we can see the origin of spinnism is central mass's spin angular momentum.

The origin of impellism is the object's linear momentum. The origin of gravity is central mass's half rest energy $1/2mc^2$. Because of the interaction of gravity and momentism, they should have the same permeability constant like electromagnetism.

We let the spinity-impelity permeability constant is μ_0 :

$$S = \frac{2G}{c^2} = \frac{\mu}{4\pi}$$

Introduce this new constant into above formulas, we can see gravity and spinnism have similar force equations like electricity and magnetism. I assume that half of the rest mass energy is for gravitational energy and another half of the rest mass energy is for rotational (spin) energy. We know the rotational energy is:

$$E = \frac{1}{2}I\omega^2 = \frac{1}{2}J\omega$$

If a spinning sphere such as proton or electron is spinning in lightspeed c and the spin angular momentum is $J=rmv$, then

$$E = \frac{1}{2}J\omega = \frac{1}{2}r\omega mv = \frac{1}{2}mv^2 = \frac{1}{2}mc^2$$

Thus, it fulfils my assumption.

Here, I will deduct why spin angular momentum is rmv for a solid sphere. The definition of angular momentum is $r \times p$. We can treat a solid sphere as a combination of multiple layers of circles. Thus, sphere angular momentum is:

$$\int d(r_i \times p_i) = \int dr \times mv + \int r \times dm v$$

Because the vector direction dr is the same as the vector direction of v in the circle, the first part of the above formula is zero.

$$\int d(r_i \times p_i) = \int r \times dm v = \int r \times m dv + \int r \times v dm$$

Because the vector direction r is the same as the vector direction of dv in any given circle, the first part of the above formula is also zero. There is no cross product.

$$\int d(r_i \times p_i) = \int r \times v dm = R \times V \int dm = R \times MV$$

If particle's spin linear velocity is greater than lightspeed, it will disobey Einstein's special relativity. Thus, lightspeed c is the maximal possible spin linear velocity. Why is there spin? I think this is due to the gravity induced by mass. In nature, quarks, electrons, neutrons, protons, planets, stars, and galactic centers are all spinning. In basic particles, spinning is the result of angular momentum conservation during pair production. In large masses, automatic spin can generate centrifugal force to counterbalance the inward gravity by the mass. It also points out the close relation between gravity and spinnism.

I think spinity constant $S=2G/c^2$ is a more fundamental constant than gravity constant G . And, we let $S=2G/c^2=\mu/4\pi$ and introduce it into Einstein's general relativity:

$$G_{uv} = \frac{8\pi G}{c^4} T_{uv}$$

We get:

$$G_{uv} = \frac{\mu}{c^2} T_{uv}$$

Which is more simple and fundamental!

Newton found a New Force and started a New Time Of Nature. Newton's first law of motion is inertia law: rest mass remains at rest, and moving mass remains at moving in constant speed without extra-force. Galileo first proposed this idea after his observation: Gravity Acceleration Law Induces Landing Equally Objects. We can consider the origin of inertia more deeply. Energy conservation can explain why moving mass remains at moving in constant speed. When there is no extra force, a moving object will keep its velocity as a constant V since there is no acceleration. This object will keep on having constant energy $1/2mv^2$ due to energy conservation. Thus, it will move forever at constant speed V . Then, why rest mass will remains at rest? It will need the concept of general relativity. Inertial mass is equal to gravitational mass. According to Einstein, mass can causes spacetime curvature. It is like when we put an iron ball onto a water bed, there will be a dent in this water bed. This curvature induced by mass can wrap the mass and limit its motion. That is the origin of inertia.

When the object's mass is larger, it will cause more severe spacetime curvature. This curvature will further limit the object's movement. Thus, mass decides inertia. Previous scholars used Mach principle or electromagnetism to explain inertia. Mach principle is mass there, inertia here. He thought a certain mass's inertia is decided by all other objects' gravity in our whole universe. However, every object is moving and changing the mutual distance. If Mach principle is correct, then the inertia will be changeable and not be solely decided by this object's mass. Thus, Mach principle is wrong. Some others used electromagnetism's zero point field to explain inertia. However, charge is charge and mass is mass. Charge causes spacetime vortex which won't limit the charge's movement. Thus, it is wrong to use electromagnetism to explain inertia. I think inertia is decided by the half of rest mass energy: $1/2mc^2$. When a mass is located in spacetime, there is upper half and lower half of this mass. Only the lower half induced by the half of the mass's rest mass energy curves the spacetime and wrap the object. That is why only $1/2mc^2$ counts for gravitational energy.

In addition, since the spin angular momentum is the origin of spinity, the maximal transmission velocity of spinity should be equal to the maximal spin linear velocity of central mass. And, if spinning or linear moving is the origin of magnetism from charge, the maximal transmission velocity of magnetism should be equal to spin linear or linear moving velocity of the charge. Besides, the transmission velocity of gravity and Coulomb's electricity should be lightspeed.

The above explanation explains why rest object will remain at rest. Then, I will explain why moving object will remain moving at a constant speed without external force. We know the impelity field is $i=SP/r$. If an object is moving at constant momentum P, then it will drag nearby spacetime to move along with its impelity field. Thus, the nearby spacetime is also moving forward. If the spacetime is moving forward, the object within it will also move forward. If the object moves forward again, it will again let its nearby spacetime move forward again. It is a positive feedback. Thus, this object will keep on moving at constant momentum. Thus, we say linear momentum is the moving inertia if the object is moving linearly. In the latter paragraph, I also show that there is symmetry between space and momentum. The impelity linear frame-dragging effect is the reason of conservation of momentum. This can also be applied to rotation. If the object is rotating in a constant angular momentum J, then it will generate a spinity field $s=SJ/r^2$. It means it will drag nearby spacetime to rotate along with it. If the nearby spacetime is rotating due to the object's angular momentum, the object within this local spacetime will also rotate. If the object rotates again, it will drag its nearby spacetime to rotate again. It is also a

positive feedback. I also show the symmetry between angular momentum and angle. This is the reason of conservation of angular momentum. The spinity frame-dragging effect is the reason of rotatory inertia. Angular momentum is the rotatory inertia if the object is rotating. Thus, both spinning object and orbiting object will produce rotating frame dragging effect. For example, the Uranus is not only orbiting our sun but also orbiting the orbit of Jupiter. This also makes all eight planets of sun in the same plane. Historically, I can this force spinity. But, rotativity might be a better term for it by definition. Thus, this is why moving object will remain moving at constant velocity. This solves the longtime puzzle of law of inertia.

If the impelity field is SMV/r , then the surrounding spacetime has linear velocity V to move along with the larger momentum object. The impelity will let nearby smaller object to move along with the bigger object until the smaller object has maximal linear velocity V (spacetime's linear velocity). If the smaller object's original linear velocity is larger than impelity field velocity V . The smaller object will decelerate until it matches the spacetime linear velocity V . So does spinity. If the spinity field is SMR/r^2 , the surrounding spacetime will also have a linear rotational velocity V . It will let orbiting smaller object to accelerate or decelerate until it matches spacetime's linear rotational velocity V . When the system reaches equilibrium, the smaller object's velocity v will be equal to the larger object's velocity V . The velocity V is also the transmission velocity of spinity or impelity.

