The New Concepts to Big Bang and to Black Holes: Both Had No Singularity at All

==== Preface====

《The fundamental defect of the General Theory of Relativity Equation is that any particles in EGTR has no thermodynamic action. It leads finally the gravitational collapse of a definite energy-matter only go to Singularity.》 May/2010

New Edition

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【Abstract】: Right now, the General Theory of Relativity Equation (GTRE) is almost linked together with all new physical concepts, such as the Big Bang, black holes (BH), Singularity, zero point energy, dark energy, N demission spaces, etc. Perhaps say it in another way, all above new physical concepts are squeezed into GTRE by the modern physicians as the reasonable coats in the mainstream of physics. However, the observed facts have demonstrated that, those new physical concepts may be illusory. The obvious examples are singularity and the density of vacuum energy. About 40 years ago, R. Penrose and S. Hawking discovered Singularity losing the time-space significance in EGTR, but there would not be any indications of singularity of infinitely great density observed in nature. They further derived from GTRE that, our universe was originated from singularity, which would certainly exist in any BHs, and even have naked singularity in universe. They also proposed out "the hypothesis of cosmic censorship" for explaining singularity better in nature, In addition, according to J. Wheeler's calculations, the density of vacuum energy would be up to 10^{95}g/cm^3. All above arguments are unimaginable, unrealistic and may have no way to be observed and demonstrated forever. In this article below, author will demonstrate with Hawking's laws of black holes that, there would not be any singularity in BHs, and our universe was not born from singularity or the Big Bang of singularity at all. Singularity can only be a product from GTRE, but impossibly appear and exist in real nature. [Academia Arena, 2010;2(8):1-26] (ISSN 1553-992X).

【Key Words】: General Theory of Relativity Equation (GTRE); singularity; black holes (BH); big bang; Planck era; Planck particle--m_p; minimum gravitational black holes--M_{bm}

【1】。The different results and conclusions of the scientific research can be decided by scientists with their different research method. However, the correct result and conclusion must accord with the observed and practical texts.

Why had the problem of Singularity troubled scientists for over fifty years? Because in GTRE which have only the sole gravitational forces between energy-matter particles and have no heat pressures as resistant forces, the results of the pure gravitational collapses would certainly and finally lead to the appearance of singularity. Therefore, GTRE which violates the causality and the second law of thermodynamics is only a mathematical equation, it cannot reflect the reality in nature.

In this article, some Hawking laws about BHs will be applied, as to study the changes of physical parameters on the event horizon of BH. The superiority of Hawking theory about BH is that, the variations of physical parameters on the event horizon of BH can completely obey quantum mechanics and thermodynamic laws. Thus, BHs can become to have the general law of life and death like everything in nature. Owing to applying Hawking laws accordant with thermodynamic laws on the event horizon of BHs, and regardless of the variations of states and structures inside BHs, as the results, the final collapse of the event horizon of any BH would finally become minimum BH (M_{bm}), i.e. $M_{bm} = (hC/8\pi G)^{1/2} = 10^{-5}$ g = m_p, and minimum BH (M_{bm}) can just be Planck particle (m_p). It shows that the final collapse of any BH would only become m_p and explode in Planck Era, but impossibly continuously collapse to singularity. The above correct conclusions don't need to solve the complicated GTRE.

【2】。The second law of thermodynamics is the causality in nature. It shows the time direction and cannot be violated by any ultimate theories included GTRE. How would physicists violate the thermodynamic laws in the process to solve

GTRE? All the famous physicists included Friedmann, Schwarzschild and Einstein himself proposed two hypotheses to solve GTRE, the first one is the gravitational shrink with equal mass, the second one is the "universal model of zero (constant) pressure". Just those two hypotheses have violated thermodynamic laws and lead to appearance of singularity in solve EGTR.

Suppose a definite (equal) amount of energy-matter particles (M) is in a shrinkable process,

1*. When M change from state 1 to state 2, according to the second law of thermodynamics, $\int TdS = C + (Q_2 - Q_1)$, in above formula, Q—quantity of heat; T—temperature; S—entropy; C—constant. It shows that, M in the heat-insulating and free state can only produce expansion and lower its temperature T due to increase in its S, but impossibly produce contraction.

