Toward the Unification of physics

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Abstract:

We found fundamental equations between base quantities including space, time, mass, charge and temperature in which proportionality constant of equations is a Combination of fundamental constants of physics. If these quantities are divided, universal equations of relativity, and if multiplied, universal equations of quantum will be obtained. Based on relativity equations, we concluded that force has an ultimate limit in addition to velocity, and with modification of Newton's law of gravitational, we proposed a rational explanation for dark matter. In the following, based on quantum equations, a new relativity was discovered causing the time to pass at higher rates in microscopic scales in comparison to macroscopic scales and length expands. This is exactly opposed to Einstein's relativity in which time gets slower and length contracts. Moreover, with combination of quantum and relativity equations, a theory is presented for universe creation explaining causes of space expansion and dark energy without needing inflationary models. In this theory, universe creation consists of two different stages of expansion and contraction in which the former includes the transformation of space to mass, charge and temperature, and the latter includes opposing phenomenon. This article relates fundamental and important subjects of physics such as special relativity, general relativity, quantum, big bang theory, uncertainty principle, Planck units, light, black hole, fundamental constants of physics, dark matter, dark energy, Maxwell equations, Newtonian mechanics and rotational motion only by using several simple equations.

1. Foreword

Fundamental constants have an important role in the physics. Their simplest and most important role is transforming proportional relationships into equations. The significance of Fundamental constants is not limited to this, but also these constants have physical concepts, and by combining them, significant physical quantities could be obtained. For example, what Newton's law of universal gravitation and Coulomb's law state are proportionality relationships.

$$F \propto \frac{m_1 m_2}{r^2} \qquad F \propto \frac{q_1 q_2}{r^2}$$

If the second sides of both equations are multiplied to a proportionality constant, this will transform the proportion into an equation:

$$F = G\frac{m_1 m_2}{r^2} \qquad F = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$$

Apart from amazing resemblance of gravitation and Coulombs' law, there is a delicate point between these two equations which has not been considered yet. First, we wrote the general formula of these two equations without considering fundamental constants using the following way:

$$F = \frac{m_1 m_2}{r^2} \quad (Eq.1) \qquad\qquad F = \frac{q_1 q_2}{r^2} \quad (Eq.2)$$

In the gravitation law (Eq.1), the units of mass and length are kilogram and meter, respectively. So the force unit should at least include these two dimensions and do so; since the force unit is Newton ($kg.m/s^2$). Coulomb's law (Eq.2) is similar to gravitation law with one difference in which mass is replaced by charge. As a result, a wise theory is to accept that the force unit should at least include a dimension of Coulomb e.g. $C.m/s^2$; but the unit of force is still Newton. The only reasonable explanation is that there should be a fundamental relationship between mass and charge in the proportionality constant of these two equations. If we multiply proportionality constants of these two equations, this relationship will be obtained:

$$[G].[4\pi\varepsilon_0] = \frac{m^3}{kg.s^2} \times \frac{C^2.s^2}{kg.m^3} \;\Rightarrow\; \frac{C}{kg} = \pm\sqrt{4\pi\varepsilon_0.G} \quad (Eq.3)$$

Consequently, we can obtain the relationship between mass and charge using Eq.3:

$$\frac{m}{q} = \pm\frac{1}{\sqrt{4\pi\varepsilon_0.G}} \quad (Eq.4)$$

Apart from its physical concept, one of the applications of the above equation could be that we can replace the mass quantity with the charge in Newton's second law. In fact, a set of equations, similar to Newtonian mechanics equations, could be obtained with the mass quantity being replaced by the charge. For example:

$$F_q = qa \quad , \quad p_q = qv \quad , \quad K_q = \frac{1}{2} q v^2$$

If there were massless charged particles, they should follow the former equations. These particles have not been discovered so far, and cannot even exist from thermodynamical point of view. Now, this question might be asked whether these equations can be applied to charged particles possessing mass such as electrons. We can relate the above equations and Newtonian mechanics with the help of Eq.4. Accordingly, if the equation of $F=qa$ has physical meanings, electron's acceleration in the electrical field (E) should be according to the following equation:

$$E.q = \frac{1}{\sqrt{4\pi\varepsilon_0 . G}} q.a \quad \Rightarrow a = E.\sqrt{4\pi\varepsilon_0 . G}$$

Consequently, charged particles should fall in the electrical field with the same acceleration apart from their charges' amounts. But the prediction of charged particle behaves such as electron and proton based on Newton's second law has been successful so far; then we can conclude that the above equations don't apply to these particles. So, if this is the conclusion, what is the physical meaning of Eq.4?

2. Universal relativity equations

Since both Coulomb's and gravitation law, and the constants of gravitation (G) and electric (ε_0) are fundamental and universal, Eq.4 should also be a universal and fundamental equation. Furthermore, Eq.4 reveals an important principle of the nature: proportionality constant of the relationships between the base quantities is a combination of the fundamental constants of physics. To understand the physical concept of Eq.4, we decided to obtain the fundamental relationships of other base quantities including space, time, mass, charge and temperature using the same procedure. The five base quantities and their corresponding SI units are listed in the following table.

Table 1.International System of Units base quantities.

Quantity name(symbol)	SI unit name(symbol)
Space or length (*l*)	Meter (m)
Time (*t*)	Second (s)
Mass (*m*)	Kilogram (kg)
Charge (*q*)	Coulomb (C)
Temperature (*T*)	Kelvin (K)

Proportionality constant of these relationships will be a combination of five fundamental constants of physics (table 2).

Table 2.The five fundamental constants of physics.

Quantity (symbol)	SI unit name
Newtonian constant of gravitation (G)	$m^3/kg.s^2$
electric constant (ε_0)	$C^2.s^2/kg.m^3$
magnetic constant (μ_0)	$C^2/kg.m$
Boltzmann constant (k_B)	$kg.m^2/K.s^2$
Planck constant (h)	$kg.m^2/s$

Each of these constants can be associated with at least one fundamental physical theory: c with electromagnetism and special relativity, G with general relativity and Newtonian gravity, h with quantum mechanics, ε_0 with electrostatics, and k_B with statistical mechanics and thermodynamics. Therefore, these fundamental relationships are expected that to be the foundation of physics.

Fundamental relationship of space-time:

Proportionality constant of the space-time relationship will be obtained from the combination of electric and magnetic constants as follows:

$$[\varepsilon_0].[\mu_0] = \frac{C^2.s^2}{kg.m^3} \times \frac{kg.m}{C^2} \implies \frac{s}{m} = \pm\sqrt{\varepsilon_0.\mu_0} = \pm\frac{1}{c}$$

Consequently, space-time equation will be:

$$\frac{l}{t} = \pm c \ \ or \ \ \frac{\Delta l}{\Delta t} = \pm c \quad (Eq. 5)$$

Eq.5 states: 1- Space (length) and time could be transformed to each other. 2- Space and time are equivalent. 3- The ultimate limit of the space to time ratio or velocity is *c* in nature and that can never be reached. 4- Corresponding phenomenon to this equation in nature is light. According to what follows, this equation will be the basis of special relativity.

Fundamental relationship of mass-time:

Proportionality constant of the mass-time relationship will be obtained as follows:

$$[G]^2.[\varepsilon_0]^3.[\mu_0]^3 = \frac{m^6}{kg^2.s^4} \times \frac{s^6}{m^6} \quad \Rightarrow \quad \frac{s}{kg} = \pm\frac{G}{c^3}$$

Consequently, mass-time equation will be:

$$\frac{m}{t} = \pm\frac{c^3}{G} \quad or \quad \frac{\Delta m}{\Delta t} = \pm\frac{c^3}{G} \quad (Eq.6)$$

Eq.6 states that: 1- Mass and time could be transformed to each other. 2- Mass and time are equivalent. 3- The ultimate limit of the mass to time ratio is c^3/G in nature and that can never be reached. 4- Corresponding phenomenon to this equation in nature is black hole.

Fundamental relationship of mass-space:

Proportionality constant of the mass-space relationship will be obtained as follows:

$$[G].[\varepsilon_0].[\mu_0] = \frac{m^3}{kg.s^2} \times \frac{s^2}{m^2} \quad \Rightarrow \quad \frac{m}{kg} = +\frac{G}{c^2}$$

Consequently, mass-space equation will be:

$$\frac{m}{l} = \frac{c^2}{G} \quad or \quad \frac{\Delta m}{\Delta l} = \frac{c^2}{G} \quad (Eq.7)$$

Eq.7 states that: 1- Mass and space could be transformed to each other. 2- Mass and space are equivalent. 3- The ultimate limit of the mass to space ratio is c^2/G in nature and that can never be reached. 4- Corresponding phenomenon to this equation in nature is black hole.

Fundamental relationship of temperature-time:

Proportionality constant of the temperature-time relationship will be obtained as follows:

$$[G]^2.[k_B]^2.[\varepsilon_0]^5.[\mu_0]^5 = \frac{m^6}{kg^2.s^4} \times \frac{kg^2.m^4}{K^2.s^4} \times \frac{s^{10}}{m^{10}} \quad \Rightarrow \quad \frac{s}{K} = \pm\frac{Gk_B}{c^5}$$

Consequently, temperature-time equation will be:

$$\frac{T}{t} = \pm\frac{c^5}{G.k_B} \quad or \quad \frac{\Delta T}{\Delta t} = \pm\frac{c^5}{G.k_B} \quad (Eq.8)$$

Eq.8 states that: 1- Temperature and time could be transformed to each other. 2- Temperature and time are equivalent. 3- The ultimate limit of the temperature to time ratio is $c^5/G.k_B$ in nature and that can never be reached. 4- Corresponding phenomenon to this equation in nature is black hole.

Fundamental relationship of temperature-space:

Proportionality constant of the temperature-space relationship will be obtained as follows:

$$[G].[k_B].[\varepsilon_0]^2.[\mu_0]^2 = \frac{m^3}{kg.s^2} \times \frac{kg.m^2}{K.s^2} \times \frac{s^4}{m^4} \quad \Rightarrow \quad \frac{m}{K} = +\frac{Gk_B}{c^4}$$

Consequently, temperature-space equation will be:

$$\frac{T}{l} = \frac{c^4}{G.k_B} \;\; or \;\; \frac{\Delta T}{\Delta l} = \frac{c^4}{G.k_B} \quad (Eq.9)$$

Eq.9 states that: 1- Temperature and space could be transformed to each other. 2- Temperature and space are equivalent. 3- The ultimate limit of the temperature to space ratio is $c^4/G.k_B$ in nature and that can never be reached. 4- Corresponding phenomenon to this equation in nature is black hole.

Fundamental relationship of charge-time:

Proportionality constant of the charge-time relationship will be obtained as follows:

$$[G]^{-1}.[4\pi\varepsilon_0].[c]^6 = \frac{kg.s^2}{m^3} \times \frac{C^2.s^2}{kg.m^3} \times \frac{m^6}{s^6} \quad \Rightarrow \quad \frac{C}{t} = \pm c^3\sqrt{\frac{4\pi\varepsilon_0}{G}}$$

Consequently, charge-time equation will be:

$$\frac{q}{t} = \pm c^3\sqrt{\frac{4\pi\varepsilon_0}{G}} \;\; or \;\; \frac{\Delta q}{\Delta t} = \pm c^3\sqrt{\frac{4\pi\varepsilon_0}{G}} \quad (Eq.10)$$

Eq.10 states that: 1- Charge and time could be transformed to each other. 2- Charge and time are equivalent. 3- The ultimate limit of the charge to time ratio is $c^3\sqrt{4\pi\varepsilon_0/G}$ in nature and that can never be reached. 4- Corresponding phenomenon to this equation in nature is black hole.

Fundamental relationship of charge-space:

Proportionality constant of the charge-space relationship will be obtained as follows:

$$[G]^{-1}.[4\pi\varepsilon_0].[c]^4 = \frac{kg.s^2}{m^3} \times \frac{C^2.s^2}{kg.m^3} \times \frac{m^4}{s^4} \quad \Rightarrow \quad \frac{C}{m} = \pm c^2\sqrt{\frac{4\pi\varepsilon_0}{G}}$$

Consequently, charge-space equation will be:

$$\frac{q}{l} = \pm c^2 \sqrt{\frac{4\pi\varepsilon_0}{G}} \;\; or \;\; \frac{\Delta q}{\Delta l} = \pm c^2 \sqrt{\frac{4\pi\varepsilon_0}{G}} \quad (Eq.11)$$

Eq.11 states that: 1- Charge and space could be transformed to each other. 2- Charge and space are equivalent. 3- The ultimate limit of the charge to space ratio is $c^2\sqrt{4\pi\varepsilon_0/G}$ in nature and that can never be reached. 4- Corresponding phenomenon to this equation in nature is black hole.