We can see the four velocity is:

$$U = \gamma(c, V_x, V_y, V_z) = \gamma(c, V)$$

And, the four momentum and four current is:

$$P = \gamma(E/c, P_x, P_y, P_z) = \gamma(mc, mV_x, mV_y, mV_z) = \gamma m(c, V)$$

$$J = \gamma \rho(c, V_x, V_y, V_z) = \gamma \rho(c, V)$$

For a rest frame, $\gamma=1$ and $V=0$, so we will get $U=(c,0)$. Thus, we will view the rest mass or rest charge object is moving through spacetime at the speed of light. Thus, the transmission velocity of Coulomb electrostatic force and Newton gravity (gravitostatic force) is lightspeed c . The first component c of $U=(c,V)$ stands for the rest frame velocity. However, in electrodynamics (magnetism) or gravitodynamics (spinity or impelity), the second component V stands for the moving frame velocity. Thus, magnetism, spinity, and impelity are transmitted in velocity V .

We can also look at the four force. The formula is:

$$F = mA = \gamma(f \cdot u/c, f) = \gamma(dE/cdt, dP/dt) = \gamma(d\gamma mc/dt, d\gamma mV/dt)$$

Compared to force formula:

$$F = dP/dt = d \gamma m V / dt$$

We can see in the rest frame, the transmission velocity of force is lightspeed c . This is true for gravity and Coulomb electrostatic force. However, in the moving frame, the transmission velocity of force is V . This is true for momentum and magnetism.

Here, I propose light refraction is closely related to the effect of general relativity. When photon goes through a medium, it deflects due to the mass density of the medium. From general relativity, the deflection angle is $4Gm/rc^2$. In refraction, there is Gladstone-Dale relation $:(n-1)/d=\text{constant}$. n is refractive index, and d is mass density. We know the linear mass density is m/r . In addition, temperature also affects refraction. The effect of temperature on refraction is opposite to the mass. This can be explained by universal lightness which is repulsive dark energy.

Rest mass causes gravity, moving mass causes momentum; rest charge causes electricity, moving charge causes magnetism. Here, I will prove momentum and magnetism are simply the special relativity moving effect of mass and charge respectively. Thus, there is no magnetic monopole.

First, I will derive electromagnetism Lorentz force:

$$\frac{dP^1}{dt} = qU_\beta F^{1\beta} = q(U_0 F^{10} + U_1 F^{11} + U_2 F^{12} + U_3 F^{13})$$

Substituting the components of the covariant electromagnetic tensor F :

$$\frac{dP^1}{dt} = q \left[U_0 \left(\frac{-E_x}{c} \right) + U_2 (B_z) + U_3 (-B_y) \right]$$

Using the component of covariant four velocity yields:

$$\begin{aligned} \frac{dP^1}{dt} &= q\gamma \left[- \left(\frac{-E_x}{c} \right) + V_y B_z + V_z (-B_y) \right] = q\gamma (E_x + V_y B_z - V_z B_y) \\ &= q\gamma [E_x + (V \times B)_x] \end{aligned}$$

Finally, we get Lorentz force:

$$\frac{dP}{dt} = q\gamma (E + v \times B)$$

Based on Dr. French AP's derivation, we can get force transformation between reference $S (x,y,z)$ and reference $S' (x',y',z')$. Reference S includes relative moving charges and reference S' includes relative static charges.

$$\begin{aligned} x &= \gamma(x' + vt') \\ y &= y' \\ z &= z' \\ t &= \gamma \left(t' + \frac{vx'}{c^2} \right) \end{aligned}$$

When charge q1 is moving at V velocity (along x axis) and charge q2 is moving at W velocity and same direction (along x axis), then:

$$W' = \frac{W - V}{1 - \frac{V * W}{c^2}} = \frac{dx'}{dt'}$$

And momentum $P_{y'} = P_y$, then the force between q1 and q2 is F_y . The two charges have the same charge q:

$$F_y = \frac{dP_y}{dt} = \frac{\frac{dP_y}{dt'}}{\frac{dt}{dt'}} = \frac{\frac{dP_{y'}}{dt'}}{\gamma \left(1 + \frac{V dx'}{c^2 dt'}\right)} = \frac{\frac{F_{y'}}{\gamma}}{1 + \frac{V}{c^2} \left(\frac{W - V}{1 - \frac{V * W}{c^2}}\right)} = \gamma F_{y'} \left(1 - \frac{V * W}{c^2}\right)$$

Since $F_{y'} = Kq^2/r^2$, we can compare this result to previous Lorentz equation. We can see the term $V*W/c^2$ arises during the relative movement between the two charges. This is the magnetic force. Thus, we can see magnetic force is merely the special relativity moving effect of charges. Similarly, when we consider two moving mass, we can also get:

$$F_y = \gamma F_{y'} \left(1 - \frac{V * W}{c^2}\right)$$

Here, $F_{y'} = GMm/r^2$. We can also find out that impelity is rised by the special relativity moving effect of two masses. If we use the gravitomonenty Lorentz force by simply using relativistic mass γm and adjusting with factor $1/2(S=2G/c^2)$, we can get $F_y = \gamma m(g+1/2s*\omega)$. Thus, we can get the impelity formula. This is the derivation of impelity force formula. Thus, we can say momentity and magnetism are just the moving effect of mass and charge, respectively.

We can also derive impelity from the formula in the beginning of this book. The vector is:

$$\text{Vector } g = \left(\frac{2G}{c^3}\right) \frac{Jx'r'}{r^2}$$

Considering two objects are moving along linearly in a distance, it can view as a small object is receiving an orbital angular momentum of the larger object. Thus, $J=rmv$.

Then the vector becomes(vector g direction=V):

$$\text{Vector } g = \left(\frac{2G}{c^3}\right) \frac{MV}{r}$$

Then, the Langragian is :

$$L' = mc * g * v = \left(\frac{2G}{c^2}\right) \frac{MVmv}{r} = \frac{SPp}{r}$$

Thus, the impelity force is($L=F*r$):

$$F = \frac{SPp}{r^2}$$

Force direction is equal to vector g direction. Here the smaller object has scalar speed v, and it is not a vector velocity. Impelity force might also be derived! The impelity potential is likely:

$$U = SP * \ln (r)$$

The field of impelity is likely:

$$F_i = \frac{SP}{r}$$

The spinity potential is:

$$U = \frac{SJ}{r}$$

The spinity field is:

$$F_s = \frac{SJxr'}{r^2}$$

Pair production

It is well known that gamma ray can be transformed to electron and positron pairs during head-on collision with the other gamma ray or atom nucleus. During the process, energy should be conserved. Each electron or positron has the same rest mass energy: 511keV, so the total rest mass energy is 1022keV. Thus, the initial one beam gamma ray should be 1022 keV. Or, each gamma ray beam for head-on collision should be 511keV. In photon-nucleus pair production, the energy of gamma ray is 1022keV. In order to fulfill the conservation of energy, the equation is:

$$E = hf = 2mc^2$$

(E=energy, h=planck constant, f=wave frequency, m=rest mass of electron, c=lightspeed, $2mc^2$ =particle+antiparticle rest mass energy)

The above equation matches the experimental observation. However, it is important to point out something is missing during the energy transformation. Each photon has not only frequency but also amplitude which constitutes the EM wave energy density eE^2 . In addition, charged particles have their electrostatic energy. Thus, it is reasonable to postulate that EM wave density eE^2 is transformed to charge electrostatic energy. Only by doing that, total energy is conserved during pair production. Thus, the initial EM wave energy density should be the same as charge

energy density after pair production.