2*. Let $M = M_1 + M_2$, according to the thermodynamic laws, in case M_1 in the shrinkable process could only decrease in S and increase in T and pressure with emitting energy-matters outside, and M_2 would get the corresponding increments from M_1, then M_1 could gradually reduce its energy-matters and shrink its size. Once M_1 could not remove out any energy-matters from inside, M_1 would stop its contraction at once. If M_1 as a original nebula could shrink its size and increase in $T \approx 2\times10^7$k and reach the temperature of nuclear fusion in its center , thus, a new star would appear in the sky. In the star conditions, once energy produced in a star core (M_1) from nuclear fusion could be equal to the amount of energy discharged out from M_1, star (M_1) would keep its constant temperature and pressure inside, and no more shrink its size in a long-term period. Only in the shrinkable process losing energy-matters, the process can really accord with thermodynamic laws. It clearly shows that, if no energy-matters emit outside, a definite amount of energy-matters (M) cannot shrink its size with the sole gravitational forces by itself.

3*. If M_1 could shrink its size to Schwarz child's limited condition, i.e. $M_1 = C^2 R_1/2G$, due to emitting energy-matters outside and increase in temperature, M_1 would become a complete BH. R_1 is the event horizon of BH M_1. After M_1 become a BH, M_1 would expand its size and decrease in its temperature and density with engulfing the greater energy-matter particles from outside, and shrink its size with emitting the smallest Hawking quantum radiations to outside. Once M_1 could engulf all energy-matters outside, M_1 would non-stop emit Hawking quantum radiations (HQR) to outside, contract its size and increase in its temperature, finally, up to $M_1 = M_{bm} = (hC/8\pi G)^{1/2} = 10^{-5}$ g = m_p, Planck particle ($m_p = M_{bm}$) had to explode in Planck Era at once, but impossibly continuously collapse to singularity. It will be demonstrated below.

It can be seen that, the appearance of singularity in GTRE is due to the wrong hypothesis of contraction of equal energy-matter and the hypothesis of constant temperature and pressure in solving EGTR.

【3】。Since singularity derived from GTRE by physicists is not accordance with reality in nature, it clearly shows that, GTRE has the basic defect hardly to be overcome. GTRE was not built on the reliable experimental foundation, but was a product from Einstein's brain. In GTRE, there are only the gravitational forces, but not heat pressure as exclusive forces between all particles in the whole body. Thus, every particle m_s in the body could only be in the unstable state, so, the exact and real movement of any particles m_s in or outside body could not be got from solve EGTR. For getting a model of stable state of the universe, Einstein added a universal constant Λ as the exclusive forces in GTRE several years later. However, Λ is added outside the body, Λ as a acting force can only push the whole body to do some whole movement, but Λ have no way to resist the gravitational forces of every particle inside body. Therefore, the movements of every particle inside are not certain yet. It is the reason why GTRE is born weak and ill cared for after birth.

However, even though GTRE has some important defects, GTRE as a new universal outlook to integrate time and space together can have very great significances on science and on philosophy.

According to Einstein's explanations to GTRE, as a steel ball presses on a tight circular rubber web, the web should be crooked. Sun can let lights outside crooked like above rubber web. Though the system of GTRE had included some rational contents of Newton's system. However, GTRE had only solved few important problems which were not solved by Newton's system in the past 100 years . It shows that, GTRE is also a uncompleted great system like Newton's system before. In his old age, Einstein said: "Every body think that, I would feel calm and satisfied, while I look backward about the works in my life. On the contrary in fact, I firmly believe that, there would not be any concepts proposed by me in the past which had been stable like a huge rock. I'm not sure that, whether or not I was in the correct orbit in total. " Only an epoch-making scientific giant

created many marvels could modestly state a common truth with his splendid achievements.

【4】。In the real universe, how could the state of temperature and the gravitational forces between all particles of M in a definite ball, affect the movement of a particle m_s inside or outside the ball? Suppose a definite mass (M) in a rubber ball with a radius R, its temperature T, the elastic forces of rubber ball can be neglected.

1*. In case m_s outside the ball, R_s is the distance between m_s and the center of ball, m_s does the curvilinear motion effected by the gravitational forces of M, the radius of curvature at R_s is k_s, temperature T_s. If ball M expands due to increase in temperature from $T_s \rightarrow T_1$, because R and M become bigger, the distance from $R_s \rightarrow R$ becomes shorter, then, the gravitational forces of M to m_s become bigger, so, the radius of curvature k_{s1} become bigger too, and $k_{s1} > K_s$, then, the motion of m_s would shorten R_s.

2*. On the contrary, in case ball M and R becomes smaller due to decrease in temperature from $T_s \rightarrow T_2$, correspondingly, $k_{s2} < K_s$, then, the motion of m_s would lead R_s become longer.