Fundamental relationship of mass-charge:

Proportionality constant of the mass-charge relationship will be obtained as follows:

$$[G].[4\pi\varepsilon_0] = \frac{m^3}{kg.s^2} \times \frac{C^2.s^2}{kg.m^3} \;\; \Rightarrow \;\; \frac{C}{kg} = \pm\sqrt{4\pi\varepsilon_0.G}$$

Accordingly, mass-charge equation will be:

$$\frac{m}{q} = \pm \frac{1}{\sqrt{4\pi\varepsilon_0.G}} \quad (Eq.12)$$

Eq.12 states that: 1- Mass and charge are equivalent. 2- The ultimate limit of the mass to charge ratio in fundamental particles is $1/\sqrt{4\pi\varepsilon_0/G}$. 3- Corresponding phenomenon to this equation in nature is black hole.

Fundamental relationship of temperature-mass:

Proportionality constant of the temperature-mass relationship will be obtained as follows:

$$[k_B].[\varepsilon_0].[\mu_0] = \frac{kg.m^2}{K.s^2} \times \frac{s^2}{m^2} \;\; \Rightarrow \;\; \frac{kg}{K} = +\frac{k_B}{c^2}$$

Accordingly, temperature-mass equation will be:

$$\frac{T}{m} = \frac{c^2}{k_B} \quad (Eq.13)$$

Eq.13 states that: 1- Temperature and mass are equivalent. 2- The ultimate limit of the temperature to mass ratio in nature is c^2/k_B. 3- Corresponding phenomenon to this equation is black hole.

Fundamental relationship of temperature-charge:

Proportionality constant of the temperature-charge relationship will be obtained as follows:

$$[G].[k_B]^2.[4\pi\varepsilon_0].[c]^{-4} = \frac{m^3}{kg.s^2} \times \frac{kg^2.m^4}{K^2.s^4} \times \frac{C^2.s^2}{kg.m^3} \times \frac{s^4}{m^4} \quad \Longrightarrow \quad \frac{C}{K} = \pm\frac{k_B}{c^2}\sqrt{G.4\pi\varepsilon_0}$$

Accordingly, temperature-charge equation will be:

$$\frac{T}{q} = \pm\frac{c^2}{k_B}\frac{1}{\sqrt{G.4\pi\varepsilon_0}} \quad (Eq.14)$$

Eq.14 states that: 1- Temperature and charge are equivalent. 2- The ultimate limit of the temperature to charge ratio in nature is $\frac{c^2}{k_B}1/\sqrt{G.4\pi\varepsilon_0}$. 3- Corresponding phenomenon to this equation is black hole.

We can also obtain the fundamental relations of the base quantities with energy and momentum:

$$E = \pm\frac{c^5}{G}t \ , \ E = \frac{c^4}{G}l \ , \ E = mc^2 \ , \ E = k_B T \ , \ E = \pm\frac{c^2}{\sqrt{4\pi\varepsilon_0.G}}q$$

$$p = \frac{c^4}{G}t \ , \ p = \pm\frac{c^3}{G}l \ , \ p = \pm mc \ , \ p = \pm\frac{k_B}{c}T \ , \ p = \pm\frac{c}{\sqrt{4\pi\varepsilon_0.G}}q$$

If we make the energy equations (or momentum ones) equivalent altogether, similar equations to ones 5-14 will be obtained. This shows that the energy and momentum equations don’t explain natural phenomena completely. In fact, a quantity called energy or momentum doesn’t exist in nature; yet we attribute this quantity to phenomena so that we could understand them much better. Therefore, energy equations are just equivalent equations. For example, in the fission process mass is not transformed into energy but it is transformed into temperature (heat) or space (mechanical energy). In other words, energy transformation from one shape to other shapes results from transformation of base quantities to each other. Conservation laws of energy and momentum exactly present this idea.

3. Space and time

If Eq.5 is the basis of special relativity, it should apply to Lorentz transformation equations, the heart of special relativity. Suppose that inertial reference frame S' moving with speed *v* relative to frame S, in the common positive direction of their horizontal axes. An observer in S reports space-time coordinates *l*, *t* for an event, and an observer in S' reports *l*', *t*' for the same event. These numbers are related to each other using Lorentz equations:

$$\Delta l' = \gamma(\Delta l - v\Delta t) \quad (Eq.15) \quad , \quad \Delta t' = \gamma(\Delta t - \frac{v\Delta l}{c^2}) \quad (Eq.16$$

The above equations are related to the coordinates of a single event as seen by two observers. Since Eq.5 describes space-time relationship of an observer, we should modify the Lorentz equations in a way that it could be used by an observer. For this purpose, if we coincide the event to inertial reference frame S', the event and the observer S' will be at the same place ($\Delta l'$=0) and at the same time ($\Delta t'$=0). By placing $\Delta l'$=0 and $\Delta t'$=0 in the Lorentz equations, equations will be obtained which describe space-time coordinates of an observer moving with speed of v relative to a single event. For the first equation of Lorentz equations we have:

$$\Delta l^{'} = \gamma(\Delta l - v\Delta t) \overset{\Delta l^{'}=0}{\Longrightarrow} \frac{\Delta l}{\Delta t} = v \quad (Eq. 17)$$

Eq.17 shows the space-time relationship between observer and event. For the second equation, we have:

$$\Delta t^{'} = \gamma\left(\Delta t - \frac{v\Delta l}{c^2}\right) \overset{\Delta t^{'}=0}{\Longrightarrow} \frac{\Delta l}{\Delta t} = \frac{c^2}{v} \quad (Eq. 18)$$

If we place Eq.17 in Eq.18 substituting v, we will get:

$$\frac{\Delta l}{\Delta t} = \pm c \quad (Eq. 19)$$

Eq.19 is exactly Eq.5 being the basis of the Lorentz equations and showing just the space-time relationship of an observer (not event). Moreover, if we place Eq.17 in Eq.18 alternating the Δl or Δt substitution, an equation will be obtained which shows the factor observer uses to measure space-time coordinates moving with speed of c (v=±c). As a result, the following equation should always be applicable to all observers moving in the inertial frame.

$$\frac{\Delta l}{\Delta t} = c$$

Any observer could pass a distance (or space) in any time interval. For being able to compare space-time coordinates of all observers, we could use the speed of observers substituting the space, by choosing one second time interval as time comparative reference. For example, if the observers 1 and 2 move with speed of v_1 and v_2 , the distance they travel in one second (as comparative time) will be $l_1=v_1$ and $l_2=v_2$,respectively. By considering this supposition, the maximum moved distance (or space) for an observer will be c. In order to prove that Eq.5 will explain the behavior of universe in addition to obtaining special relativity equations, suppose these 2 situations:

The first sate: Pay attention to this sentence: If we insert one second time interval in the equation $l=tc$, the space will be c (the maximum one). This would mean to a stationary observer that an observer is moving with the speed of light; but it would mean to an observer (or a clock) moving with the speed of light that the whole time is transformed into space. So, while it passed a length of time as one second to a stationary observer, time is stopped to a moving observer. The more it is decreased the maximum space (or speed of light) for a moving observer the more the space is transformed into time. For example, for an observer moving with the speed of 3×10^7m/s, ($\Delta l=3\times10^8-3\times10^7=$) 2.7×10^8m of the whole space is transformed into time. As a result, if we put 2.7×10^8m instead of space in the equation $l=tc$, the obtained time will be 0.9s meaning if one second is passed for an observer or clock at rest, 0.9s is passed for an observer moving with the speed of 3×10^7m/s from constant clock's point of view (time is slowing down for moving observer). In other words, 1 second will get longer for moving clock than stationary one. Consequently, if an observer at rest reports 5 second time interval for an event, the observer moving with the speed of 3×10^7m/s will report a larger value for this time interval being (5/0.9=) 5.55s in this example (time dilation).

Generally, it could be pointed out that if an observer moves with the speed of v, the scope of space, which is transformed into time, will be $\Delta l=c-v$. As a result, the time passing one second for a stationary observer will pass for a moving observer according to what is stated in the following equation:

$$\Delta t_1 = \frac{c-v}{c} \quad \Rightarrow \quad \Delta t_1 = 1-\frac{v}{c} \quad (Eq.20)$$

If the observer is at rest in Eq.20, the time will get that reference time of one second meaning the stationary observer just moves in the time. If the observer moves with the speed of light, time will come to a stop in his point of view, and he will just move in space.

If the stationary observer measures Δt_0 as the time of an event, the moving observer measures a larger time interval for that event from the stationary observer's point of view according to the following equation:

$$\Delta t_1 = \frac{\Delta t_0}{1-\frac{v}{c}} \quad (Eq.21)$$

Since the equation $l=tc$ should always be applied to the observers, length should also be contracted according to the following equation by slowing down the time as the effect of moving.

$$\Delta l_1 = \Delta l_0\left(1-\frac{v}{c}\right) \quad (Eq.22)$$

The second state: We just saw that for the observer moving with the speed of v, the scope of the space which is transformed into time is $\Delta l=c-v$. If we suppose $\Delta l^2=c^2-v^2$ in this situation, the time passed as one second for the stationary observer will be as follows for the moving observer:

$$\Delta {t_2}^2 = \frac{c^2 - v^2}{c^2} \quad \Rightarrow \quad \Delta t_2 = \sqrt{1-(v/c)^2} \quad (Eq.23)$$

Supposing this theory, time dilation and length contractions' equations could also be shown by Eq.24 and Eq.25, respectively:

$$\Delta t_2 = \frac{\Delta t_0}{\sqrt{1-(v/c)^2}} \quad (Eq.24) \quad , \quad \Delta l_2 = \Delta l_0\sqrt{1-(v/c)^2} \quad (Eq.25)$$

The dimensionless ratio of c/v is often replaced by $\beta_{l/t}$ in Eq.24 and Eq.25, called speed parameter, and the dimensionless inverse square root which is shown by $\gamma_{l/t}$ is called the Lorentz factor. If the stationary observer reports a 5 second time interval for an event, the time interval which will be obtained from Eq.24 for the observer moving with the speed of 3×10^7m/s is 5.025s. Comparing these two situations, it can be deduced that the time dilation obtained by Eq.21 is always larger than that obtained by Eq.24 and the larger the Δt_0, the larger this difference. Now, these two questions might be asked, first, which equation gives us the true result, and second, what is the relationship between these two situations?

If Eq.24 is divided by Eq.21 and the resulted equation is rewritten by inserting $f=1/\Delta t$, we will get this equation:

$$\frac{f_1}{f_2} = \sqrt{\frac{1-\beta_{l/t}}{1+\beta_{l/t}}} \quad , \quad (\beta_{l/t} = \frac{l/t}{c} = \frac{v}{c}) \quad (Eq.26)$$

The above equation is not Doppler Effect but also shows a Cosmological redshift or universe's expansion. We have just used the positive form of Eq.5, $l=tc$, until here. But if we suppose the negative form of this equation, the signs in front of both $\beta_{l/t}$ symbols in Eq.26 will be reversed and will result in an equation which shows universe' contraction. On the other hand, while the universe is getting older, the amount of Δt_0 increases and the difference between Δt_1 and Δt_2 gradually becomes larger, which causes acceleration in decreasing f_1/f_2. Therefore, the speed of galaxies' moving away should be regularly accelerated; this means that universe's expansion should be accelerating. This expansion continues until galaxies move away from each other with the speed of light. In this state, $\beta_{l/t}$ =1 and f_1/f_2=0 and with times' coming to stop, universe's expansion will be terminated.

Symmetrically, from the above discussion, some important points can be concluded about universal equations of relativity:

1- These equations are universal and describe the behavior of the universe in large scale.
2- In the equations including the t quantity, the sign ± shows the accelerated contraction and expansion of the universe.
3- We can use the equations of the special relativity when we are not taking the universe's expansion into account in our calculations. So, the equations of the special relativity are only specific states of these equations.

The trend used to obtain the relativistic equations of Eq.5 will be used for the other universal relativity equations in the following discussion.