The initial EM wave total energy density is $S = eE^2$ including both magnetic and electric field components. (S=energy density(energy per unit volume), e=electric permeability constant, E=electric field)

EM wave total energy density

$$S = \frac{1}{2} \left(\epsilon E^2 + \frac{B^2}{\mu} \right)$$

$B = E/c$, Thus, total $S = eE^2$

It is worth noting that energy density (J/m^3) is equal to force per unit area (N/m^2) which is used to derive the equation later.

Electron is a small conductive sphere. Its charges should be equally distributed on the surface of sphere. Thus, it is more reasonable to assume the electron should be like a hollow ball. Thus, the electrostatic energy of electron should be:

$$E = \left(\frac{1}{2} \right) \frac{KQ^2}{r}$$

The net force for unit charge on the sphere surface is:

$$F = \left(\frac{1}{2} \right) \frac{KQ^2}{r^2}$$

The electrostatic force of electron is:

$$dF = Edq$$

$$E = \frac{kq}{r^2}$$

$$dF = \frac{kq dq}{r^2}$$

$$F = \left(\frac{1}{2} \right) \frac{kq^2}{r^2} = \left(\frac{1}{2} \right) \left(\frac{\mu}{4\pi} \right) \frac{c^2 q^2}{r^2} = Fe$$

According to Biot-Savart law, the magnetic field is:

$$dB = \frac{\mu}{4\pi} \int \frac{Idl}{r^2}$$

For a spinning electron, the current I is $QV/2\pi r$, and the total length L is $2\pi r$. Thus, the

magnetic field produced by a spinning charge is:

$$B = \left(\frac{\mu}{4\pi}\right) \frac{qv}{r^2}$$

So, the magnetic force of electron is:

$$dF = Bdqv$$

$$B = \left(\frac{\mu}{4\pi}\right) \frac{qv}{r^2}$$

$$dF = \left(\frac{\mu}{4\pi}\right) \frac{qv dqv}{r^2}$$

$$F = \left(\frac{\mu}{4\pi}\right) \frac{q^2 v^2}{r^2}$$

Electron is spinning in lightspeed, then:

$$F = \left(\frac{\mu}{4\pi}\right) \frac{q^2 c^2}{2r^2}$$

$$(v = c = \text{constant})$$

The magnetic energy of a point sphere charge should be:

$$E = \left(\frac{1}{2}\right) \frac{KQ^2}{r}$$

For unit charge, total force is magnetic force plus electrostatic force:

$$\text{Net } F = F_m + F_e = \frac{kq^2}{r^2}$$

Since energy density is equal to the force per unit area, the energy density of the hollow electron sphere should be:

$$S = \left[\frac{KQ^2}{r^2} \right] \div (4\pi r^2)$$

Thus, the initial energy density is equal to aftermath energy density:

$$S = \epsilon E^2 = \left[\frac{KQ^2}{r^2} \right] \div (4\pi r^2)$$

Thus,

$$E^2 = \left(\frac{KQ}{r^2} \right)^2$$

In addition, we can also find out the particle's gravity field and its link to its radiated wave gravity field.

$$S = \frac{g^2}{4\pi G} = \left[\frac{GM^2}{r^2} \right] \div (4\pi r^2)$$

Thus,

$$g^2 = \left(\frac{GM}{r^2} \right)^2$$

Thus, when a fermion radiates, its radiation wave's electric field and gravity field is the same as the original particle's electric and gravity field.

Thus, we can predict that the wave amplitude for generating proton-antiproton or neutron-antineutron should be different. Although proton and neutron have the same mass, the wave frequency for generating proton-antiproton or neutron-antineutron should be the same. However, proton-antiproton requires more energy to be synthesized.

In the second part of article, I would like to deduct particle size during pair production. I will show that particle size is depending on its mass, lightspeed, and planck constant.

Due to the conservation of angular momentum, the angular momentum of photon is equal to the angular momentum of particle plus antiparticle. We know the angular momentum of photon is h' :

$$L_0 = L_1 + L_2$$

(L_0 :photon angular momentum, L_1 :particle angular momentum, L_2 :antiparticle angular momentum; $L_1=L_2$)

$$L_0 = 2L_1 = h'$$

Thus,

$$L_1 = L_2 = 1/2h'$$

Thus, all fermions have spin angular momentum $1/2h'$

There is relation between photon angular frequency and wave frequency.

$$W_0 = 2\pi * f$$

(f =wave frequency)

During pair production, $hf=2mc^2$. Thus,

$$W_0=(4\pi*mc^2)/h$$

There is energy conservation after pair production. Half of the rest mass energy contributes to the gravitational energy. Half of the rest mass energy of particle (anti-particle) contributes to the spin energy: (W_1 =particle spin angular velocity)
 $1/2mc^2=1/2IW_1^2$

Spin angular momentum

$$S=IW_1=1/2h'$$

Thus,

$$mc^2=SW_1$$

$$W_1=(4\pi*mc^2)/h=W_0=W$$

Photon angular frequency is equal to particle (antiparticle) angular spin velocity:

Since energy-momentum relation is:

$$\left(\frac{E}{c}\right)^2 - p^2 = (mc)^2$$

In addition, the four velocity:

$$\|U\| = \sqrt{|U^u U_u|} = c$$

It means that the norm of magnitude of the 4-velocity of a rest massive object is always exactly equal to lightspeed c . All rest massive objects can be thought of as moving through spacetime at lightspeed c . So, fundamental particles like electrons are spinning in lightspeed. Thus,

$$C=r*W \text{ (C=lightspeed, r=particle radius, W=angular velocity of spin)}$$

Thus,

Electron radius $r=h'/2mc$ (see reference)

Electron diameter $D=h'/mc$

Because the angular momentum for a massive fermion is rmv , the spin will become $1/2h'$ for fundamental particles ($v=c$). Thus, the origin of spin is from radius, mass, and velocity. This can solve the proton spin crisis. Originally, researchers thought the proton spin is from the spin of quarks. However, they found the discrepancy of quark spins and proton spin. Thus, the proton spin should be acquired from the gluons

which acquire majority of mass for the proton. In the later chapter, I will discuss how gluon acquire mass from higgs mechanism.

The proton is a positive charge. Its magnetic moment is from the total charge (pole strength multiply length). Because proton is fermion, its three quarks should be arranged in the following pattern due to charges.