3*. In case m_s inside the ball M, the distance R_s would becomes shorter or longer while temperature of M becomes lower or higher. It is said, the change of temperature in a body M has to affect the motional orbit of any particle m_S inside or outside the body.

Conclusion: It can be seen that, applying the hypothesis of "universal model of zero (constant) pressure " to solve GTRE cannot accord with the reality in nature. Temperature and pressure of every particle cannot be neglected in GTRE at all, Once neglecting the heat pressure of all particles as exclusive forces to gravity, it would certainly lead to the appearance of singularity. That just is the tragedy of EGTR.

4*. A ball of particles in the heat-insulating and free state can only expand but not shrink. It shows that, the heat pressure of particles would be bigger than its gravitational forces, Therefore, the hypothesis that a ball full of energy-matters could shrink its size under the heat-insulating and free state, is a "artificial proposition" . A ball of particles would shrink its size, only its heat could emit outside and decrease in temperature. Specifically, once a star BH formed after the explosion of supernova, owing to BH having no way to emit energy-matters outside except extremely faint Hawking quantum radiations, and owing to BH inside having no way to produce super higher pressure than the explosion of supernova, as the result, energy-matters inside BH could absolutely impossible shrink with the gravitational forces of themselves. It can be seen, singularity is an absurd result of GTRE caused from hypothesis to violate the thermodynamic laws.

【5】。At first, GTRE has only two items, i.e. the first item is Einstein tensor to describe the geometrical characteristics of time-space; the second one is energy-momentum tensor to describe the field of energy-matters. In reality, GTRE should be a unstable dynamical equation, it could hardly describe the motions of every particle in or out a ball which is shrinking. It is the reason why GTRE must set up two false hypotheses to violate the thermodynamic laws for getting a solution of stable state , one is "definite energy-matters", another one is "universal model of zero pressure". Just those two false hypotheses let GTRE to inevitable appearance of singularity. Thus, only the states of a ball of energy-matters are extremely approximate to above two hypotheses, GTRE may be solved and get some better results. For examples:

1*. In case M is the total energy-matter in a ball (region) great enough, owing to stability of density and pressure in the ball, so, the orbit and curvature of motion of particles m_s (included light) outside may be approximately got from solving GTRE. Scientists often applied the principle of GTRE to calculate light deflection near star or star cluster, but the result not precisely.

2*. When mercury passes by sun, owing to that sun is a stable ball, its density distributions can be easily got, so, the calculated value of the motion of mercury at perihelion got from GTRE is more precise than got from Newton dynamics.

3*. Let sun as a ball of stable temperature and constant diameter, the light deflection appeared near sun cannot be explained and calculated by Newton dynamics, but only be solved by GTRE, because according to special theory of relativity (STR), any light must have no mass. Suppose lights would have some corresponding mass, Newton dynamics might also solve the problem of light deflection near sun.

【6】。In our universe, either any stable thing or body, or a stable ball of matters, their stable structures are all the results of balance inside between gravitational forces and heat pressures as exclusive forces under the condition of some definite temperature and pressure. Thus, keeping the limits of permitted temperature and pressure can just be keeping the stable existence of the structures of that thing or body or a ball of matters. It shows that, the stable and solid structures of a matters or a body,

but not broken, can resist the gravitational collapse of great amount of matters. If the sole contraction of gravitational forces of definite energy-matters can't overcome the resistance of solid structure, the contraction can only be stopped.

1*. In our universe, any body of mass $<10^{15}$g always has a little solid core, which can support the gravitational collapse of a great amount of mass outside the core. Any planet has a solid or liquid iron core to resist the gravitational collapse of mass outside the core. Sun and all other stars must have a stable core of very high temperature and pressure producing nuclear fusion, which can maintain the high pressure in core to resist the gravitational collapse of matters outside the core. Every white dwarf has a solid core of high density about 10^6g/cm^3. Any neutron star has a solid core of high density about 10^{16}g/cm^3, which can only produced by the strongest explosion of supernova in our universe. Generally, after a supernova of the original mass > 8 M_0 (sun mass) exploding, its survivals may form a star BH with density of about 10^{16}g/cm^3. In any star BHs, the highest density in core may $\leq 10^{16}$g/cm^3 .

2*. In our present universe, the strongest explosion may only be originated from supernovae, it can only presses matters to density of 10^{16}g/cm^3. neutrons can't be broken in about density of 10^{16}g/cm^3. Thus, inside any star BH, it could impossibly produce the supernova explosion again. Therefore, the gravitational contraction of matters in star BH could absolutely not collapse to singularity. What is more, the bigger BH is, the lower its density will be, so, the bigger BHs inside could more impossibly collapse to singularity.