4. Mass and space-time

The equation $m/t=c^3/G$ states that the rate at which time passes on a clock is influenced by mass (or gravitational field). If we insert the one second time interval in this equation, mass will become c^3/G, and this means that all the time is transformed into mass. So, for the observer existing on such a mass, time will stop. Symmetrically, relativity equations could be written as follows:

First state; by considering the universe expansion: Time gets slower in the presence of mass according to the following equation:

$$\Delta t_1 = 1 - \frac{m/t}{c^3/G}$$

For the observer not being in the gravitational field (m=0), time will be reference time of one second. Furthermore, if this observer reports time interval Δt_0 for an event, the other observer being in the gravitational field will report a larger time interval (gravitational time dilation):

$$\Delta t_1 = \frac{\Delta t_0}{1 - \frac{m/t}{c^3/G}} \quad (Eq. 27)$$

Second state; without considering the universe expansion: Time gets slower in the presence of mass according to the following equation:

$$\Delta t_2 = \sqrt{1 - (\frac{m/t}{c^3/G})^2}$$

And the amount of time dilation is obtained from the following equation:

$$\Delta t_2 = \frac{\Delta t_0}{\sqrt{1 - (\frac{m/t}{c^3/G})^2}} \quad (Eq. 28)$$

We can define Lorentz factor matching Eq.6 ($\gamma_{m/t}$) similar to the former state as follows:

$$\gamma_{m/t} = \frac{1}{\sqrt{1 - (\frac{m/t}{c^3/G})^2}} \quad (Eq. 29)$$

If we insert Eq.5 instead of *t* in Eq.6, Eq.7 will be obtained. So, *t* in Eq.6 is the distance from the center of the mass (*l*) which is stated according to the time in which light travels this distance. The sum of Eq.6 and Eq.7 shows the space-time relation with mass. Because of that, by combining of these two equations, space-time coordinates of the observers in presence of the mass could be obtained. If we insert Eq.5 in Eq.27 and Eq.28 instead of *t*, following two new equations are obtained which are easy to use and understand:

$$\Delta t_1 = \frac{\Delta t_0}{1 - \frac{m/l}{c^2/G}} \quad (Eq. 30) \ : by\ considering\ universe\ expansion$$

$$\Delta t_2 = \frac{\Delta t_0}{\sqrt{1 - (\frac{m/l}{c^2/G})^2}} \quad (Eq. 31) \ : without\ considering\ universe\ expansion$$

For example, Eq.31 shows that the longer the distance of the observer or the clock from the center of the mass, the more time gets slower. Since the value of the ultimate limit of the mass to length ratio is large, slowing down of the time caused by the presence of the mass for massive bodies such as planets and stars is of importance. For earth planet, the nearest distance from the center of the mass is its surface, and in this condition space (*l*) becomes equal with the radius of the earth. If there is a mass coordinate which applies to Eq.6 and Eq.7, time will stop in the surface of such a mass according to Eq.28 and Eq.31. On the other hand, since time stops in the surface of black holes, Eq.6 and Eq.7 should be its coordinates. These two equations also show that contrary to popular belief, mass and volume of the black holes cannot be infinite and zero, respectively. The equation *l*=*tc* should always be applied to the observer; so, with slowing down of the time in the presence of the mass, length should also be contacted according to the following equation:

$$\Delta l_1 = \Delta l_0 \left(1 - \frac{m/l}{c^2/G}\right) \ (Eq. 32) \ : by\ considering\ universe\ expansion$$

$$\Delta l_2 = \Delta l_0 \sqrt{1 - (\frac{m/l}{c^2/G})^2} \quad (Eq. 33) \quad : without\ considering\ universe\ expansio$$

Eq.33 tells us that the less the distance of the observer or the clock from the mass centers of a body, the more the length contracts. If man lived on the moon, he would be a little taller but time would pass a little faster instead. If an observer moves with the speed of light, time stops and length becomes zero for him but Eq.6 and Eq.7 state that no mass can possess zero time and length. This shows that nobody can reach the speed of light.

If Eq.31 be divided by Eq.30 and the obtained equation is rewritten by inserting f=1/Δt, we will get this equation:

$$\frac{f_1}{f_2} = \sqrt{\frac{1 - \beta_{m/l}}{1 + \beta_{m/l}}} \ , \ (\beta_{m/l} = \frac{m/l}{c^2/G}) \quad (Eq. 34)$$

From the above equation, some results could be obtained:

1. This equation shows expansion of the universe. So, the sign ± in Eq.6 shows the expansion and contraction of the universe.
2. In order for the space (universe) to be expanded, the state $\beta_{m/l} \neq 0$ should be established. It means that the mass should be transformed into space. So, it can be concluded that space is transformed into mass in the contraction stage of the universe.
3. As time passes (increase in the amount of Δt_0), the difference between f_1 and f_2 increases progressively resulting in the accelerating expansion of the universe. So, more mass should be transformed into space any second. The world expansion continues until all the mass of the universe is transformed into space.
4. Because Eq.6 and Eq.7 apply to the black holes, the transformation of the mass into space should happen in the black holes.

At the end of this section, this point should be considered that the relativistic equations of mass cannot be obtained from Eq.6 and Eq.7 because these two equations show the relation between space-time and mass (not vice verse). In fact, when mass is influenced by the force, it has meanings and can be measured. So, to obtain the relativistic equation of mass, we should first obtain the relativistic equation of force.

5. Force

First, we write the general form of the force equation according to the following relation:

$$F = \frac{m.l}{t.t} \quad (Eq. 35)$$

Speed and force are two very important quantities in physics one of which is the basis of the special relativity and the other is the basis of the general relativity. All the equations which could be obtained from combination of *m*/*t*, *m*/*l* and *l*/*t* could be shown only with two quantities of speed and force. For example:

$$\frac{m}{l} = \frac{F}{v^2} \quad , \quad \frac{m}{t} = Fv \quad , \quad \frac{l}{t} = v \quad , \quad \frac{m^2}{l.t} = \frac{F^2}{v^3} \quad , \quad \frac{m.t}{l^2} = \frac{F}{v^3} \quad and \ ...$$

As a result, if speed has the ultimate limit of *c*, force also should have an ultimate limit. If we insert Eq.5 and Eq.6 in Eq.35, the ultimate limit of the force should be c^4/G.

$$F = \frac{m}{t} . \frac{l}{t} = \left(\pm \frac{c^3}{G} \right) . (\pm c) \ \Rightarrow \ F = + \frac{c^4}{G}$$

The corresponding phenomenon with ultimate limit of the speed is light. Symmetrically, the corresponding phenomenon with ultimate limit of the force should be in nature which is (surface of) black hole. To obtain the relativistic equation of force, we should first obtain the Lorentz factor (γ_F) of the force according to the following equation:

$$F = \gamma_{m/t} \cdot \gamma_{l/t} \frac{m.l}{t.t} \quad (Eq. 36) \ \Rightarrow \ \gamma_F = \gamma_{m/t} \cdot \gamma_{l/t}$$

If we multiply the Lorentz factor of mass-time ($\gamma_{m/t}$) and speed ($\gamma_{l/t}$), we will get this equation:

$$\gamma_F = \frac{1}{\sqrt{1 - (\frac{l/t}{c})^2 + (\frac{m.l/t.t}{c^4/G})^2 - (\frac{m/t}{c^3/G})^2}} \ or \ \gamma_F = \frac{1}{\sqrt{1 - (\frac{v}{c})^2 + (\frac{F}{c^4/G})^2 - (\frac{m/t}{c^3/G})^2}} (Eq. 37)$$

Eq.37 shows the general form of Lorentz factor of force, and depending on conditions, it can be simplified. For example:

1. If a stationary body is being influenced by the gravitational force:

$$\gamma_F = \frac{1}{\sqrt{1 + (\frac{F}{c^4/G})^2}}$$

So, the relativistic form of the Newton's law of gravitation will be accordingly:

$$F = \frac{G \frac{m_1 m_2}{r^2}}{\sqrt{1 + (\frac{G \frac{m_1 m_2}{r^2}}{c^4/G})^2}} \quad (Eq. 38)$$

In the above equation, it should be considered that although Gm_1m_2/r^2 can have any quantity; force (F) can never become equal to c^4/G. In other words, we cannot reach the ultimate limit of force.

2. If a body influenced by a force gets a quick movement with constant acceleration, the relativistic form of the Newton's second law will be:

$$F = \frac{ma}{\sqrt{1 + (\frac{ma}{c^4/G})^2}} \quad (Eq.39)$$

3. If a body moves with constant speed on a circular route:

$$\gamma_F = \frac{1}{\sqrt{1 - (\frac{v}{c})^2 + (\frac{F}{c^4/G})^2}}$$

In this condition, the relativistic form of centripetal force is:

$$F = \frac{\frac{mv^2}{r}}{\sqrt{1 - (\frac{v}{c})^2 + (\frac{mv^2/r}{c^4/G})^2}} \quad (Eq.40)$$

In order for a stationary body to reach the speed of light, it should be accelerated using ultimate force. Based on the above equations, we can never reach the ultimate force, meaning that no particle can reach the speed of light.

6. Dark matter

Orbital motion of the planets of the solar system obey the Newton's laws so that with an increase in the distance from the center of it, rotational speed of the planets around the sun decreases independent of their masses. But in galaxies, for clusters of stars which are scattered in the different distances from the galaxy center, the observed rotational speed remains unchanged with an increase in the far spaces. The only explanation of this issue is that the galaxy should have much more mass than what we see. Since this matter cannot be seen, it is called dark matter. It has been years that physicists have been uselessly searching for explanation of dark matter, and no satisfying results have been obtained so far.

If we take a look at Eq.38-40, we can see that the acceleration of bodies' free fall and the rotational speed of the material rotating around the more massive material are not independent of mass in the high forces. In the solar system, the forces' quantities are not that much high; so, the relativistic equations of force are not important; but in the galaxies, force's quantity can near the limit amount because of the existence of massive black holes and a large number of stars so that rotation speed of a star cluster should obey the following equation:

$$\frac{G\frac{m_1 m_2}{r^2}}{\sqrt{1+(\frac{G\frac{m_1 m_2}{r^2}}{c^4/G})^2}} = \frac{\frac{m_1 v^2}{r}}{\sqrt{1-(\frac{v}{c})^2+(\frac{m_1 v^2/r}{c^4/G})^2}} \quad (Eq. 41)$$

If we solve Eq.39 for m and insert $m_0=F/a$ in it, the following relation will be obtained. Meanwhile, if we use a similar trend for Eq.38, we will get the following equation:

$$m = \frac{m_0}{\sqrt{1-(\frac{F}{c^4/G})^2}} \quad (Eq. 42)$$

The above equation is the true relation of relativistic mass (inertial mass and gravitational mass) stating that if the force influencing a material be equal to the limit force, the mass of the material becomes infinite. In the galaxies, a high amount of force is applied to the star clusters which are in the far distance from the center of the galaxy's mass because of the existence of a large quantity of mass, and this causes their real mass to be more than our estimations. So, it seems that dark matter is a simple relativity of force.

7. Temperature and space-time

Equation $T=tc^5/G.k_B$ states that the rate at which time passes on a clock is influenced by temperature. If we insert the one second time interval in this equation, the temperature becomes $c^5/G.k_B$ and all the time is transformed into temperature. So, for the observer being in this temperature, time stops. The relativity equations can be written as follows:

First state; by considering the universe expansion: Time gets slower in the presence of the temperature according to the following equation:

$$\Delta t_1 = 1 - \frac{T/t}{\frac{c^5}{G.k_B}}$$

For the observer being in the temperature of absolute zero (T=0), time will be reference time of one second. Furthermore, if this observer reports Δt_0 time interval for an event, the other observer being in the temperature T will report larger time interval (thermal time dilation):

$$\Delta t_1 = \frac{\Delta t_0}{1-\frac{T/t}{c^5/G.k_B}} \quad (Eq. 43)$$

Second state; without considering the universe expansion: In this state, time for an observer being in a temperature gets slower according to the following equation:

$$\Delta t_2 = \sqrt{1-(\frac{T/t}{c^5/G.k_B})^2}$$

And the quantity of time dilation is calculated using the following equation:

$$\Delta t_2 = \frac{\Delta t_0}{\sqrt{1-(\frac{T/t}{c^5/G.k_B})^2}} \quad (Eq.44)$$

Moreover, if we replace *t* in Eq.8 with Eq.5, Eq.9 will be obtained. So, in Eq.8, *t* quantity is the distance from the center of temperature (*l*) which is stated according to the time light passes this distance. So, by combining these two equations, we can obtain the space-time coordinates of the observers with temperature. If we replace *t* quantity in Eq.43 and Eq.44 with Eq.5, the following two new equations are obtained:

$$\Delta t_1 = \frac{\Delta t_0}{1-\frac{T/l}{c^4/G.k_B}} \quad (Eq.45) \qquad \Delta t_2 = \frac{\Delta t_0}{\sqrt{1-(\frac{T/l}{c^4/G.k_B})^2}} \quad (Eq.46)$$

Eq.46 shows that the less the distance of the observer or clock from the center of the temperature of a body, the more time gets slower. Since the ultimate limit of the temperature to length ratio is a very big number, time's slowing down caused by the temperature for the universe we know is insignificant. On the other hand, since time stops in the surface of the black hole, Eq.8 and Eq.9 must be the coordinates of the black holes. Additionally, since the equation *l*=*tc* should always be applicable for the observers, by slowing down the time in the presence of the heat, the length should also be contracted according to the following equation:

$$\Delta l_1 = \Delta l_0 \left(1-\frac{T/l}{c^4/G.k_B}\right) \; (Eq.47) \; : by\ considering\ universe\ expansion$$

$$\Delta l_2 = \Delta l_0 \sqrt{1-(\frac{T/l}{c^4/G.k_B})^2} \; (Eq.48) \; : without\ considering\ universe\ expansion$$

Eq.48 tells us that the less the distances of an observer or a clock from the temperatures center of a body, the more the length contracts. If Eq.46 is divided by Eq.45 and the obtained equation is rewritten by inserting *f*=1/Δ*t*, we will get this equation:

$$\frac{f_1}{f_2} = \sqrt{\frac{1-\beta_{T/l}}{1+\beta_{T/l}}} \;,\; (\beta_{T/l} = \frac{T/l}{c^4/G.k_B}) \; (Eq.49)$$

From the above equation, some results are obtained:

1- This equation shows the expansion of the universe. So, the sign ± in Eq.8 shows the contraction and expansion of the universe. In order for the space (universe) to expand, $\beta_{T/l} \neq 0$. It means that the temperature should be transformed into space. So, it can be concluded that the space is transformed into the temperature in the contraction stage of the universe.
2- As time passes (increase in the quantity of Δt_0), the difference between f_1 and f_2 enlarges progressively which causes the expansion of the universe to be accelerated. The expansion of the universe continues until all the universe's temperature is transformed into space (thermal death).
3- Because Eq.8 and Eq.9 are applicable in the black holes, the transformation of the temperature into space should happen in the black holes.