+++

Or

SNS

NSN

Because the net total charge is $+1(+3/3)$, the magnetic moment for proton is $(+3/3)*r$

The neutron is a neutral charged particle. Its magnetic moment is from the rotation of neutron particle itself. Its three quark alignment should be:

+-

Or

NSN

SNS

The magnetic moment of neutron is from the rotating negative quarks of it. Thus, its net magnetic moment is $-1/3*2*r=-2/3*r$. It is worth noting that all three quarks in proton or neutron are spinning in the same direction. Thus, the net magnetic moment ratio between proton and neutron is $3/2=1.5$. That matches the experimental observation. It explains the spin crisis problem.

Here, I will also like to discuss the characteristics of nuclear force. The nuclear force is mediated by neutral pion which is made of $U\bar{U}$ or $d\bar{d}$. The alignment of neutral pion should be:

+

-

Because there is no net spin or angular momentum for pion, there should be anti-alignment spin for magnetic moment of the two quarks. And, the rotation direction of the two quarks is the same. The neutral pion is:

S
N
N
S

Thus, if one proton and another neutron are aligned up-and-down in the same spin direction like:

+ (proton)
+ (neutron)
Is
S
N

N
S

In the middle of proton and neutron, we can see a neutral pion can be inserted inbetween. Thus, the proton and neutron can be linked by a pion. It can explain the vertical tensor component of nuclear force.

We can also look at the horizontal alignment of the two quarks in neutral pion. It is:

+
-
Or
NS
SN

If two protons or two neutrons (opposite spins) are sit side-by-side in the horizontal direction, its arrangement is:

- +
Or
S N
N S

We can also insert the neutral pion inbetween the two protons or two neutrons. Thus, it can also explain the tensor component and spin dependence of the horizontal alignment of nuclear force.

Here, I would like to introduce a concept about spin angular momentum four vector.

The vector is:

$$(h', J_x, J_y, J_z) = (rhc)^2$$

Due to the spin invariance, $rhc = 1/2h'$. Thus, $r = h'/2hc$. We can also derive basic particle's diameter. Then,

$$(h')^2 - J^2 = (1/2h')^2, \text{ so}$$

$$J = \frac{\sqrt{3}}{2} h'$$

We call J the total spin angular momentum for a basic particle.

Besides, we can also derive the diameter of photon. Since the angular momentum of photon is h' , the first item of spin angular momentum four vector. And, based on the equation of angular momentum:

$$h' = r \times p = \frac{r \times E}{c} = \frac{r \times hf}{c}$$

We can get $r = \lambda/2\pi$. This is the radius of photon. Thus, the diameter of photon depends on its wavelength. The circumference of photon is λ . Photon goes straight. We can use this to revise current scattering theory. The scattering of radiation is depending on a size parameter:

$$\alpha = \frac{R}{\lambda/2\pi}$$

If $\alpha \ll 1$, this is Rayleigh scattering. If $\alpha = 1$, this is Mie scattering. If $\alpha \gg 1$, this is geometric scattering such as Compton scattering. Thus, the alpha factor is depending on the scattering particle radius R and the photon radius $\lambda/2\pi$. Comparing the size of scattering particle to photon, we can get different scattering pattern. For example, Compton scattering,

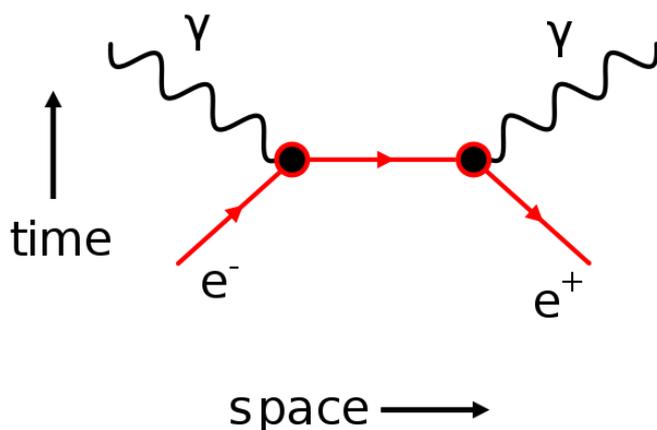
$$\frac{\lambda'}{2\pi} - \frac{\lambda}{2\pi} = \frac{h}{2\pi mc} (1 - \cos \theta)$$

We can see the scattering pattern is also depending on photon radius $\lambda/2\pi$ and electron's radius $h'/2hc$.

Besides, since the photon spins one 2π circle at its wavelength λ . The angular velocity of photon is actually its angular frequency $\omega (= 2\pi f)$. Thus, the maximal linear spin velocity of photon is $V = R * \omega = (\lambda/2\pi) * (2\pi f) = c = \text{lightspeed}$

And, photon energy E is its spin angular momentum h' multiplies its angular velocity ω . ($E = h' \omega$)

So, there is relation between Compton wavelength (h'/mc) and particle size. My deduction is well correlated with experimental observation. A theory suggested that Higgs mechanism gives all particle mass, and I think that theory is incorrect. I think all masses are transformed from wave frequency during photon-photon pair production. In the early universe, the space-time dimension is quite small, so there are much higher chance for photon-photon pair production to generate particles with masses and charges.



The greatest achievement of Dirac's quantum mechanics is that he derived the spin magnetic moment of electron. However, I think quantum mechanics is wrong. The formula of electron spin magnetic moment can successfully explain the Zeeman effect. We can also use the above concept to derive electron's spin angular momentum rmv .

A method to derive magnetic moment of electron is by treating the electron sphere as a small magnet:

$$M=P \cdot l$$

For electron north pole, the magnetic strength is $+p$ which is equal to the magnetic strength $-p$ of electron's south pole. The total magnetic strength of electron is QV .

$$\text{Either pole magnetic strength } P=1/2QV=|+p|=|-p|$$

Distance l of two pole is $2r$

Thus, magnetic moment is QVr

Finally, I will try to solve the mystery of number 137. 137 is suggested a coupling constant for electromagnetic interaction. However, it is poorly understood why it should be 137. Here is the fine structure constant:

$$\text{Alpha} = \frac{KQ^2}{h'c} = \frac{1}{137}$$

Since the particle radius for electron or proton is $r=h'/2mc$. Thus, the fine structure constant is changed to be:

$$\text{Alpha} = \left(\frac{KQ^2}{2r} \right) \div (mc^2) = \frac{1}{137}$$

Thus, we can see that alpha is a ratio between electron/proton's electrostatic energy and their rest mass energy mc^2 . Thus, it is why $1/137$ is the coupling constant of electromagnetic interaction.

Here, I want to incorporate Higgs mechanism, strong interaction, and weak interaction in the pair production model. Thus, we can try to explain why basic particles have discrete mass and charge. During the photon collision, two gamma beam with Higgs can generate massive Z particle, massive W+W-pair, and glueballs.

$P+P \rightarrow H \rightarrow ZZ \rightarrow \text{fermion} + \text{anti-fermion} (\text{quark} + \text{antiquark})$

During photon collision, two photons can be stopped in order to interact with Higgs boson. It is also true for photon-nucleus synthesis. It is because that photons with two equal and opposite momentums can let them cease or one photon beam stopped by the obstacle of atom nucleus. Only when photon stops, it can interact with Higgs boson. Photon is itself's anti-particle. Thus, photon collision is equal to photon-antiphoton annihilation. During the self interaction of photon particles, symmetry breaking happens. Then, massless Z boson obtain the mass from Higgs boson and become two massive Z bosons. Because Z boson is very unstable, it can easily decays into a fermion-antifermion pair such as quark-antiquark, especially meson such as pion.