3*. At the time of building GTRE, Einstein only knew two forces-- gravity and electromagnetic force, but not know other two forces—weak force and strong force. Scientists even didn't know white dwarfs and neutron stars, and their high density in core to 10^6g/cm^3 and 10^{16}g/cm^3 at that time. Perhaps they considered that the gravitational collapse of matters is a simple and natural process. Now, scientists know that the matter density may be high to 10^{93}g/cm^3 under combined interactions of above 4 forces, but the strongest explosion of supernova in our universe can only press matters to the high density of 10^{16}g/cm^3. Thus, the resistance of density from 10^{16}g/cm^3 to 10^{93}g/cm^3 could be too high to be overcome by the gravitational collapse of matters in our universe, the density of singularity $>>10^{93}$g/cm^3 could impossibly be overcome by any present natural forces.

【7】。It can be seen, 1*. if wanting to get the stable orbit of any particles m_s in or out a ball of energy-matters from GTRE, then, the exclusive forces of heat pressure must be added into item of energy-momentum tensor in GTRE, but not Λ added outside the item of energy-momentum tensor. 2*. In case a ball of energy-matters have the gravitational collapse, a solid core and its structure must exist. In reality, above two conditions (heat pressure and structure of high density) should just be the mechanisms or origin in nature to obstruct the occurrence of Singularity. However, the current GTRE has no way to be added in those two or any other supplementary conditions, it would certainly break the perfection of GTRE and impossibly be permitted by Einstain and GTRE. Those are reasons why GTRE just has a showy appearance, but hardly had practical use in the past 100 years. Furthermore, R.Penrose and S.Hawking got a monster of inconceivable singularity from GTRE.

Why would the most scientists believe the inconceivable singularity? Starting off from singularity, scientists might dream of the more inconceivable concepts: such as, white holes. Worm holes, and how to travel to other universe, etc.

【8】。According to his imagination, but not on the basis of observations and experiments, the model created a new scientific theory of GTRE by Einstein is widespread welcome and accepted by scientists in the future, because they can build and develop the new scientific theories and concepts only with their intelligent brain. After that, various new theories and concepts had been born out like the bamboo shoots after a spring rain，such as the Big Bang, Singularity, dark energy, N demission spaces, string theory, film theory, theory of everything, etc. An important defect of GTRE leading the occurrence of singularity is the point structure of particles in GTRE. String and film are not the point structure, so, singularity can impossibly appear in string theory or film theory.

Most importantly, any new theory or concept can impossibly be successful, if it has no thermodynamic actions.

【9】。In Part 1 of this article, it will be proved that, the final collapse of any BHs would be minimum BHs--$M_{bm} = (hC/8\pi G)^{1/2} = m_p$, and disappeared in Planck Era. In Part 2 of this article, it will be proved that, our universe was originated from minimum BHs--$M_{bm} = m_p$ in Planck Era, not originated from singularity, or the Big Bang of singularity. $=1.09 \times 10^{-5}$g

The New Concepts to Big Bang and to Black Holes: Both Had No Singularity at All

New Edition

====Part 1：Black Holes====

May.-2010

《Black Holes: The Final Gravitational Collapse Of The Event Horizon Of Any BHs In Nature Would Only Contract To Planck Particle $m_p = M_{bm} = 10^{-5}$g And Disintegrate in Planck Era, But Impossibly Contract To Singularity Of Infinite Density.》

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【Abstract】: In this article, author doesn't propose any hypothesis and any supplementary condition, may derive out directly "the finally gravitational contraction of any black holes (BH) could impossibly become singularity, but Planck particles $m_p = M_{bm}$ and disappear in Planck Era". That result is got from Hawking laws about BH and other classical formulas together.

The superiority of author's method is to apply a group of formulas only to research the changes of physical parameters on the event horizon (EH) of any BHs, regardless of the complicated state and structure inside BHs. Thus, the final contracted result of EH of BHs could only become Planck particle $m_p = M_{bm}$ (minimum BH), but not singularity. Since the final collapse of EH of BH with its all mass (M_b) had to become m_p, if there were little BHs inside, it could certainly contract to m_p in advance.