8. Charge and space-time

Equation $q = tc^3\sqrt{\frac{4\pi\varepsilon_0}{G}}$ could mean that the charge (electric field) could change the rate at which time passes on a clock. If we insert the one second time interval in this equation, the charge becomes $c^3\sqrt{4\pi\varepsilon_0/G}$ and all the time is transformed into charge. So, for the observer being in the presence of such a charge, time comes to a stop. We can write the relativity equations similar to the former sections accordingly:

First state; by considering the universe expansion: Time gets slower in the presence of an electrical charge according to the following equation:

$$\Delta t_1 = 1 - \frac{q/t}{c^3\sqrt{4\pi\varepsilon_0/G}}$$

For the observer who has not been set in the electrical field (q=0), time will be the reference time of one second. If this observer reports Δt_o as time interval for an event, the other observer being in the electrical field of the electric charge reports larger time interval (electrical time dilation):

$$\Delta t_1 = \frac{\Delta t_0}{1 - \frac{q/t}{c^3\sqrt{4\pi\varepsilon_0/G}}} \quad (Eq.50)$$

The second state; without considering the universe expansion: In this condition, time gets slower for the observer being in an electrical field according to the following equation:

$$\Delta t_2 = \sqrt{1-(\frac{q/t}{c^3\sqrt{4\pi\varepsilon_0/G}})^2}$$

And the amount of time dilation is calculated according to the following equation:

$$\Delta t_2 = \frac{\Delta t_0}{\sqrt{1-(\frac{q/t}{c^3\sqrt{4\pi\varepsilon_0/G}})^2}} \quad (Eq.51)$$

Also, if we replace *t* quantity in Eq.10 with Eq.5, Eq.11 is obtained. So, in Eq.10, *t* quantity is the renowned distance from the center of the charge (*l*), which is stated according to the time light passes this distance. If we replace *t* quantity in Eq.50 and Eq.51 with Eq.5, the following two new equations are obtained:

$$\Delta t_1 = \frac{\Delta t_0}{1-\frac{q/l}{c^2\sqrt{4\pi\varepsilon_0/G}}} \quad (Eq.52) \qquad \Delta t_2 = \frac{\Delta t_0}{\sqrt{1-(\frac{q/l}{c^2\sqrt{4\pi\varepsilon_0/G}})^2}} \quad (Eq.53)$$

Eq.53 shows the less the distance of an observer or a clock from the center of the charge the more time gets slower. On the other hand, because time stops in the surface of the black hole, Eq.10 and Eq.11 must be the coordinates of the black holes. By slowing down the time in the presence of electric field, length should be contracted according to the following equation:

$$\Delta l_1 = \Delta l_0\left(1-\frac{q/l}{c^2\sqrt{4\pi\varepsilon_0/G}}\right) \quad (Eq.54) \quad : by\ considering\ universe\ expansion$$

$$\Delta l_2 = \Delta l_0\sqrt{1-(\frac{q/l}{c^2\sqrt{4\pi\varepsilon_0/G}})^2} \quad (Eq.55) \quad : without\ considering\ universe\ expansion$$

If Eq.53 is divided by Eq.52 and the obtained equation is reformed by inserting f=1/Δt, we will get this equation:

$$\frac{f_1}{f_2} = \sqrt{\frac{1-\beta_{q/l}}{1+\beta_{q/l}}} \quad , \quad (\beta_{q/l} = \frac{q/l}{c^2\sqrt{4\pi\varepsilon_0/G}}) \quad (Eq.56)$$

From the above equation, some results may be obtained:

1- This equation shows the accelerated expansion of the universe.
2- In order for the universe to expand, $\beta_{q/l}\neq 0$; this means that the charge should be transformed into the space. So, it can be concluded that space is transformed into charge in the stage of contraction of the universe.
3- The expansion of the universe continues until all the charge of the universe is transformed into the space.

4- Because Eq.10 and Eq.11 are applicable in the black holes, the transformation of the charge into space should happen in the black holes.

In all the universal equations of relativity including charge, there is the sign ± which may point out that there are two types of charges. Anyway, if the temperature and charge influence the rate at which time passes on the clock, they should follow the equations which were discussed earlier.

9. Mass, charge and temperature

The relativity equations which relate mass, charge and temperature (Eq.12, Eq.13 and Eq.14) can be obtained from the combination of the other universal equations; so, these equations must also be applicable in the black holes. Furthermore, this shows that firstly, these equations are equivalent, and secondly, they cannot be directly converted to each other; yet they influence on each other indirectly and from space-time. For example, if a material has the nonzero temperature, it can radiate light (space), and light also can produce electron-positron pair (mass and charge). Based on what is described, similar equations can be written for these three quantities. If we replace the mass quantity in the Newton's gravitational law with Eq.12, Coulomb's law is obtained. Also, if we replace the mass quantity with Eq.13, we reach this equation:

$$F = \frac{G.{k_B}^2}{c^4}\frac{T_1 T_2}{r^2} \quad (Eq.57)$$

The above equation tells us that the two bodies with the temperatures T_1 and T_2 which are set in the distance of r from each other influence each other using a force proportional to the temperatures of these two bodies and opposite square root of their distance. The truth of the gravitational and Columba's laws gives us the hope that Eq.57 also has a physical meaning. Because the constant of Eq.57 is very little, this force will be the weakest in nature. We can also relate the relativistic equations of charge and temperature with force accordingly:

$$T = \frac{T_0}{\sqrt{1-(\frac{F_T}{c^4/G})^2}} \ (Eq.58) \ : \ F_T = \frac{G.{k_B}^2}{c^4}\frac{T_1 T_2}{r^2} \qquad q = \frac{q_0}{\sqrt{1-(\frac{F_q}{c^4/G})^2}} \ (Eq.59) \ : \ F_q = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$$

The above equations can clearly show that mass, charge and temperature are three different aspects of one thing (space).

10. Classical equations derived from universal equations of relativity

Newtonian mechanics: All the Newtonian mechanics equations can be obtained by combining the three base quantities of *t*, *l*, and *m*. On the other hand, as it was mentioned before, all the equations obtained by the combination of *m/t*, *m/l*, and *l/t* can be represented by only two quantities of velocity (*v*) and force (*F*). We should therefore be able to derive the basic and fundamental equations of Newtonian mechanics from the universal relativity equations. The starting point is the fact that although there are phenomena such as light and black hole in nature corresponding to the ultimate speed and force limit, as it was proved before, we can never reach these limit values. Therefore, if we replace c and c^4/G with v and F in the universal relativity equations, respectively, non-relativistic equations are obtained which can be used for the description of the phenomena around us. For example,

1. By replacing c with v in $p=mc$, an equation is obtained that shows the linear momentum of a particle moving with a constant speed of v ($p=mv$).
2. If c^4/G and F are exchanged in $p= t\ c^4/G$, the second law of Newton in terms of momentum is obtained ($F=dp/dt$). If the obtained momentum equation is inserted in a new equation, the second law of Newton is also obtained ($F=ma$).
3. If c^4/G is replaced with F quantity in $E= l\ c^4/G$, an equation is obtained to work with ($dW=F.dl$).
4. The law of gravitation, Coulomb's law, and Eq.57 can be derived from the universal relativity equations as follows:

$$\frac{m}{l}=\frac{c^2}{G} \Rightarrow \frac{m^2}{l^2}=\frac{c^4}{G.G} \overset{F=\frac{c^4}{G}}{\Longrightarrow} \boxed{F=G\frac{m^2}{l^2}\ \ or\ \ F=G\frac{m_1m_2}{r^2}}$$

$$\frac{q}{l}=\pm c^2\sqrt{\frac{4\pi\varepsilon_0}{G}} \Rightarrow \frac{q^2}{l^2}=\frac{4\pi\varepsilon_0.c^4}{G} \overset{F=\frac{c^4}{G}}{\Longrightarrow} \boxed{F=\frac{1}{4\pi\varepsilon_0}\frac{q^2}{l^2}\ \ or\ \ F=\frac{1}{4\pi\varepsilon_0}\frac{q_1q_2}{r^2}}$$

$$\frac{T}{l}=\frac{c^4}{G.k_B} \Rightarrow \frac{T^2}{l^2}=\frac{c^8}{G^2.{k_B}^2} \overset{F=\frac{c^4}{G}}{\Longrightarrow} \boxed{F=\frac{G.{k_B}^2}{c^4}\frac{T^2}{l^2}\ \ or\ \ F=\frac{G.{k_B}^2}{c^4}\frac{T_1T_2}{r^2}}$$

The following equations are other forms of the above equations expressing that force is transferred at the speed of light:

$$\frac{m}{t}=\frac{c^3}{G} \Rightarrow \frac{m^2}{t^2}=\frac{c^6}{G^2} \overset{F=\frac{c^4}{G}}{\Longrightarrow} \boxed{F=\frac{G}{c^2}\frac{m^2}{t^2}\ \ or\ \ F=\frac{G}{c^2}\frac{m_1m_2}{t^2}}$$

$$\frac{q}{t} = \pm c^3\sqrt{\frac{4\pi\varepsilon_0}{G}} \implies \frac{q^2}{t^2} = \frac{4\pi\varepsilon_0 . c^6}{G} \overset{F=\frac{c^4}{G}}{\Longrightarrow} \boxed{F = \frac{1}{c^2 . 4\pi\varepsilon_0}\frac{q^2}{t^2} \ \ or\ \ F = \frac{1}{c^2 . 4\pi\varepsilon_0}\frac{q_1 q_2}{t^2}}$$

$$\frac{T}{t} = \frac{c^5}{G . k_B} \implies \frac{T^2}{t^2} = \frac{c^{10}}{G^2 . {k_B}^2} \overset{F=\frac{c^4}{G}}{\Longrightarrow} \boxed{F = \frac{G . {k_B}^2}{c^6}\frac{T^2}{t^2} \ \ or\ \ F = \frac{G . {k_B}^2}{c^6}\frac{T_1 T_2}{t^2}}$$

Other equations of Newtonian mechanics are obtained by performing mathematical operations on these equations.

Maxwell equations: Maxwell equations are relativistic by nature and do not change under the light of relativity theory; therefore, we should also be able to obtain them. The starting point is the relation between the following equations:

$$\frac{l}{t} = c \quad (Eq. 60) \qquad \frac{E}{B} = c \quad (Eq. 61)$$

Symmetrically, the *E/B=c* denotes that the electric field and magnetic field can be transformed into each other. The above two equations show the values of the ultimate limit and *v* should replace *c* so that the phenomena around us is observable:

$$\frac{l}{t} = v \quad (Eq. 62) \qquad \frac{E}{B} = v \quad (Eq. 63)$$

Eq.63 shows that the transformation of electric and magnetic fields is carried out through space-time (*motion*). Therefore, this equation should be a base for Maxwell equations.

1- Faraday's law of induction: Eq.63 can be written as follows:

$$\frac{E}{B} = \frac{dx}{dt}$$

By multiplying the side of the equation by *ds* we will have:

$$\vec{E} . ds = \frac{dA}{dt} . \vec{B} \implies \oint \vec{E} . ds = \frac{d\Phi_B}{dt}$$

The above equation is the very Faraday's induction law which states that the magnetic field induces electric field by varying the magnetic field with time.

2- Maxwell law: the magnitude of the magnetic field resulting from the moving charge or electric current is calculated by the following equation:

$$dB = \frac{\mu_0}{4\pi}\frac{i . ds}{r^2} \quad or \quad B = \frac{\mu_0}{4\pi}\frac{q . v}{r^2}$$

The magnitude of the electric field resulting from stationary charge is also shown by the following equation:

$$E = \frac{1}{4\pi\varepsilon_0}\frac{q}{r^2}$$

If the above two equations are divided by each other we will have:

$$\frac{E}{B} = \frac{c^2}{v} \quad (Eq.64)$$

Eq.64 is similar to Eq.18 and shows that the special relativity and Maxwell equations result from a fact (space-time transformation). If we replace *v* with its own differential form (*dl/dt*) and multiply the sides of the equation by *ds* Maxwell law is obtained:

$$\oint \vec{B}.ds = \varepsilon_0\mu_0 \frac{d\Phi_E}{dt}$$

By placing Eq.63 in Eq.64 an equation ($E/B=\pm c$ or $v=\pm c$) is obtained that denotes that electric and magnetic fields are transferred at the speed of light. Also, if *E* is replaced with Eq.63 in $F=qE$, an equation is obtained ($F=qvB$) showing the magnitude of the force imposed on the moving charged particle in a magnetic field. The recent equation expresses that the magnetic field in a stationary charge frame is observed as an electric field.