$P+P \rightarrow H \rightarrow W+W \rightarrow \text{electron} + \text{positron} + \text{neutrino} + \text{antineutrino}$

Another kind of gamma photon collision happens, two photons can interact with one W boson pair (W+ boson and W-boson). It is also because that massless W boson acquires mass form the Higgs boson via Higgs mechanism. W boson is also a very unstable particle. It can easily decays into lepton plus neutrino. Thus, the W+W- pair will decay into electron-positron pair plus neutrino-antineutrino pair. Since neutrino and antineutrino usually travel near lightspeed, we may only detect positron and

electron pair. That is why we can observe electron-positron pair production during gamma gamma photon collision or photon-nucleus collision. Not like the synthesis of Z boson described above, the amplitude of these two gamma photons should be large enough to make the W boson or subsequent lepton to have charge. W^+ or W^- boson has one unit basic charge. Thus, it can decay into electron, muon, or tau particles. All of these leptons have one unit charge because W boson has one unit charge only. In addition, larger mass muon or Tau can decay into smaller mass electron due to the decay model. Large mass particle is unstable. In addition, electron-positron synthesis needs least energy in the interaction with Higgs, so there are more abundant electrons and positrons. Because Higgs boson has discrete mass, the basic particles from Higgs mechanism also have certain value of mass. However, the mass of Higgs still needs to be decided by LHC. It is worth noting that we can use two 511keV gamma rays to generate one positron-electron pair. It is less than the energy required for generating W^+W^- pair. However, due to principle of uncertainty, energy can be borrowed from vacuum and be returned back. Thus, after the annihilation of neutrino-antineutrino pair, the borrowed energy is returned. Thus, energy conservation is still kept. It is worth noting that W boson can also decay into quark-antiquark pair such as pion which is important QCD mediator for atomic nucleus.

The decay of W pair or Z pair generates fermion particles. Photon and photon collide with high speed and near elastic collision happens. Thus, single W or Z boson from Z pair or W pair are separated not fused. It individually decays to fermions. It is important to know that the neutrinos are mainly from the massive W or Z bosons. In the original standard model, scientists thought neutrinos should be massless. However, if neutrinos are actually from the degradation of massive W or Z bosons, they should have mass.

$P+P \rightarrow H \rightarrow \text{quark-gluon} \rightarrow \text{neutron-antineutron or proton-antiproton}$

In higher energy photon collision, even glueball can be interacted with Higgs mechanism. Thus, glueball can generate nucleon such as proton or neutron via QCD theory mechanism such as quark-gluon plasma. Massive gluon can be generated after getting mass from Higgs boson. More gluon can form into glueball including quarks. Then, neutron-antineutron pair can be generated from the glueball. It is reasonable because gluon has no charge. However, proton-antiproton can also possibly be generated. If free neutron is generated, it can easily decay into proton via weak interaction with releasing one W^- boson. Thus, proton has also one unit of

charge. Other larger mass hadrons can also be generated via this mechanism. However, larger mass hadrons are unstable, and they can easily decay into proton or neutron which has the smallest mass.

We can infer there is opposite mechanism:

$e+e \rightarrow W+W \rightarrow H \rightarrow P+P$

$e+e \rightarrow Z+Z \rightarrow H \rightarrow P+P$

$\text{proton}+\text{antiproton} \rightarrow \text{gluon}+\text{gluon} \rightarrow H \rightarrow P+P$

$\text{neutron}+\text{antineutron} \rightarrow \text{gluon}+\text{gluon} \rightarrow H \rightarrow P+P$

The collision is near inelastic collision since the fermion cannot move with lightspeed. In these reactions, the elimination of particle and antiparticle pair generates W, Z boson or Gluons. Then, W boson, Z boson, and gluons will return their mass to the Higgs boson to generate Higgs boson. Higgs particle may be generated by W+W- annihilation, ZZ annihilation, or gluon-gluon fusion. That is why LHC uses this mechanism to search for Higgs particle. This paper explain all the pair production and annihilation process. So we unite four fundamental forces: strong force(gluon), electroweak force(P, W, Z boson, charge), and gravity(Higgs, mass).

Finally, I would like to discuss about the CPT-G symmetry of pair production or annihilation. During this process, symmetry usually occurs. These symmetry include charge conjugation(C-symmetry), parity symmetry(P-symmetry), time symmetry(T-symmetry), and rotation symmetry(G parity symmetry). We know in the weak interaction, there is CP violation. That is charge conjugation and parity symmetry are violated during weak interaction such as beta decay. Here, I propose here that charge conjugation and parity symmetry are actually the same thing. During the pair production, the opposite(right or left) one dimensional space orientation (r or $-r$) of the matter and anti-matter gives them opposite charges. Thus, I say the sign of charge is depending on their space orientation during pair production. Based on charge relativity, positive and negative charge produces just opposite spacetime vortex(clockwise or counterclockwise). Thus, we see CP is usually coupled.

As for T symmetry, during pair production, matter and antimatter are generated due to the time symmetry. As Richard Feynman's suggestion, matter is produced in the positive time arrow(+t), and anti-matter is produced in the reversed time arrow(-t). That is anti-matter is time reversal product(time backward). Thus, due to time reversal or not, matter and anti-matter are given opposite lepton number or baryon number. This is important because anti-matters disobey our current one directional time arrow. Thus, anti-matters are very unstable and have very short life time.

Anti-matters will disappear in a very short time because they disobey causality(temporal relationship). That is the main reason why matter is much more greater than anti-matter in our universe. Thus, in galaxy, antimatter cannot easily be found. It is because anti-matter cannot survive in our universe's positive time arrow.

The final symmetry is the G parity. This is the symmetric relation of rotation. A concept called isospin explains this symmetry. Proton and neutron has the similar characteristics except the charge. Thus, proton and neutron are involved in rotational symmetry. Pions are also involved in this symmetry. Thus, if we combine these above findings together, we can get a new RST symmetry which is Rotational symmetry, Space symmetry, and Time symmetry. And, based on the symmetries, we can modify the Feynman diagram.

Birth of universe

The current mainstream theory of universe creation is "Big Bang" theory. It is thought that our universe began with a great explosion and started to expand. This theory is supported by several observed facts. First, our universe is actually expanding. In fact, our universe expands acceleratedly. It suggests that the universe was started from a tiny point and it expands to current volume. It seems to keep on expanding in the future. Second, there is background cosmic microwave radiation. There is 2.73 K radiation in universe which is not related to earth or sun rotation. Based on calculation, there will be 3-5 k background black-body radiation if the beginning of universe has billions K temperature. Thus, it suggests that there was high temperature in the beginning of universe. According to these two major reasons, Big Bang theory is the most accepted universe creation theory. However, there are some unsolved problems in universe creation that is not explained by Big Bang. Since I propose that universal lightity (radiation pressure) is the actual cause of universe expansion, I will use this concept to further discuss universe creation.