The fundamental defect of the General Theory of Relativity Equation (EGTR) is that, any particles in EGTR has no thermodynamic action to resist the gravitational collapse, it would certainly lead to occurrence of singularity. On the contrary, Hawking formulas of BH were built on the foundation of thermodynamics and quantum mechanics, the heat pressure could resist the gravitational collapse forever.

According to above explanations and analyses, an important formula will be got as below:

$$m_{ss} M_b = hC/8\pi G = 1.187\times10^{-10}g^2 \quad (1d)$$

In above formula (1d), m_{ss} is the mass of Hawking quantum radiation (HQR) on the EH, M_b is the mass of whole BH. $m_{ss}M_b$ is a constant. From (1d), in the real universe, $M_b \neq 0$, and, $m_{ss} \neq 0$, the smaller M_b is, the bigger m_{ss} can be. According to axiom of any part ≦the whole, at the limited condition, $m_{ss} = M_b = (1.187\times10^{-10}g^2)^{1/2}$. Thus, M_b is impossible become a singularity.

$$m_{ss} = M_b = M_{bm} = (hC/8\pi G)^{1/2} = m_p = 1.09 \times 10^{-5}g \quad (1f)$$

Formula (1f) is the best important. correct and final conclusion in this article got by author. It clearly shows that, the final gravitational collapse of any BH would become Planck particle m_p, and explode in Planck Era, but not continuously go to singularity of infinite density.

Many new concepts and laws in this article are all the further developments to Hawking theory about BHs. In science, the simplest is the best. The demonstrations in this article is the simplest, whether it is good or bad will remain to reader's comments. [Academia Arena, 2010;2(8):1-26] (ISSN 1553-992X).

【Key words】。black holes (BH); singularity; star-formed Schwarzschild (gravitational) black holes: Planck particle--m_p; Planck Era; Hawking quantum radiation (HQR); General Theory of Relativity Equation (GTRE); minimum BH--M_{bm};

In this whole article, only Schwarzschild (= gravitational) BHs of no charges, no rotating and spherical symmetry will be studied as below.

【I】。Regardless of the states and structures in BHs, the final contraction of the event horizon (EH) and mass M_b of any BHs due to emit Hawking quantum radiations (HQR) could only become minimum BH (M_{bm}) equal to Planck particle (m_p), it could impossibly contract to singularity.

According to Hawking radiation law of BHs and Schwarzschild special solution to GTRE and other classical formulas, the relationship of many physical parameters on the event horizon (EH) of BHs can be got as below: M_b –- mass of a BH, T_b –-temperature on EH of BH, m_{ss} –-mass of Hawking quantum radiation on BH, R_b –-radius of EH of a BH, h—Planck constant = $6.63\times10^{-27}g_*cm^2/s$，, C –-light speed =$3 \times 10^{10}$cm/s,, G –-gravitational constant = $6.67\times10^{-8}cm^3/s^2_*g$, Bolzmann conseant κ = $1.38\times10^{-16}g_*cm^2/s^2_*k$，
m_p –- Planck participle, L_p ---Planck length, T_p ---Planck temperature,

Applying Hawking law and other classical formulas to derive out the final gravitational collapse of EH of BH. Hawking temperature formula on EH of BH,

$$T_b = (C^3/4GM_b) \times (h/2\pi\kappa) \approx 10^{27}/M_b \text{ [2]} \quad (1a)$$

Formula of energy transformation (i.e. gravitational energy transfer into radiation energy through valve temperature) on EH of BH,

$$m_{ss} = \kappa T_b / C^2 \text{ [1][2]} \quad (1b)$$

According to Schwarzschild special solution to GTRE,

$$GM_b/R_b = C^2/2 \text{ [1][2]} \quad (1c)$$

From (1a) and (1b), then,

$$m_{ss} M_b = hC/8\pi G = 1.187\times10^{-10} g^2 \quad (1d)$$

Formulas (1a),(1b),(1c), (1d) are 4 general laws effective on any EH of BHs. In formulas (1a) and (1d), due to that, $T_b M_b$ = constant, $m_{ss} M_b$ = constant. So, m_{ss}, T_b and M_b is impossible ∞ or 0, then, m_{ss}, T_b and M_b all have its limit. Furthermore, according to axiom of any part ≦the whole, m_{ss} is impossible > M_b, at the limited condition, the maximum m_{ss} = the minimum M_b-- M_{bm}, so,

$$m_{ss} = M_{bm} = (hC/8\pi G)^{1/2} = 1.09 \times 10^{-5} g \text{ [3]} \quad (1e)$$