11. Quantum universal equations

As it was observed, the relativity universal equations are derived from the ratio of the base quantities and the proportionality constant of these equations is a combination of four fundamental constants of physics (i.e. ε_0, G, μ_0 and k_B). Now, this question might arise that whether the product of the base quantities can also provide meaningful relations. The answer to this question is positive. In addition to the fundamental constants that have been used so far, we need another fundamental constant to obtain the proportionality constant of new equations. This fundamental constant is Planck constant (*h*). Since this constant is the sign of quantum and the values of the proportionality constant of these equations are a very small number, it is therefore expected that the new equations are the very quantum universal equations which are important at quantum scale. These equations can be obtained as follows:

Quantum fundamental relationship of space-time

Proportionality constant of the quantum relationship of space-time will be obtained as follows:

$$[G].[h].[\varepsilon_0]^2.[\mu_0]^2 = \frac{m^3}{kg.s^2} \times \frac{kg.m^2}{s} \times \frac{s^4}{m^4} \quad \Longrightarrow \quad m.s = +\frac{hG}{c^4}$$

Consequently, quantum equation of space-time will be:

$$l.t = n\frac{hG}{c^4} \quad or \quad \Delta l.\Delta t = n\frac{hG}{c^4} \quad (Eq.65)$$

Eq.65 states: 1- Space and time could be transformed to each other. 2- Space and time are equivalent. 3- The lowest limit of the product of space-time is hG/c^4 in nature and that can never be reached. 4- Corresponding phenomenon to this equation is light. 5- Light is an integer multiple of Planck length.

Quantum fundamental relationship of mass-time:

Proportionality constant of the quantum relationship of mass-time will be obtained as follows:

$$[h].[\varepsilon_0].[\mu_0] = \frac{kg.m^2}{s} \times \frac{s^2}{m^2} \quad \Longrightarrow \quad kg.s = +\frac{h}{c^2}$$

Consequently, quantum equation of mass-time will be:

$$m.t = n\frac{h}{c^2} \quad or \quad \Delta m.\Delta t = n\frac{h}{c^2} \quad (Eq.66)$$

Eq.66 states that: 1- Mass and time could be transformed to each other. 2- Mass and time are equivalent. 3- The lowest limit of the product of mass-time is h/c^2 in nature and that can never be reached. 4- Corresponding phenomenon to this equation is quantum black hole. 5- Quantum black hole is an integer multiple of Planck mass.

Quantum fundamental relationship of mass-space:

Proportionality constant of the quantum relationship of mass-space will be obtained as follows:

$$[h]^2.[\varepsilon_0].[\mu_0] = \frac{kg^2.m^4}{s^2} \times \frac{s^2}{m^2} \quad \Longrightarrow \quad kg.m = \pm\frac{h}{c}$$

Consequently, quantum equation of mass-space will be:

$$m.l = \pm n\frac{h}{c} \quad or \quad \Delta m.\Delta l = \pm n\frac{h}{c} \quad (Eq.67)$$

Eq.67 states that: 1- Mass and space could be transformed to each other. 2- Mass and space are equivalent. 3- The lowest limit of the product of mass-space is h/c in nature and that can never be reached. 4- Corresponding phenomenon to this equation is quantum black hole. 5- Quantum black hole is an integer multiple of Planck mass.

Quantum fundamental relationship of temperature-time:

Proportionality constant of the quantum relationship of temperature-time will be obtained as follows:

$$[h].[k_B]^{-1} = \frac{kg.m^2}{s} \times \frac{K.s^2}{kg.m^2} \quad \Rightarrow \quad K.s = +\frac{h}{k_B}$$

Consequently, quantum equation of temperature-time will be:

$$T.t = n\frac{h}{k_B} \quad or \quad \Delta T.\Delta t = n\frac{h}{k_B} \quad (Eq.68)$$

Eq.68 states that: 1- Temperature and time could be transformed to each other. 2- Temperature and time are equivalent. 3- The lowest limit of the product of temperature-time is h/k_B in nature and that can never be reached. 4- Corresponding phenomenon to this equation is quantum black hole. 5- Quantum black hole is an integer multiple of Planck temperature.

Quantum fundamental relationship of temperature-space:

Proportionality constant of the quantum relationship of temperature-space will be obtained as follows:

$$[h]^2.[k_B]^{-2}.[\varepsilon_0]^{-1}.[\mu_0]^{-1} = \frac{kg^2.m^4}{s^2} \times \frac{K^2.s^4}{kg^2.m^4} \times \frac{m^2}{s^2} \quad \Rightarrow \quad K.m = \pm\frac{h.c}{k_B}$$

Consequently, quantum equation of temperature-space equation will be:

$$T.l = \pm n\frac{hc}{k_B} \quad or \quad \Delta T.\Delta l = \pm n\frac{hc}{k_B} \quad (Eq.69)$$

Eq.69 states that: 1- Temperature and space could be transformed to each other. 2- Temperature and space are equivalent. 3- The lowest limit of the product of temperature-time is hc/k_B in nature and that can never be reached. 4- Corresponding phenomenon to this equation is quantum black hole. 5- Quantum black hole is an integer multiple of Planck temperature.

Quantum fundamental relationship of charge-time:

Proportionality constant of the quantum relationship of charge-time will be obtained as follows:

$$[G].[4\pi\varepsilon_0].[h]^2.[c]^{-4} = \frac{m^3}{kg.s^2} \times \frac{C^2.s^2}{kg.m^3} \times \frac{kg^2.m^4}{s^2} \times \frac{s^4}{m^4} \quad \Rightarrow \quad C.s = \pm\frac{h}{c^2}\sqrt{G.4\pi\varepsilon_0}$$

Consequently, quantum equation of charge-time will be:

$$q.t = \pm n\frac{h}{c^2}\sqrt{G.4\pi\varepsilon_0} \quad or \quad \Delta q.\Delta t = \pm n\frac{h}{c^2}\sqrt{G.4\pi\varepsilon_0} \quad (Eq.70)$$

Eq.70 states that: 1- Charge and time could be transformed to each other. 2- Charge and time are equivalent. 3- The lowest limit of the product of charge-time is $h/c^2\sqrt{4\pi\varepsilon_0 . G}$ in nature and that can never be reached. 4- Corresponding phenomenon to this equation is quantum black hole. 5- Quantum black hole is an integer multiple of Planck charge.

Quantum fundamental relationship of charge-space:

Proportionality constant of the quantum relationship of charge-space will be obtained as follows:

$$[G].[4\pi\varepsilon_0].[h]^2.[c]^{-2} = \frac{m^3}{kg.s^2}\times\frac{C^2.s^2}{kg.m^3}\times\frac{kg^2.m^4}{s^2}\times\frac{s^2}{m^2} \quad \Rightarrow \quad C.m = \pm\frac{h}{c}\sqrt{G.4\pi\varepsilon_0}$$

Consequently, quantum equation of charge -space will be:

$$q.l = \pm n\frac{h}{c}\sqrt{G.4\pi\varepsilon_0} \quad or \quad \Delta q.\Delta l = \pm n\frac{h}{c}\sqrt{G.4\pi\varepsilon_0} \quad (Eq.71)$$

Eq.71 states that: 1- Charge and space could be transformed to each other. 2- Charge and space are equivalent. 3- The lowest limit of the product of charge-space is $h/c\sqrt{4\pi\varepsilon_0 . G}$ in nature and that can never be reached. 4- Corresponding phenomenon to this equation is quantum black hole. 5- Quantum black hole is an integer multiple of Planck charge.

Quantum fundamental relationship of mass-charge:

Proportionality constant of the quantum relationship of mass-charge will be obtained as follows:

$$[G]^{-1}.[4\pi\varepsilon_0].[h]^2.[c]^2 = \frac{kg.s^2}{m^3}\times\frac{C^2.s^2}{kg.m^3}\times\frac{kg^2.m^4}{s^2}\times\frac{m^2}{s^2} \quad \Rightarrow \quad kg.C = \pm h.c\sqrt{\frac{4\pi\varepsilon_0}{G}}$$

Accordingly, quantum equation of mass-charge will be:

$$m.q = \pm nhc\sqrt{\frac{4\pi\varepsilon_0}{G}} \quad or \quad \Delta m.\Delta q = \pm nhc\sqrt{\frac{4\pi\varepsilon_0}{G}} \quad (Eq.72)$$

Eq.72 states that: 1- Mass and charge are equivalent. 2- The ultimate limit of the mass and charge of the fundamental particles is equal to Planck mass and Planck charge, respectively. 3- Corresponding phenomenon to this equation is quantum black hole. 4- Quantum black hole is an integer multiple of Planck mass and Planck charge.

Quantum fundamental relationship of temperature-mass:

Proportionality constant of the temperature-mass relationship will be obtained as follows:

$$[G]^{-2}.[h]^{2}.[k_B]^{-2}.c^{6} = \frac{kg^2.s^4}{m^6} \times \frac{kg^2.m^4}{s^2} \times \frac{K^2.s^4}{kg^2.m^4} \times \frac{m^6}{s^6} \quad \Rightarrow \quad K.kg = \pm \frac{hc^3}{Gk_B}$$

Accordingly, quantum equation of temperature-mass will be:

$$m.T = \pm n \frac{hc^3}{Gk_B} \quad or \quad \Delta m.\Delta T = \pm n \frac{hc^3}{Gk_B} \quad (Eq.73)$$

Eq.73 states that: 1- Temperature and mass are equivalent. 2- The ultimate limit of the temperature and mass of the fundamental particles is equal to Planck temperature and Planck mass, respectively. 3- Corresponding phenomenon to this equation is quantum black hole. 4- Quantum black hole is an integer multiple of Planck mass and Planck charge.

Quantum fundamental relationship of temperature-charge:

Proportionality constant of the quantum relationship of temperature-charge will be obtained as follows:

$$[G]^{-1}.[4\pi\varepsilon_0].[h]^{2}.[k_B]^{-2}.[c]^{6} = \frac{kg.s^2}{m^3} \times \frac{C^2.s^2}{kg.m^3} \times \frac{K^2.s^4}{kg^2.m^4} \times \frac{kg^2.m^4}{s^2} \times \frac{m^6}{s^6} \quad \Rightarrow \quad K.C = \pm \frac{hc^3}{k_B}\sqrt{\frac{4\pi\varepsilon_0}{G}}$$

Accordingly, quantum equation of temperature- charge will be:

$$T.q = \pm n \frac{hc^3}{k_B}\sqrt{\frac{4\pi\varepsilon_0}{G}} \quad or \quad \Delta T.\Delta q = \pm n \frac{hc^3}{k_B}\sqrt{\frac{4\pi\varepsilon_0}{G}} \quad (Eq.74)$$

Eq.74 states that: 1- Temperature and charge are equivalent. 2- The ultimate limit of the temperature and charge of the fundamental particles are equal to Planck temperature and Planck charge, respectively. 3- Corresponding phenomenon to this equation is quantum black hole. 4- Quantum black hole is an integer multiple of Planck temperature and Planck charge.

We can also obtain the quantum fundamental relations of the base quantities with energy and momentum:

$$E = n\frac{h}{t} \;,\; E = \pm n\frac{hc}{l} \;,\; E = \pm n\frac{hc^3}{G}\frac{1}{m} \;,\; E = \pm n\frac{hc^5}{Gk_B}\frac{1}{T} \;,\; E = \pm nhc^3\sqrt{\frac{4\pi\varepsilon_0}{G}}\frac{1}{q}$$

$$p = \pm n\frac{h}{c.t} \;,\; p = n\frac{h}{l} \;,\; p = n\frac{hc^2}{G}\frac{1}{m} \;,\; p = n\frac{hc^4}{Gk_B}\frac{1}{T} \;,\; p = \pm nhc^2\sqrt{\frac{4\pi\varepsilon_0}{G}}\frac{1}{q}$$

If the energy (*or momentum*) equations are equalized, the same universal relativity equations are obtained. But, by equalizing the above equations with the corresponding relativity equations, the quantum universal equations are obtained. This shows that the energy and momentum equations describe only half of the fact; therefore, we require energy and momentum conservation laws.