In Stephen Hawking's theory, he thought that universe is from a black hole evaporation. The problem is that the energy inside the black hole could be infinite large. There is no energy limitation in the black hole creation theory. And, according to Hawking's explanation, black hole evaporation is due to particle-antiparticle pair production in black hole's event horizon due to uncertainty principle. He thought that the antiparticle fell into the black hole and the other particle escaped from the black hole. The anti-particle becomes virtual particle which has negative energy. Thus,

the black hole appears to lose energy and emits one real particle. However, in a primordial spacetime, there is no existing particle and antiparticle first. Thus, it is difficult to initiate Hawking evaporation in the beginning of universe. Thus, the singularity will be maintained. Second, there is no observed virtual particle with negative energy. In addition, Hawking radiation will cause a black hole information paradox. It disobeys the Liouville theorem. Thus, black hole evaporation is unlikely happening in the beginning of universe.

We can now look at Hawking radiation in detail. Hawking thinks that black hole can emit mass based on the following formula:

$$P = \frac{h'c^6}{15360\pi G^2 M^2}$$

Thus, there is a relation of emitted power and mass loss. However, the above formula is derived from a more fundamental relation of temperature and mass of black hole.

The formula is:

$$T = \frac{h'c^3}{8\pi GMk}$$

We can see there is an inverse relation between temperature T and mass M. Actually, this inverse relation prevents Hawking evaporation of the black hole. If a black hole can emit mass as Hawking radiation, then there will be a mass loss. Then, decreasing M means decreasing gravity acceleration a:

$$a = \frac{GM}{r^2}$$

However, according to the temperature-mass relationship of the black hole, decreasing mass means increasing temperature. Thus, temperature T is increased. But, based on Unruh-Hawking effect:

$$T = \frac{ah'}{2\pi ck}$$

The increasing temperature T causes the increasing acceleration a. Thus, the decreasing a due to mass loss will go back again due to temperature gain. Thus, the acceleration a won't be easily to be changed. The coming back a means mass also goes back again. That means mass loss in black hole is not easy to happen. This means a black hole is a stable structure. It is not easy for a black hole to gain mass or lose mass or to gain temperature or lose temperature. It is reasonable. If one black hole is continuously gaining mass due to its ultimately strong gravity field, it will eventually swallow all the universe. Once a black hole is formed, it will keep on maintaining its primary status. Hawking radiation is unlikely to happen. And, if Hawking radiation is real, it will inevitably lead to black hole information paradox.

That disobey the Liouville theorem. Thus, in the beginning universe, a maximal Planck mass must have a size to prevent black hole formation. If a stable black hole is formed in the beginning of universe, no universe synthesis will happen. Besides, the singular point in the middle of a black hole will let all physics laws to be invalid!

Then, what really happened in the beginning of universe? Here, I will propose a theory which is more likely. I call it "Ab Adam-Eve" theory. Our universe was actually created by avoiding black hole formation. "Ab" in Latin language means "from". "Adam" and "Eve" are the first man and woman respectively created by God according to Bible. In order to explain my theory, I need to introduce the concept of plank scale here. My theory is there was a particle named "Adam" and an anti-particle named "Eve" in the beginning of universe. Both "Adam" and "Eve" are in the scale of Plank mass. If "Adam" or "Eve" exceeds the scale of Plank mass, gravity singularity will occur to form a black hole. Thus, there was a maximal mass allowed for "Adam" and "Eve". In Chinese Taoism, the origin of nature is due to "Ying" and "Yang". We can also call "Adam" as "Yang" or "Eve" as "Ying". In the two primordial particles, "Adam" has positive charge and "Eve" has negative charge. In the Plank scale of the beginning minimal spacetime volume, "Adam" and "Eve" collided each other. Then, a great particle-antiparticle annihilation occurred. This process is the actual "Big Bang". The great annihilation created the Plank scale of the maximal temperature. According to radiation pressure (universal lightity: $P=kT^4/c$), the universe started to expand. The space-time began to expand.

The formula of Planck mass is:

$$M_p = \sqrt{\frac{h'c}{G}} = 2.176 * 10^{-8} \text{kg}$$

It is due to the primordial mass size(radius) must exceed Schwarzschild radius to avoid black hole formation:

$$\frac{h'}{2mc} \geq \frac{2Gm}{c^2}$$

Thus,

$$M_p \leq \sqrt{\frac{h'c}{4G}} = 1.088 * 10^{-8} \text{kg}$$

In addition, the primordial mass has Planck charge in this Planck epoch. Planck charge formula is:

$$Q_p = \sqrt{\frac{h'c}{K}} = 1.88 * 10^{-18} \text{coulomb}$$

We can say the Planck particle "Adam" has positive Q_p and antiparticle "Eve" has negative Q_p .

In addition, the minimal possible Planck length is the diameter of the Planck mass:

$$L_p = \frac{h'}{2mc} = \sqrt{\frac{h'G}{c^3}} = 1.616 * 10^{-35} \text{meter}$$

After the primordial particle-antiparticle pair annihilation, the mass energy totally transformed into radiation energy. This is high energy situation, and It did not simply form two opposite radiation rays. This annihilation can produce multiple bosons and fermions as well.

$$M_p * c^2 = K * T_p$$

The Planck temperature which is the maximal temperature of universe is then:

$$T_p = \sqrt{\frac{h'c^5}{GK^2}} = 1.417 * 10^{32} \text{K}$$

The Planck time is defined by the duration that formed radiation passed the Planck length at the Planck epoch:

$$t_p = \frac{L_p}{c} = \sqrt{\frac{h'G}{c^5}} = 5.39 * 10^{-44} \text{sec}$$

Planck time and Planck length are the smallest unit of our universe spacetime at Planck epoch. And, Planck temperature is the maximal highest possible temperature in our universe. The Planck frequency from Planck energy is the maximal possible energy and frequency for the earliest/smallest time in the beginning universe. Due to Unruh effect and radiation pressure (universal lightity), the universe started to expand acceleratedly:

$$P = \frac{\sigma T^4}{c}$$

$$T = \frac{h'a}{2\pi cK} = \frac{h'c}{2\pi xK}$$

The cosmic inflation theory explains why our universe is flat, homogeneous, and

isotropic. Due to the above formula, the highest Planck temperature caused the maximal acceleration to expand the initial universe. This period fulfills the inflation theory. When the universe started to expand, the universe radius x kept on increasing. Since the universe radius x is inverse proportional to temperature T , the acceleration caused by temperature could be lower. Thus, the inflation speed in early universe started to become lower. It is worth noting that heat is transformed into outward acceleration in our universe. It is not acceleration is transformed into heat. The one direction universe arrow is time arrow, entropy arrow, and radiation arrow. In addition, since the spacetime in the initial universe is so small, the chance of radiation head-on collision is very high to form all the mass and charge which are seen in our universe. Then, you may doubt who made the two primordial masses. The primordial masses may be made by particle-antiparticle pair production by using two radiations or one radiation with $1.855 \cdot 10^{43}$ Hertz head-on collision. This radiation frequency is called Planck frequency which is the theological maximal possible radiation frequency. However, this is the maximal possible theological deduction. Since the particle's radius is equal to reduced Compton wavelength, it highly suggests that the two Planck charge-masses are made from two radiation rays. Mass and charge were united in the radiation ray. Frequency of radiation was transformed into mass, and amplitude of radiation was transformed into charge. The original radiation period was the grand unified status. After the Planck charge-masses are formed, charge and mass are separated. Charge (electronuclear) causes spacetime torsion, and mass causes spacetime curvature. After the further pair production and annihilation, weak force and strong force are separated from the electromagnetic force. This is the sequence of the birth of all the fundamental forces. According to Godel's incomplete theorem, we cannot completely deduct all the consistent laws. Thus, we need to assume that God's hand involved in the creation of universe.