Owing to $(hC/8\pi G)^{1/2} \equiv m_p$ [3] so,

$$m_{ss} = M_{bm} = (hC/8\pi G)^{1/2} \equiv m_p \equiv 1.09\times 10^{-5} g. \quad (1f)$$

$$R_{bm} \equiv L_p \text{ [3]} \equiv (Gh/2\pi C^3)^{1/2} \equiv 1.61\times 10^{-33} cm \quad (1g)$$

$$T_{bm} \equiv T_p \text{ [3]} \equiv 0.71\times 10^{32} k \quad (1h)$$

$$R_{bm} m_{ss} = h/(4\pi C) = 1.0557\times10^{-37} cmg \quad (1i)$$

Similarly, $m_{ss} \neq 0$, $R_{bm} \neq 0$, so, R_{bm} and m_{ss} all have its limit.

The best important conclusion: 1. From fotmulas (1b)，(1c)，whether one of M_b，R_b，T_b，m_{ss} is 0 or ∞ can not be judged. That is reason why singularity could present in General Theory of Relativity Equation (GTRE). However, from formula (1a)，(1d) and (1i), any one of M_b，R_b，T_b and m_{ss} can impossibly be "0 " or "∞"，so, each of 4 has to its limit. That are results of Hawking theory about BHs to apply thermodynamics and quantum mechanics. 2。**When a BH could get into the gravitational collapse because of emitting Hawking quantum radiations (HQR) after engulfing all energy-matters outside, it would continuously shrink its size R_b, increase in T_b, lose mass M_b and finally become $M_{bm} = m_{ss} \equiv m_p$. In addition, M_{bm}, R_{bm}, T_{bm}, m_{ss} form a perfect minimum BH, and perfectly and individually equal to m_p, L_p, T_p of Planck Era,**

【2】. In the process of the gravitational contraction of any original nebula (matters), the principle of a particle m_s emitted to outside in nebula is the same mechanism with HQR emitted to outside from EH of a BH. They are all from high energy (temperature) flowing to low energy (temperature). The final result of both continuously contracted process are all the complete same, i.e. $M_{bm} = m_p = (hC/8\pi G)^{1/2} \equiv m_p \equiv 1.09 \times 10^{-5} g$. Thus, Hawking quantum radiations (HQR) are just the energy particles, which have the lower energy (temperature) than the valve temperature on EH and may flee out from the restraint of gravity of BHs to go to outside.

For examining the correctness of (1f); Suppose a particle m_s in nebula and on the boundary of R, if m_s is in the state of thermodynamic balance and locate at the end of R, then,

$$dP/dR = -GM\rho/R^2 \text{ [3]} \quad (2a)$$

$$P = n\kappa T = \rho\kappa T/m_s \quad (2b)$$

$$M = 4\pi\rho R^3/3 \quad (2c)$$

Formula (2b) is the state equation of gas or particles, Formula (2c) is the formula of ball volume, P – pressure of R end, M –total mass in radius R, ρ – average density of R ball, T – temperature of R end,

Applying formulas (2a)，(2b)，(2c)，(1a), (1c) together. Formulas (1a), (1c) are right to physical parameters on EH of any BHs, so, the results of parameter values got from solving following equations are all on EH of BH. Thus, to any BHs, in reality, M, R are all completely equal to M_b, R_b as below.

$$\text{From } P = \rho\kappa T/m_s = \kappa/m_s \times (3M/4\pi R^3) \times (C^3/4GM) \times (h/2\pi\kappa) = 3hC^3/(32\pi^2 GR^3 m_s),$$

$$dP/dR = d[3hC^3/(32\pi GR^3 m_s)]/dR = -(9hC^3)/(32\pi^2 Gm_s R^4), (\therefore dP/dR \propto R^{-4}), \quad (2d)$$

$$-GM\rho/R^2 = -(GM/R^2) \times (3M/4\pi R^3) = -(3G/4\pi R^3) \times (M^2/R^2),$$

from (1c), $M_b/R_b = C^2/2G = M/R$.