12. Planck units

The physical significance of the Planck units and correctness of physics laws at Planck scale where the length is the very Planck length, are the subject of many discussions in the world of physics. It is often mentioned that the laws of physics fail beyond Planck scale. But, it will be shown that although the Planck scale exists in nature, we can never attain this scale. If the universal relativity equations and quantum are presented as $x/y=a$ and $x.y=b$ respectively, where x and y are the very base quantities, these equations are then in agreement in a value of x and y. The obtained values for each quantity are the very Planck units as follows:

$$t_p = \sqrt{\frac{hG}{c^5}} = 1.35 \times 10^{-43}\ s \quad , \quad l_p = \sqrt{\frac{hG}{c^3}} = 4.05 \times 10^{-35}\ m \quad , \quad m_p = \sqrt{\frac{hc}{G}} = 5.45 \times 10^{-8}\ kg$$

$$T_p = \sqrt{\frac{hc^5}{Gk_B}} = 3.55 \times 10^{32}\ k \quad , \quad q_p = \sqrt{4\pi\epsilon_0 hc} = 4.7 \times 10^{-18}\ C$$

Therefore, the ratio of Planck units, universal relativity equations, and their product provide the universal quantum equations. In other words, Planck units are true for the relativity and also for quantum equations. Therefore, the quantum equations in the form of $x.y=b$ can be true for light and black hole, where x and y are replaced with Planck units. An important result is derived from the above discussion: light and black hole are governed by both relativity and quantum equations.

13. Fundamental constants of physics and uncertainty principle

A question arises in physics that whether it is possible to obtain the exact and absolute values of fundamental constants of physics or not? Assume that we want to obtain a fundamental constant, e.g. constant c, by performing an experiment. Our experiment and measurement inevitably lead to the transformation of the base quantities, e.g. space and time are transformed into each other due to motion and so their values are changing at any moment. On the other hand, the transformation of the quantities and their rate of change are governed by universal relativity equations. Therefore, space-time changes resulting from our measurement should be governed by $l=tc$. Since the proportionality constant of the recent equation is the very constant that we intend to obtain, therefore we can obtain the exact and absolute value of c. It can be concluded from the previous example that the absolute and exact values of all the physical fundamental constants which are the proportionality constant of universal relativity equations are obtainable. Although the exact value of the two constants of μ_0 and ε_0 are obtained so far, the exact values of two other constants, i.e. k_B and G can be obtained by the study of black holes.

Now, assume that we want to obtain the exact value of Planck constant by performing an experiment. Like the precious state, our measurement leads to the change of values of the base quantities and the rate of this change is governed by the relativity equations. On the other hand, we should employ the quantum universal equations which are the very product of the base quantities to obtain the Planck constant. But, the change of the values of the quantities does not obey these equations and in a similar manner the proportionality constant of these equations especially Planck constant. We cannot simultaneously measure precise values of two changing quantities such as space and time for a world obeying these equations. It means that we can never obtain the exact value of Planck constant.

In general, there are two types of uncertainties; one is related to the uncertainty resulting from a experiment on which test precision and precision of measuring devices are effective and includes all the equations; another one results from the effect of the experiment and the measuring devices on measurement which is intrinsic and inevitable including quantum equations. Therefore, some equations with Planck constant (*quantum universal equations*) are always accompanied by one intrinsic uncertainty. If we divide the Planck units by each other (*universal relativity equations*), the only physical constant deleted is the Planck constant and if the Planck units are multiplied by each other (*quantum universal equations*), the only physical constant present in all equations is the Planck constant. The uncertainty principle is often presented in the form of the following two equations:

$$\Delta E.\Delta t \geq h \quad , \quad \Delta p.\Delta l \geq h$$

In the next section we prove that not only the above two equations do not present the uncertainty principle, but $\geq$ sign refers to another profound concept.

14. New relativity in quantum mechanics

Relativity and quantum theories have startled the world of science by challenging common sense. The world of relativity and quantum theories looks quite unfamiliar to us merely because the velocity of light is great and inaccessible, and Planck's constant (h) is very small value. Actually, our general perception of the world is merely correct when h is zero and c is infinite. In this case, the relativity and quantum effects are completely nullified. We know the velocity is not infinite and the ultimate limit of the velocity is c in nature and that can never be reached. Therefore, the speed of bodies in nature must be $l/t \leq c$. This very recent condition has created the special relativity (and its effects). On the other hand, universal equations of relativity indicate that the ratio of base quantities in nature cannot be infinite, and this causes these quantities to be relativistic. Therefore, the accessible quantity of base quantities ratio in nature must obey the unequals below:

$$\frac{l}{t} \leq c \ , \ \frac{m}{t} \leq \frac{c^3}{G} \ , \ \frac{m}{l} \leq \frac{c^2}{G} \ , \ \frac{T}{t} \leq \frac{c^5}{G.k_B} \ , \ \frac{T}{l} \leq \frac{c^4}{G.k_B} \ , \ \frac{q}{t} \leq c^3\sqrt{\frac{4\pi\varepsilon_0}{G}} \ , \ \frac{q}{l} \leq c^2\sqrt{\frac{4\pi\varepsilon_0}{G}}$$

On the other hand, we know that the Planck constant value is not zero and this has led to the presence of quantum effects. It can therefore be inferred that there is a factor in nature that does not let the Planck constant or the product of base quantities be zero. This means that the quantum universal equations present the lowest limit of the product of the base quantities in nature. Therefore, the value of the product of the base quantities in nature should obey the following unequals for all phenomena:

$$l.t \geq \frac{hG}{c^4} \ , \ m.t \geq \frac{h}{c^2} \ , \ m.l \geq \frac{h}{c} \ , \ T.t \geq \frac{h}{k_B} \ , \ T.l \geq \frac{hc}{k_B} \ , \ q.t \geq \frac{h}{c^2}\sqrt{G.4\pi\varepsilon_0} \ , \ q.l \geq \frac{h}{c}\sqrt{G.4\pi\varepsilon_0}$$

The equal sign in the unequals of relativity and quantum are only true for light and black hole. In general, the relativity and quantum equations together make the base quantities in nature not become zero or infinity. The quantum unequals clearly show that there should be a new relativity in quantum scale.

15. Quantum space-time

$l=tc$ is the only equation of the universal relativity equations which is true for light. The space-time quantities in this equation can assign any value to themselves provided the recent equation is maintained. In contrast, the $l.t=nhG/c^4$ quantum equation is true for light only when the space and time quantities are replaced with Planck length and Planck time, respectively. That is because the Planck units are the only values which are applied to relativity and quantum equations. For this reason, Eq.65 denotes that light in quantum scales should be an integral multiple of Planck length. By comparing equations $l=tc$ and $l.t= hG/c^4$, it can therefore be concluded that light at macroscopic scales, i.e. where relativity equations are governing (*because the ratio of base quantities is a large number*) behave in a wavy and continuous manner; and in quantum scales, i.e. where quantum equations are governing (*since the product of the base quantities is a small number*), they behave in a photon and discrete manner. In the latter case, the intrinsic uncertainty should also be taken into consideration. Also, the latter two equations elucidate that the macroscopic world is derived from the quantum world. Since the two equations are true for light, we therefore can never have access to these values; one represents the ultimate limit and the other the lowest possible limit (*Planck scale*) for space-time. It was already shown that the value of space-time in nature should obey the following two unequals:

$$\frac{l}{t} \leq c \ , \ l.t \geq \frac{hG}{c^4}$$

By combining the above two conditions we attain the following unequal:

$$\frac{hG}{c^4}\frac{1}{t} \leq l \leq ct$$

If proper values are assigned for time in the above unequal, we will have:

$$\begin{cases} t = 1s & \Rightarrow \ 5.5 \times 10^{-78} \leq l \leq 3 \times 10^{8} \quad (correct) \\ t = t_p & \Rightarrow \ 4.05 \times 10^{-35} \leq l_p \leq 4.05 \times 10^{-35} \quad (correct) \\ t = 10^{-50}s & \Rightarrow \ 5.5 \times 10^{-28} \leq l \leq 3 \times 10^{-42} \quad (incorrect) \end{cases}$$

As it is shown by the above calculations, time cannot be less than Planck time in quantum scales. On the other hand, since the ultimate limit of speed is the speed of light, therefore the least distance that can be covered in Plank time is the Planck length. Therefore, the least possible length in nature is the Planck length. Light can cover the distance of 3×10^{8}m, 3m and Planck length in 1s, 10^{-8}s and Planck time, but light cannot cover the distance of 3×10^{-40}m in10^{-48}s. In simple words, if the distance between two particles is less than the Planck length, light cannot be transferred between these two particles. Also, the above calculations show that only when the product of space-time tends to very small values, the quantum equations along with relativity equations become important, but in macroscopic scales, only the relativity equations can be important.

As shown before, the fact that the space-time product cannot be smaller than hG/c^4, it makes a new relativity in quantum scale. Similar to relativity equations, the following two states are taken into consideration:

First state, by considering the universe expansion: The importance of symmetry in physics tells us that by considering two points, an equation related to time relativity in quantum scales can be obtained similar to Eq.20. These two points are: 1- Space and time in Eq.65 have an inverse relation. 2- The condition of quantum for space-time is $l.t \geq hG/c^4$. Therefore, the time relativity equation in quantum scales should be as follows:

$$\Delta t_1 = \frac{1}{1 - \frac{hG/c^4}{l.t}} \quad (Eq.75)$$

In macroscopic scales, the $l.t$ is great and the time will be that one-second reference. The smaller the value of $l.t$ becomes and nears the hG/c^4 limit value, the more is Δt_1 value. This point to the fact that time in quantum scales relative to macroscopic scales (where we are) passes faster. In other words, when we move from macroscopic scales to Planck scale, space is converted into time. If a particle covers the Planck length in Planck time, i.e. at light speed, time passes extremely fast for it. This is exactly the reverse of the special relativity that if we travel at light speed in macroscopic scales, time will stop for us. Therefore, in quantum scales, the length of the distance and duration of time that the particle covers is important, but in macroscopic scales the distance that a particle covers in one second is important. If an observer in a macroscopic scale reports the Δt_0 time interval for a quantum event, another observer in a quantum scale reports a smaller time interval:

$$\Delta t_1 = \Delta t_0 \left(1 - \frac{hG/c^4}{l.t}\right) \quad (Eq.76)$$

Since $l=tc$ should always be true for all the observers, so with the fast passage of time in quantum scales, length should also be expanded according to the following equations:

$$\Delta l_1 = \frac{\Delta l_0}{1 - \frac{hG/c^4}{l.t}} \quad (Eq.77)$$

The second state; without considering the universe expansion: In this state, the time for an observer in quantum scales passes for one second of the time of an observer in macroscopic scales is obtained by the following equation:

$$\Delta t_2 = \frac{1}{\sqrt{1 - \left(\frac{hG/c^4}{l.t}\right)^2}} \quad (Eq.78)$$

Therefore, the equation denoting the fast passage of time and length expansion will be at this state:

$$\Delta t_2 = \Delta t_0 \sqrt{1 - (\frac{hG/c^4}{l.t})^2} \quad (Eq.79) \quad , \quad \Delta l_2 = \frac{\Delta l_0}{\sqrt{1 - (\frac{hG/c^4}{l.t})^2}} \quad (Eq.80)$$

The Lorentz factor corresponding to Eq.65 ($\gamma_{l.t}$) can be defined as follows:

$$\gamma_{l.t} = \sqrt{1 - (\frac{hG/c^4}{l.t})^2}$$

If Eq.79 is divided by Eq.76 and we rewrite the obtained equation by inserting $f=1/\Delta t$ in it, we will have the following equation:

$$\frac{f_1}{f_2} = \sqrt{\frac{1+\beta_{l.t}}{1-\beta_{l.t}}} \quad , \quad \beta_{l.t} = \frac{hG/c^4}{l.t} \quad (Eq.81)$$

The above equation shows the expansion of the universe, since as it is shown later, in the beginning of the expansion of the universe the value of $\beta_{x.y}$ is equal to one and by the expansion of the universe the value of $\beta_{x.y}$ gets smaller. We know that the universe is expanding and the value of f_1/f_2 is reducing in an accelerating manner for the universe. Therefore, according to Eq.81, the value of $\beta_{l.t}$ should be reduced in an accelerating manner, i.e. the value of *l.t* should be increased. This means that space in quantum scales is expanding at a negative acceleration, since the more the value of *l.t*, the less time is changed to space. This expansion is continued until the value of $\beta_{l.t}$ equals zero and $f_1/f_2=1$. In this state, the quantum world is completely changed into the relativity world. Also, + sign in Eq.65 reveals this fact that the world of quantum and quantum universal equations play a role only in the expansion stage of the world.