Here, I also want to discuss about the concept of zero point energy. According to the Einstein-Stern formula:

$$E = \frac{hf}{e^{kT} - 1} + \frac{hf}{2}$$

We can see when the absolute temperature is zero, there is a minimal residual energy. This state is the earliest universe when Adam-Eve particles exist. It is the minimal energy needed to maintain the minimal spacetime to let the Ying-Yang particles exist. This is zero point energy. We can also find out absolute zero can never achieve because there is always zero point energy. And, based on Unruh-Hawking

formula:

$$\frac{1}{2}kT * 2\pi = \frac{1}{2}hf$$

The half photon energy (zero point energy) is the minimal kinetic energy per degree of freedom. And,

$$kT * 2\pi = hf$$

We can see a relationship between kT and hf . We can view kT as a radius increase and hf as a circumference increase during spacetime expansion. Thus, there is a relation like $x=2\pi r$.

In addition, the imaginary time is not possible. Based on Euler's formula:

$$e^{ix} = \cos x + i \sin x$$

Thus,

$$e^{2\pi i} = 1$$

And, the imaginary time based on definition is:

$$i * t = \frac{h'}{kT}$$

Thus,

$$2\pi i = \frac{hf}{kT}$$

We put this into Einstein-Stern formula above. Then,

$$E = \frac{hf}{e^{\frac{hf}{kT}} - 1} + \frac{hf}{2} = \infty$$

Thus, if the imaginary time exists, the energy needed is infinite large. That means imaginary time is not possible. There is only real time, no imaginary time.

End of universe

After the discussion of the birth of our universe, we will discuss about the end of universe. The dominant factor deciding the fate of our universe is universal lightity (radiation pressure).

$$P = \frac{\sigma T^4}{c}$$

$$T = \frac{h'a}{2\pi cK} = \frac{h'c}{2\pi xK}$$

Combing the above two formula:

$$P = \left(\frac{\pi^2}{60}\right) \frac{h'c}{x^4} = \left(\frac{\pi^2}{60}\right) \frac{h'}{tx^3} = \frac{\sigma T^4}{c}$$

Currently, our background cosmic radiation is 2.73K. In the end of universe, the absolute temperature will be approaching zero temperature. Although absolute zero temperature is impossible to reach due to third law of thermodynamics, it is still highly possible that the universe will be near 0.0000001 K degree to approach so called "heat death" epoch. If it is true, then the spacetime of universe will be approaching infinite large due to the above formula:

$$T^4 \propto \frac{1}{tx^3}$$

Thus, there is no doom day for our universe. Our universe will approach near infinite large. Both space and time will be near infinite large. In addition, we need to exam if our universe will really approach "heat death". We need to find out what causes galaxy to radiate first. Spiral galaxies are the dominant galaxies in our universe. Spiral galaxies have both charge and mass. Due to Larmor equation, charge will radiate if there is acceleration:

$$\text{Power} = \frac{a^2 Q^2}{6\pi\epsilon c^3}$$

The gravity field is actually acceleration due to the relativity equivalence principle. Thus,

$$a = \frac{GM}{R^2}$$

Combing the above two formula, we can get:

$$\text{Power} = \frac{2KG^2Q^2M^2}{3c^3R^4} = 4\pi R^2 \sigma T^4$$

In spiral galaxies, there is unlikely loss of charge and mass. The charge and mass will be conserved in spiral galaxies if the emitted radiation is due to the gravity acceleration of rest charge in galaxy center.

In the elliptical galaxies, the radiation is due to the strong gravity field acceleration from huge mass. We can also apply the Unruh-Hawking effect:

$$T = \frac{ah'}{2\pi cK}$$

Thus,

$$\text{Power} = 4\pi R^2 \sigma T^4 = 4\pi R^2 \sigma \left(\frac{ah'}{2\pi cK}\right)^4$$

In massive galactic center:

$$\text{acceleration } a = \frac{GM}{R^2}$$

If there is such mechanism, the radiation emitted from both elliptical and spiral galaxies will be lasting forever. In addition, if we put the relation of acceleration and temperature (Unruh effect) into the above equation, we can find out the direct proportional relation of electromotive force and mechanic acceleration (Stewart-Tolman effect) as well as the direct proportional relation of electric potential and temperature (Thermoelectric effects such as Seebeck effect). We can link Larmor formula to Stefan's law.

$$\text{Power} = \frac{a^2 Q^2}{6\pi\epsilon c^3} = 4\pi R^2 \sigma T^4$$

And, the surface electric potential of a sphere is $V=KQ/R$. In addition, we can introduce a^2 instead of T^2 in the right side of the above equation. We re-arrange the above formula and get:

$$KT = \sqrt{160\pi h' c \epsilon} * V$$

In addition, the planck charge is:

$$Q_p = \sqrt{4\pi h' c \epsilon}$$

Thus, we can link heat energy(temperature) to electric potential(voltage) with a constant: planck charge:

$$KT \propto Q_p * V$$

There is a direct relation between absolute temperature and electric potential(voltage). It means that electric potential and temperature can be mutually transformed. This also explains the physical meaning of planck charge. We can rearrange the equation as:

$$\frac{2V^2 a^2}{3\epsilon c^3} = \sigma T^4$$

If we want to transform the above equation into field, we can divide the right and left side of the equation by $4\pi R^2$. (R =field distance=radius). Then, the above equation will become:

$$\frac{E^2 a^2}{6\pi\epsilon c^3} = \frac{\sigma T^4}{4\pi R^2}$$

If an accelerated charge can radiate as Stefan's law, the photon then will have four fields(gravity field, spinity/impelity field, electric field, and magnetic field). In photon, there is direct relation of electric field and magnetic field($E=CB$) and a direct relation of gravity field and spinity/impelity field($g=a=1/2\omega i$). So, we can also put magnetic field and spinity/impelity field into the above equation. Thus, we can link the

temperature field(heat field) in the right side to the gravity field, spinity/impelity field(angular momentum and linear momentum), electric field, and magnetic field in the left side by this equation via light/radiation. A photon can be generated with amplitude(E & B) and frequency(g & i) with the Stefan's law σT^4 .

$$\frac{E * B * G * I}{4\pi\epsilon c} = \frac{\sigma T^4}{\frac{4}{3}\pi R^3}$$

The Planck impedance which for wave passing through vacuum is $Z_p=1/4\pi\epsilon c$. And, we put sphere volume into the above equation. Thus:

$$Z * (BEGIm) = \sigma T^4 / V$$

I am kidding to call this equation: Z to Begin= Σ for time/space. (In latin, temp=time, temperature and time are closely related). Photon is important for the beginning and end of our universe. This equation can explain a particle such as proton, electron, or neutron which has mass-gravity field and then have temperature. The temperature radiation in four dimensional space-time causes electric field, magnetic field, gravity field, and impelity field which can make a photon. This equation can also explain the mutual transformation between light and heat. The volume V can be thought as our universe total volume, so this equation can explain the transformation of light to universe background temperature.