$\therefore -GM\rho/R^2 = -3C^4/(16\pi GR^3)$, $(\propto R^{-3})$ (2e)

let (2d), (2e) into (2a),

$-(9hC^3)/(32\pi^2 Gm_s R^4) = -3C^4/(16\pi GR^3)$,

or $3h/(2\pi m_s R^4) = C/R^3$

$\therefore R = 3h/(2\pi Cm_s)$, or

$\therefore Rm_s = 3h/(2\pi C) = 1.0557\times10^{-37}$cmg (2f)

From (2f) and (1c), then,

$m_s M_b = 3hC/(4\pi G)$ (2g)

Comparing formulas (1d) and (2g), (1i) and (2f), only under the condition of $m_s = 6m_{ss}$, as the results, (1d) = (2g), (1i) = (2f). Why must $m_s = 6m_{ss}$? Because in deriving process from (2a) to (2g), density ρ and temperature T in formulas (2a), (2b) and (2c) used as the average values in a ball M of R, but not the real density and temperature on EH of BH, which < their average values, so, their combined effects let $m_s = 6m_{ss}$. Thus, under the condition of $m_s = 6m_{ss}$,

$\therefore m_s = 6m_{ss}$, (1d) ≡ (2g), (1i) ≡ (2f) (2h)

Thus, the gravitational collapse and final destiny of any nebula (particles) is the perfectly same with the EH of a BH. Their final destinies are all $m_{ss} = M_{bm} = (hC/8\pi G)^{1/2} = 1.09\times10^{-5}$g. In nature, any gravitational collapses of anybody are the certain results of discharging energy nonstop to outside.

Analyses and conclusions:

1*. Since formula (2h) accords with the real conditions, it is a circumstantial evidence to formulas (1d), (1f) and (1i). it shows that, the final collapse of EH of any BHs can reach to Planck Era, but not to singularity.

2*. Formula (2a) is really a simplified equation to Tolman-Oppenheimer-Volkoff equation. [7] Formula (2a) cancelled 3 complicated amended items from TOV equation. Thus, on the foundation of (2a), combined (1a), (1c) and (2b) as the boundary conditions, the correctness of (2f) and (2g) should be reliable.

3*. There are no essential distinctions for any BH or a star or a nebula to emit out or to attract in energy-matters. However, any BHs have very strong gravity, even light can't flee out from EH of BH. Owing to the very high density or big mass of current BHs, for example, a BH of $5M_0$, according to formula (1d), it could emit the extremely small energy of HQR equivalent to $m_{ss} = 1.187\times10^{-44}$g and absorb in any energy-matters > $m_{ss} = 1.187\times10^{-44}$g. A BH of mass $=10^{15}$g, its HQR = $m_{ss} = 1.66\times10^{-24}$g = mass of a proton. The current BHs in nature are all star BHs, so in people's mind, all BHs are rapaciously plundering energy-matters outside,

4*. How could HQR flee out from EH of BH? Just like a particle or quantum (energy or light) fleeing out from the boundary of a star or any body, once average energy of HQR < κT on EH, or its instant temperature < κT on EH duo to the heat motion and vibration, they could possibly flee out at a instant under the state of little lower temperature and energy.

【3】。No. 1 essential attribute of any BHs: Once a BH could be formed, it would be a BH forever until it finally become a Planck particle $m_p = M_{bm} = (hC/8\pi G)^{1/2} = 1.09\times10^{-5}$g, no matter whether it's expansion because of engulfing energy-matter from outside or it's contraction because of emitting HQR to outside.

According to Schwarzschild solution to GTRE, from (1c),

$R_b = 2GM_b/C^2$, (3a)

$\therefore C^2 dR_b = 2GdM_b$

$C^2(R_b \pm dR_b) = 2G(M_b \pm dM_b)$ (3b)

Suppose another BH M_{ba}, and,

$C^2 R_{ba} = 2GM_{ba}$ (3c)

From (3a) + (3b) + (3c)

$\therefore C^2(R_b \pm R_{ba} \pm dR_b) = 2G(M_b \pm M_{ba} \pm dM_b)$ (3d)

Formula (3d) clearly shows that, any BH, no matter whether it would emit out or plunder in energy-matters, or collide with another BH, it could only be a BH of different mass forever.

In 1998, two groups of U.S.A. and Australia discovered the accelerating expansion of our universe (AEOU) through observations to the bursts of remote supernovas Ia, they pointed out, that remote galaxies are accelerating away from us. Most current scientists explained AEOU with "dark energy" of exclusive force in the universe. Author considered that, AEOU was due to the collision of our universal BH with other BHs in their early ages. Formula (3d) was proposed as the theoretical foundation for above hypothesis.