16. Mass and quantum space-time

$m=tc^3/G$ and $m=lc^2/G$ are two relativity equations which are applied to the black holes. In contrast, $m.t=nh/c^2$ and $m.l=nh/c$ are two quantum equations that if Planck scales (*Planck mass, Planck time, and Planck length*) are inserted in them, they show the features of quantum black holes. So, it can be concluded that the quantum black holes should be an integer multiple of Planck mass. Also, by comparing the relativity and quantum equations which contain mass, it can be concluded that the relativistic black holes are derived from quantum black holes. Therefore, it is expected that the behavior of a black hole is continuous in macroscopic scales and discrete in quantum scales. Also, $=tc^3/G$ and $m=lc^2/G$ show the inaccessible and ultimate limit of the mass-time and mass-space ratios in nature which can only exist in black holes. The two equations of $m.t=nh/c^2$ and $m.l=nh/c$ show the inaccessible and lowest possible limit of the mass-time and mass-space product too which can only be applied in quantum black holes. Therefore, the relation between mass and space-time in a general state should obey the following unequals.

$$\frac{m}{t} \leq \frac{c^3}{G} \quad , \quad m.t \geq \frac{h}{c^2} \quad and \quad \frac{m}{l} \leq \frac{c^2}{G} \quad , \quad m.l \geq \frac{h}{c}$$

By combining the above unequals we attain the following unequals:

$$\frac{h}{c^2}\frac{1}{t} \leq m \leq \frac{c^3}{G}t \quad , \quad \frac{h}{c}\frac{1}{l} \leq m \leq \frac{c^2}{G}l$$

If right values for time and space are inserted in the above two unequals, we will have:

$$\begin{cases} t = 1s & \Rightarrow \ 7.4 \times 10^{-51} \leq m \leq 4 \times 10^{35} \quad (correct) \\ t = t_p & \Rightarrow \ 5.45 \times 10^{-8} \leq m_p \leq 5.45 \times 10^{-8} \ (correct) \\ t = 10^{-50}s & \Rightarrow \ 0.74 \leq m \leq 4 \times 10^{-15} \quad (incorrect) \end{cases}$$

$$\begin{cases} l = 1m & \Rightarrow \ 2.2 \times 10^{-42} \leq m \leq 1.3 \times 10^{27} \quad (correct) \\ l = l_p & \Rightarrow \ 5.45 \times 10^{-8} \leq m_p \leq 5.45 \times 10^{-8} \ (correct) \\ l = 10^{-50}m & \Rightarrow \ 2.2 \times 10^{8} \leq m \leq 1.3 \times 10^{-23} \quad (incorrect) \end{cases}$$

It can be concluded from the above calculations that:

1- The least possible length and time in nature is the length and time of Planck.

2- The ultimate limit of the mass of the fundamental particles, i.e. where the quantum equations are governing, is equal to Planck mass (*the left side of the unequal*).

3- Only when the product of mass-time and mass-space reaches very small values, quantum equations become important.

The relativity equations in quantum scale can be obtained by considering the following two states as before:

The first state; by considering the universe expansion: In this state, the time for an observer (*e.g. a fundamental particle with the mass of m*) in quantum scales passes for one second of the time of an observer's view in a macroscopic scales is obtained as follows:

$$\Delta t_1 = \frac{1}{1 - \frac{h/c^2}{m.t}}$$

If an observer in macroscopic scales reports the Δt_0 time interval for a quantum event, another observer in quantum scales reports a smaller time interval:

$$\Delta t_1 = \Delta t_0 (1 - \frac{h/c^2}{m.t}) \quad (Eq. 82)$$

The second state; without considering the universe expansion: In this state, the recent two equations are changed as follows:

$$\Delta t_2 = \frac{1}{\sqrt{1-\left(\frac{h/c^2}{m.t}\right)^2}} \quad , \quad \Delta t_2 = \Delta t_0 \sqrt{1-\left(\frac{h/c^2}{m.t}\right)^2} \quad (Eq.83)$$

If t in $m.t=h/c^2$ is replaced with Eq.5, $m.l=h/c$ is obtained. Therefore, Eq.82 and Eq.83 can be rewritten like the previous sections as follows:

$$\Delta t_1 = \Delta t_0 (1-\frac{h/c}{m.l}) \quad (Eq.84) \quad , \quad \Delta t_2 = \Delta t_0 \sqrt{1-\left(\frac{h/c}{m.l}\right)^2} \quad (Eq.85)$$

Lorentz factor corresponding to Eq.76 ($\gamma_{m.l}$) can be defined as follows:

$$\gamma_{m.l} = \sqrt{1-\left(\frac{h/c}{m.l}\right)^2}$$

Eq.85 expresses that if the half-life of a fundamental particle with a mass of m in macroscopic scales is equal to Δt_0, and when this particle is in quantum scales, e.g. it is trapped in a very small space, its half-life is reduced, since time passes faster for this particle. Because Eq.66 and Eq.67 are applied to quantum black holes, therefore time passes infinitely fast at the surface of these black holes. This is exactly the reverse of the relativistic black holes where time stops at their surface. Also, since $l=tc$ should always be applied to all the observers, therefore by the fast passage of time in quantum scales, length should also expand according to the following equation.

$$\Delta l_2 = \frac{\Delta l_0}{\sqrt{1-\left(\frac{h/c}{m.l}\right)^2}} \quad (Eq.86)$$

If Eq.85 is divided by Eq.84 and the obtained equation is rewritten by inserting $f=1/\Delta t$ in it, we will have the following equation:

$$\frac{f_1}{f_2} = \sqrt{\frac{1+\beta_{m.l}}{1-\beta_{m.l}}} \quad , \quad \beta_{m.l} = \frac{h/c}{m.l} \quad (Eq.87)$$

Several conclusions are obtained by the above equation:

1- The +sign in Eq.66 shows that the quantum world and equations play a role only at the stage of the universe expansion.

2- The value $m.l$ should increase in an accelerating manner due to the accelerating expansion of the universe. This means that mass should change into space in quantum scales, i.e. the mass of the fundamental particles is reducing at a negative acceleration.

3- Universal expansion is continuing up to a point that the value of $\beta_{m.l}$ equals zero and $f_1/f_2=1$. In this state, the quantum world is completely changed into a relativity world.

4- Since Eq.66 and Eq.67 are applied to quantum black holes, therefore a decrease in the mass of the fundamental particles should result from these black holes.

If l is replaced with λ in $m.l=h/c$, we will have an equation which explains the annihilation process of electron and positron into light. In fact, the present equation shows the transformation of mass and space into each other. The $m.\lambda=h/c$ is obtained by equalizing $E=mc^2$ with $E=hc/\lambda$ which once again shows that energy is not real quantity and the real phenomena of nature result from the transformation of the base quantities to each other. Also, if c is replaced with v quantity in $m.\lambda=h/c$, de Broglie equation which is an equivalent equation is obtained. The relativistic mass and similarly relative charge and temperature in quantum scales also obey equations 42, 58, and 58 like macroscopic scales. For example, if m is replaced with the electron mass in $m.l=h/c$, l is equal to 2.4×10^{-12}meters. That is, the least space in which an electron can move is equal to 2.4×10^{-12}meters and in this situation, time passes infinitely fast for the electron. On the other hand, we know that the mass-space product in nature cannot reach its lowest possible limit, i.e. hG/c^4. Therefore, in order to entrap the electron in such a space, a force equal to the ultimate limit of force, i.e. c^4/G is applied to the electron. As the force applied to the electron increases, the mass of the electron also increases according to Eq.42 so that the value of the mass-space product for the electron still remains more than hG/c^4. Therefore, the space an electron can exist in should be larger than 2.4×10^{-12}meters. On the other hand, the mass of a proton and a neutron is larger than that of an electron, so the proton and neutron can occupy a smaller space (*i.e. atom nucleus*). The more we move down the lower scales, the more mass can occupy the scales and since the least space is the Planck length, therefore the most mass of a fundamental particle can be the Planck mass. Another example is the Neutrino. If the mass of Neutrino is considered to be 10^{-39}kg, the space in which the Neutrino can be entrapped and detected should be larger than 2.2×10^{-3}meters. This clarifies why detection of Neutrino is so difficult. Therefore, $m.l=h/c$ shows that for every fundamental particle with mass whether in the free state or entrapped, space cannot be zero. As a result, the fundamental particles should have a kind of intrinsic motion (*probably spin*).

17. Classical equations derived from quantum universal equations

We observed that all the equations obtained from the combination of *m/t, m/l*, and *l/t* can be shown by two quantities of speed and force. In contrast, to describe quantum equations obtained by the combination of three base quantities of *t*, *l*, and *m* there is a need for another quantity in addition to two quantities of *F* and *v*. This new quantity is the very angular momentum (*L*). The angular momentum formula can be written as follows in a general state:

$$L = (m.l)(\frac{l}{t}) = \frac{m.l^2}{t} \quad (Eq.88)$$

Therefore, the quantum equations resulting from the combination of the three quantities of *t*, *l*, and *m* can be presented by the three quantities of *F*, *v*, and *L*. As an example:

$$l.t = \frac{L}{F} \quad , \quad m.t = \frac{L}{v^2} \quad , \quad m.l = \frac{L}{v} \quad , \quad m^2 = \frac{L.F}{v^3} \quad , \quad t^2 = \frac{L}{F.v} \quad , \quad l^2 = \frac{L.v}{F} \quad , \quad \frac{m^2.l}{t} = \frac{L.F}{v^2} \quad , \quad \frac{t^2.m}{l} = \frac{L}{v^3} \quad and \ ....$$

An interesting point is that it is not possible to present energy quantity and linear momentum by these three quantities. Symmetrically, therefore, the angular momentum which is also similar to speed and force should have a limit which is obtained by replacing Eq.5 and Eq.67 in Eq.88:

$$L = \left(\pm\frac{h}{c}\right)(\pm c) \quad \Rightarrow \quad \boxed{L = h}$$

The above equation shows that the lowest possible limit for the angular momentum should be *h* (or *ħ*), so it should be $L \geq h$ in nature. If *c*, c^4/G, and *h* are replaced with the quantities of *v, F*, and *L*, respectively in universal quantum equations, equations for rotational motion are obtained which can be used for the description of our surrounding phenomena. For example:

$$m.l = \frac{h}{c} \quad \xRightarrow{h=L\ ,\ c=v} \quad m.l = \frac{L}{v} \quad \Rightarrow \quad \boxed{\vec{L} = m\vec{v} \times l \quad or \quad \vec{L} = \vec{p} \times l} \quad (angular\ momentum)$$

$$l.t = \frac{hG}{c^4} \quad \xRightarrow{h=L\ ,\ \frac{c^4}{G}=F} \quad l.t = \frac{L}{F} \quad \Rightarrow \quad \boxed{\vec{F} \times l = \frac{\vec{L}}{t} \quad or \quad \vec{\tau} = \frac{d\vec{L}}{dt}} \quad (torque)$$

We can now realize why the angular momentum and rotational motion equations in quantum are so important. Therefore, relativistic form of rotational motion equations should be employed in quantum scales. As an example, relativistic equation of the angular momentum should be written as follows:

$$L = \gamma_{m.l}\, \gamma_{l/t} (m.l) \left(\frac{l}{t}\right) \;\Rightarrow\; L = \sqrt{\frac{1-\left(\frac{h/c}{m.l}\right)^2}{1-(v/c)^2}}\, mv \times l$$

In the above equation, $\gamma_{l/t}$ and $\gamma_{m.l}$ act in contrast to each other and make L quantity not be equal to zero or infinite.

Relativistic form of De Broglie equation should also be as follows:

$$\lambda.m = \sqrt{\frac{1-\left(\frac{h/c}{m.\lambda}\right)^2}{1-(v/c)^2}}\, \frac{h}{v}$$

So what secret is hidden in this fact that classical equations for rotational motion are obtained from universal quantum equations?

18. Temperature and Quantum space-time

If Planck units are inserted in Eq.68 and Eq.69, these two equations show that the quantum black holes should be an integer multiple of Planck temperature, and we never attain this scale. Also, similar to previous states, the values of quantum temperature and space-time should obey the following unequals:

$$\frac{h}{k_B}\frac{1}{t} \le T \le \frac{c^5}{G.k_B} t \quad , \quad \frac{hc}{k_B}\frac{1}{l} \le T \le \frac{c^4}{G.k_B} l$$

If appropriate values are inserted for space and time in the above two unequals, we will have:

$$\begin{cases} t = 1s & \Rightarrow\; 4.8 \times 10^{-11} \le T \le 2.6 \times 10^{75} & (correct) \\ t = t_p & \Rightarrow\; 3.5 \times 10^{32} \le T_p \le 3.5 \times 10^{32} & (correct) \\ t = 10^{-50}s & \Rightarrow\; 4.8 \times 10^{39} \le T \le 2.6 \times 10^{25} & (incorrect) \end{cases}$$

$$\begin{cases} l = 1m & \Rightarrow\; 1.4 \times 10^{-2} \le m \le 8.8 \times 10^{66} & (correct) \\ l = l_p & \Rightarrow\; 3.55 \times 10^{32} \le T_p \le 3.55 \times 10^{32} & (correct) \\ l = 10^{-50}m & \Rightarrow\; 1.4 \times 10^{48} \le m \le 8.8 \times 10^{16} & (incorrect) \end{cases}$$

It can be concluded from the above calculations that: 1- The least possible length and time in nature is the Planck length and time. 2- The ultimate limit of the temperature of fundamental particles is the very Planck temperature. 3- Quantum equations become important only when the product of temperature-time and temperature-space reaches very small values.