In above case, we consider photon radiation by fermion particle absorbing heat energy. We can also consider other boson radiation as well such as gluon and W/Z particle. We just replace the electric field and magnetic field by Yukawa field in the above equation. With strong interaction coupling constant g-s, gluon can be emitted from the heat absorbing fermion. With weak interaction coupling constant g-w, W/Z boson can be emitted from the heat absorbing fermion. We just need to put mass term in the Yukawa field for them. Coulomb potential for the photon is just the modified special case Yukawa potential with zero mass of photon. Thus, this equation can also include strong and weak force.

Higgs and meson bosons can also be radiated from fermions absorbing heat energy. We can also use generalized Yukawa potential-field instead of electromagnetic field in the above equation to explain Higgs and meson(pion etc) radiation. There is also mass term and gravity field for higgs boson and meson boson. Although Higgs and pion has zero spin, they can still have linear impelity field. Thus, the above equation also explains the radiation of higgs and mesons.

We then can look at the fermion for the equation. Larmor formula is still valid in rest charge or slow moving particle compared to lightspeed. The above formula can be re-write as:

$$\frac{\mu}{4\pi} * (BEGIm) = \sigma T^4 / cV$$

The constant μ is the electromagnetic permeability. The right side is the energy density divided by space-time unit of the particle. It explains how the particle (fermion) such as charge can transform its four fields into heat. And, then heat can be transformed into radiation(boson). Neutron has no charge but it still have gravity and acceleration. Thus, its acceleration can be transformed into heat first. And then, its heat still can be transformed into radiation. kT^4/c is also radiation pressure. This equation is the united field equation.

However, the universe Ricci tensor is:

$$R_{uv} = -K(-\rho U_u U_v + p g_{uv})$$

When the light pressure p decreases due to temperature drop, the net energy momentum will approach zero. Then, our universe will cease expansion. But, we know the energy is the function of spacetime and spacetime is the function of energy based on the light pressure-spacetime formula. Galaxy mass is conservative. Thus, mass will keep on contracting spacetime. Then, contracting spacetime will generate energy(radiation). Because everything has mass and acceleration, absolute temperature zero cannot be achieved. Mass cannot be changed, but photons can be generated forever. Even the universe temperature drops to near absolute zero due to universe expansion(consumption of pre-existing radiations), more and more new photons can still be emitted from galaxies to overcome the magnitude of gravity contraction. So, our spacetime will expand to near infinity large(space) with infinity long(time). It is likely the galaxies will be ever shining forever!

Here, I will try to deduct light-to-mass ratio and Tully-Fisher relationship for galaxy here, especially for spiral galaxy. The typical luminosity-mass ratio for galaxy is $L \rightarrow M$ and the Tully-Fisher relationship is $L \rightarrow V^4$. The luminosity formula is:

$$L = 4\pi R^2 \sigma T^4$$

In rotating star or galaxy, we know the spinity formula:

$$F = S J m \omega / r^2 = S M V^2 / r^2 = m a$$

And, we know Larmor formula:

$$P = Q^2 a^2 / 6\pi \epsilon c^3 \rightarrow 4\pi R^2 \sigma T^4$$

If the spinity acceleration in provides the acceleration for the rotating spiral galaxy

core, then $a \rightarrow MV^2/r^2$.

Thus, $T^4 \rightarrow Q^2 * a^2 / R^2 \rightarrow Q^2 M^2 V^4 / r^4 R^2$. And, we know radiation pressure induced luminosity relation is: (Due to radiation pressure gradient is the momentum transfer)

$$L \rightarrow T^4 r^4 / M$$

We put the above T^4 relation into the second relation. Then, we get:

$$L \rightarrow Q^2 M V^4 / R^2 \rightarrow Q^2 M \omega^4 R^2$$

(Q is charge, M is mass, V is max rotational velocity, ω is max angular velocity, and R is the galaxy radius)

Thus, we get the Tully-Fisher relationship and the mass-to-light ratio!

Here, we can see if radius R is smaller, then the light-to-mass ratio L/M is larger.

When there is a smaller star or galaxy, the luminosity L is proportional to M^2 to M^6 .

This can help to explain why there is L/M ratio change due to the size of galaxies or stars.

Finally, I would like to discuss about the final destiny of our universe. We should know the Einstein's twin paradox first. According to time dilation formula: $dt' = \gamma dt$ (γ is Lorenz factor), the twin brother traveling in spacecraft will be younger than his the other twin brother. It is because the moving velocity in the spacecraft has time dilation effect. Thus, the time passed much slower in spacecraft. If the spacecraft is moving near lightspeed, then the twin brother in the spacecraft will not get old or he could live for a very long time.

Then, we can think about our light pressure-spacetime formula. ($T^4 \rightarrow 1/tX^3$) The formula explains that light pressure cause our universe(spacetime) to expand. The universe time is slower and slower. When the universe temperature is dropping to near zero and the total mass in our universe is few, then there will be a great time dilation effect. It is likely because light pressure effect (dark energy) is much greater than gravity effect now. The universe time may be approaching to infinite large. This is similar to the effect of the above twin brother in the spacecraft. People at that time won't get old if our people on earth now are not foolish enough to destroy ourselves. Besides, galaxies will still be shining forever based on the above deduction providing more and more energy. Because stars also have gravity acceleration and subsequently temperature, stars like sun will also keep shining. Radiation will be kept on releasing from the stars. Even a planet like Earth or Saturn will also generate heat in their inner core continuously. Here, I will like to point out the concept of center of mass. The gravity about center of mass formula is:

$$F = \frac{GMm(r_{cg}-r)}{|r_{cg} - r|^3}$$

We know gravity acceleration is $g=F/m$. The r_{cg} is the center of mass(=0) and the r is the distance. Thus, the gravity acceleration will be larger inside the mass. That is the reason why inner stars or planets have strong acceleration and temperature.

Currently, we don't know how supernovae get radiation energy to explode when it suffers from core collapse. When a supernovae collapses, the diameter shortens and the net gravity acceleration increases($a=GM/r^2$). We know the acceleration is proportional to temperature due to Unruh effect, so the supernovae will acquire again the radiation pressure to explode($p=kT^4/c$). This can also apply to sonoluminescence. Thus, at that time, people in our universe will approach eternity. They will need a lot of time to get old before they die. Thus, the people and the universe at that time will be eternity. It is also interesting about the six dimensional paired. Calabi-Yau manifold. We don't know if such manifold really exist. If there is such manifold existing inside our universe, the near-zero temperature and near-zero radiation pressure will let the paired Calabi-Yau manifold to expand. Our universe won't be ended. It will be the time for eternity.

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