A series of relativistic equations similar to the previous states is also established for this state. To prevent repetition, here, we do not intend to obtain them, but we only consider the following equation:

$$\frac{f_1}{f_2} = \sqrt{\frac{1+\beta_{T.l}}{1-\beta_{T.l}}} \quad , \qquad \beta_{T.l} = \frac{hc/k_B}{T.l} \quad (Eq.89)$$

A few conclusions can be drawn from the above equation e.g.:

1- The + sign in Eq.68 shows that the quantum equations play a role just at the universal expansion stage.

2- Due to the accelerated expansion of the universe, the value of *T.l* should increase in an accelerated manner. This means that in quantum scales temperature should transform into space, i.e. temperature is decreasing at a negative acceleration.

3- The expansion of the universe continues up to a point that the value of $\beta_{T.l}$ equal zero and f_1/f_2=1. In this state, the quantum universe is completely destroyed.

4- Since Eq.68 and Eq.69 are applied for quantum black holes, therefore this temperature reduction in the universe should originate from these black holes.

Also, if *l* is replaced with λ in $T.l=h/k_B$, the Wien displacement law is obtained.

19. Charge and Quantum space-time

If Planck units are inserted in Eq.70 and 71, these two equations show that the quantum black holes should be an integer multiple of Planck charge. Also, similar to the previous states, the values of the charge and quantum space-time should obey the following unequals:

$$\sqrt{G.4\pi\varepsilon_0}\,\frac{h}{c^2}\frac{1}{t} \le q \le \sqrt{\frac{4\pi\varepsilon_0}{G}}\,c^3 t \quad , \quad \sqrt{G.4\pi\varepsilon_0}\,\frac{h}{c}\frac{1}{l} \le q \le \sqrt{\frac{4\pi\varepsilon_0}{G}}\,c^2 l$$

Here again a series of relativistic equations similar to the previous states are maintained. To prevent repetition, we don’t obtain them here, but we only consider the following equation:

$$\frac{f_1}{f_2} = \sqrt{\frac{1+\beta_{q.l}}{1-\beta_{q.l}}} \quad , \qquad \beta_{q.l} = \frac{h/c\sqrt{G.4\pi\varepsilon_0}}{q.l} \quad (Eq.90)$$

A few conclusions can be drawn from the above equation. They are: 1- As a result of accelerated expansion of the universe, the value of *q.l* should be increased in an accelerated manner. That is, charge should be transformed into space in quantum scales, i.e. the value of the charge of fundamental particles is reducing at negative acceleration. 2- Universal expansion continues up to a point where the value of $\beta_{q.l}$ is zero and f_1/f_2=1.

20. Mass, charge, and temperature at quantum scales

Eq.73, Eq.74, and Eq.75 can be obtained by combining quantum and universal relativisty equations. Also, these three equations show the feature of quantum black hole. These three equations show that mass, charge, and temperature cannot directly transform to each other and therefore they should be equivalent.

21. Birth of the universe

The Big Bang theory is the prevailing cosmological model that describes the early development of the Universe. The most important observational evidence that strongly confirms this theory is the abundance of primordial elements, cosmic microwave background radiation, and universe expansion. There are generally considered to be three outstanding problems with the Big Bang theory: the horizon problem, the flatness problem, and the magnetic monopole problem. The most common answer to these problems is the inflationary theory; however, this creates new problems. According to the Big Bang theory, the whole universe was smaller than a proton (*approximately equal to the Planck length*) at t=10^{-43} with a temperature of 10^{32} Kelvin (Planck temperature). Due to the expansion of this extreme dense and hot particle, the world we see today was formed. Now, two important questions are raised: 1- How was this hot particle created and how it reached to such a temperature? 2- According to $m/l=c^2/G$, the maximum mass that can be included in this particle equals to the Planck mass. In this case, how was the huge mass of the universe which is greater than the Planck mass created?

Although the theory of the Big Bang is in the right path in principle, it cannot answer to these questions. Therefore, this theory is defective and expresses only a part of the universe creation event.

The settings for the creation of the universe require laws which can be applied in the beginning of the universe. Therefore, we should be able to present a general description of the manner of the formation of the universe by quantum and relativity universal equations. For this purpose, we summarize the results we have obtained about the behavior of the universe so far: 1- The creation of the universe consists of two stages of contraction and expansion. 2- The contraction and expansion of the universe are accelerated. 3- The relativity equations are present at the two stages of contraction and expansion of the universe, but quantum equations play a role only in the universe expansion, i.e. the contraction of the universe is relativistic. 4- At the contraction stage, space is transformed into mass, charge, and temperature, but at the expansion stage, the reverse takes place. 5- Rotational motion and its equations should be used for the description of the quantum universe.

Since the term "space" can have different meanings, we should first differentiate among the three types of space: 1- Desert space: this space is so named because there is no mass, charge, temperature, and light within it. The only property of this space is that when this space is crumpled (*wrinkled*) it is transformed into mass, charge, and temperature. 2- Empty space: this space is similar to the desert space, but with a difference that it cannot be transformed into anything else. This space is truly empty. 3- Quantum space: it is the space of our universe that we know it. It encompasses light, mass, charge, and temperature.

The first stage in the creation of the universe is the splitting of the desert space and creation of an empty space (Fig.1a). By splitting and then crumpling of the desert space, mass, charge, and temperature are created. Since at the contraction stage of the universe, only the relativity universal equations play a role, therefore the value of the mass, charge, and temperature created from the crumpling of the space should obey equations 7, 9, and 11. On the other hand, since these equations describe the features of the black hole, therefore black hole should be formed due to the crumpling of the space. In simple words, at the contraction stage of the universe there is only a black hole. According to these equations, the value of the mass and temperature created resulting from the transformation of a small amount of space is very great and this causes the black hole to be extremely dense and turbulent liquid. It might be asked how space can be transformed into three quantities simultaneously. Although it is difficult to talk about this issue, it can only be said as an example that the value of the crumpled space is the same quantity of mass; twist of the space is the same charge quantity; and space vibrations can show the quantity of temperature. Since, as mentioned before, the three quantities of mass, charge, and temperature are different aspects of one thing (*space*). The great amount of the created mass crumples the desert space around itself causing the black hole to form a closed surface without any boundary and edge (Fig.1b). Also, the great gravitational force among them contributes to the crumbling of the desert space and causes the contraction of the universe to continue.

Although the created black hole (*or black holes*) is of very high temperature, it cannot radiate light or another particle, because the black hole great gravitational force prevents it. Therefore, by the crumbling of the desert space, an empty space is left. The initial speed of the space contraction is very great, but by more crumbling of space, restoring torque is created preventing more contraction of space leading to the reduction of crumbling speed in an accelerated manner. At the end of the contraction stage, space is crumbled up to its ultimate limit and yet, the force torque reaches its maximum value. Due to the very great torque, space starts to open at the center of the black hole and the liquid black hole located on its surface is raised and expanded. Untwisting the twists of the space makes its accompanying liquid rotate intensely (Fig.1c). This fast and intense rotational motion causes many fine particles to be evenly ejected from the liquid black hole into the empty space (Fig.1d). These fine particles, which are the very quantum black holes, create the universe we observe around ourselves (*quantum space*). As the wrinkles of space are smoothing out, a great number of quantum black holes are thrown out from the hot and extreme dense liquid over the surface of expanding desert space and this causes the universe seem foggy and look like smoke at this stage.

Mass, charge, and temperature of these quantum black holes should be a multiple of or equivalent to the Planck units. Therefore, the physical significance of n in universal quantum equations is the number of quantum black holes. Since we do not know the value of n, we therefore cannot estimate the value of the mass of the whole universe, but the temperature and charge of the quantum space should be the same charge and temperature of Planck at the beginning of the expansion of the universe. Time at the expansion stage of the universe is imaginary and the concept we know of time now was only created at the expansion stage of the universe. The black holes whose mass is equal to the Planck mass are quickly transformed into light and particles with a mass smaller than the Planck mass due to an intense rotation and space expansion. These fundamental particles will later form atoms and molecules. According to $m/t=c^3/G$ larger black holes remain for a longer duration so two states can take place for them: 1- If there is no matter around these black holes, they will also fade away gradually and create more light and particles. 2- These black holes can grow fast by swallowing matter and neighboring black holes. In the initial moments of the universe expansion, there is a very large amount of matter, light, and black holes, therefore it is likely that some larger black holes transform into a super black hole by swallowing matter. These super black holes are placed over the desert space and can create galaxies by their strong gravity (Fig.1e). On the one hand, the black holes swallow atoms, light, and superstars getting larger, but on the other hand their crumbled space transforms into desert space due to rotation. In simple language, black hole is a place where quantum space is transformed into desert space. Therefore, mass, charge, and the temperature that enter the black hole accompanying matter is transformed into desert space. The desert space gets larger and expands the quantum space placed over it (Fig.1f-h). In the initial moments of the expansion of the universe, the large amount of matter and the gravitational force among them causes the black holes to swallow less matter. But, by the passage of time and thinning of matter, the black holes can easily overcome the gravitational force and swallow more matter. As a result, the desert space and quantum space expand in an accelerated manner.

Today, there are many empty spaces among the galaxies, but in the past there was a large amount of matter among these spaces which are now transformed into desert space. The concept of entropy is attributed to the black holes; In fact, they show the irreversible transformation of quantum space to desert space in the black holes. In the beginning of the universe expansion, the torque of the force resulting from intense twist of space causes mass, charge, and the temperature of the fundamental particles to reduce fast at quantum scales, but by accelerating reduction of this force, the values of the base quantities are also reduced at a less acceleration. The universe average temperature of Planck temperature has reached an average temperature of about 3K. Evidence shows that the mass and the fundamental particle charge are also decreasing. 1- Magnetic monopoles: the theory of GUT predicts that the magnetic monopoles generated due to the Big Bang should have been existed until now, but such particles have not yet been observed. From the view of our theory, the magnetic monopoles are extinct and their mass and charge are reduced. 2- The exact and absolute value of mass and charge of the fundamental particles have not yet been obtained. 3- None of the physics theories can predict the mass and charge of the fundamental particles. 4- Recent measurements show that the size of proton is decreasing. Anyhow, both in macroscopic and quantum scales, the quantum space is transforming to desert space [1]. The end of the universe is when the quantum space is completely transformed to desert space. In this case mass, charge, and temperature of the universe as we know is destroyed simultaneously. Our theory not only explains the observational evidence confirming the Big Bang theory, but also its problems.

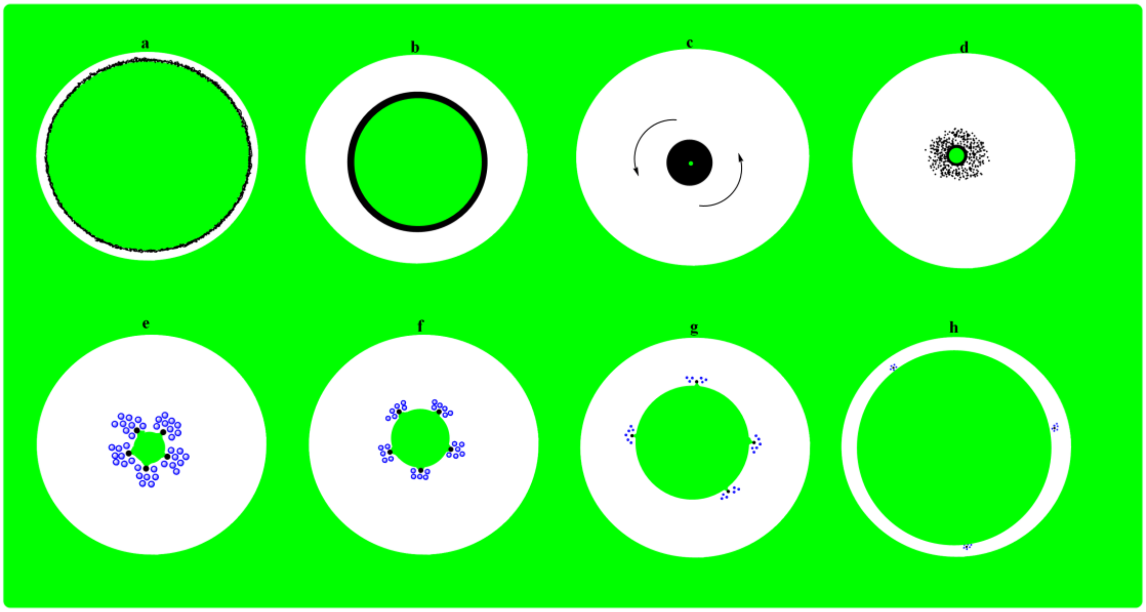

Figure. 1 The creation of the universe consists of two stages of contraction and expansion.

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