【4】。No. 2 essential attribute of any BHs: BHs are all the simplest bodies in nature. All physical parameters on the EH of BHs are only decided by mass of a BH, and have the same, sole, linear and single numerical value corresponding to mass M_b. In other words, any 2 physical parameters on the EH of all BHs have the same relationship of the sole, linear and single numerical value. Furthermore, no matter how structures and states inside different BHs, all EHs of BHs with the same mass M_b can have the completely same essential attributes. Therefore, there are not necessary for us for solving the complicated GTRE to study the structures and states inside BHs. Once knowing the mass of any BHs, then, knowing its all. This is Hawking's great contribution to the theory of BHs. From formulas (1a), (1b), (1c), (1d), it can be seen for any BHs, then,

$$M_b \propto R_b \propto 1/T_b \propto 1/m_{ss} \qquad (4a)$$

【5】。No. 3 essential attribute of any BHs: Non-stop emitting HQRs to outside or engulfing in energy-matters from outside is other essential attribute of any BHs. Just like a star or a body to emit lights or infrared radiations, energy would always flow out naturally from high energy to low energy, no exception for any BHs to emit HQRs.

The EH of any BH is its boundary. The exchange of energy-matters must pass through EH. It can be seen from (2a), owing to that, HQR on EH would always be in the condition of heat motion, it could non-stop vibrate and have no an instant precise temperature, so, any HQR on EH could be in the unstable state and impossible to keep the thermodynamic balance at any instant. Thus, the exchange of energy-matters passed through EH would only lead to Event Horizon oscillated.

From formula (1b) $m_{ss}C^2 = \kappa T_b$, T_b is the valve temperature on EH, Really, EHs have become the switch of BHs to transfer energy-matters.

1*. Only in case κT_b of HQRs on or in BH, which instant temperature T_b is a little higher than outside, could flee out. After they fled out from EH. because of decrease in a little energy of BH, BH would contract a little size and increase in a little temperature, then, the energy distance would become bigger between EH and the fled HQR, which could impossibly return back into BH again. Thus, after losing a HQR, BH would continuously emit HQRs to outside, until finally become a Planck particle $m_p = M_{bm} = (hC/8\pi G)^{1/2} = 1.09 \times 10^{-5}$g, and explode in Planck Era.

2*. Obviously, in case outside particle $m_o > m_{ss}$ or outside temperature $T_o > T_b$, m_o and radiation energy κT_o outside can be attracted into BH. Thus, BH can nonstop attract in all energy-matters outside with increase in mass M_b and decrease in T_b on EH. After that, BH will nonstop emit HQRs to outside, until M_b finally become a Planck particle $m_p = M_{bm} = (hC/8\pi G)^{1/2} = 1.09 \times 10^{-5}$g, and explode in Planck Era.

3*. In case $m_o = m_{ss}$ or $T_o = T_b$, generally, because the number of particles and T_o outside are more then those on EH of BH, so. BH can attract in more energy-matters than those fled out. After that, the process and result will be the same with above 2* section.

The character of any BH is always nonstop taking in all energy-matters from outside at first, then, emitting energy to outside until its final vanish in Planck Era, its Event Horizon would be oscillated nonstop.

According to Hawking's theory, the rate of radiating energy of a BH is:

$$dE/dt \approx 10^{46} M^{-2} \text{ erg/s}, \quad (5a)$$ <2>

Suppose $M = M_0 = 2\times 10^{33}$g $= M_0$, $dE/dt \approx 10^{-20}$ erg/s, based on such extremely tiny rate, a BH of sun mass (M_0) needs about 10^{65}years to radiate out all its energy-matters and explode in Planck Era.

Suppose $M = M_0 = 2\times 10^{33}$g, its HQR $= m_{ss} = 1.187\times 10^{-10}/(2\times 10^{33}) = 6 \times 10^{-44}$g. So, m_{ss} is too small. It shows that, mass of a BH equal to sun can almost absorb any tiny energy in the current space. If no energy outside, that sun BH can radiate HQR of 6×10^{-44}g, It is much smaller than a proton mass of $1{,}66 \times 10^{-24}$g.

It can be seen, Hawking theory and laws of BHs to emit HQRs are all right, but Hawking's explanations to emit HQRs are not correct and convincing. Normally, Hawking and the most modern scientists may explain HQRs with the concepts of vacuum energy. They recognized that a pair of virtual particles would be suddenly born out from vacuum, then annihilate and appear repeatedly. [1]. After negative particle on EH of BH being captured by positive virtual particle of vacuum and annihilating, then, the positive particle of BH would remain and appear outside BH and become a HQR fled out, Such explanations of them is a deliberate myth with the new physical concept. The energy value of HQR on EH of BH is certain, why could a pair of virtual particles appeared have the same energy value with HQR on EH and both could meet at the same time and same place? In addition, the explanation of so-called "virtual energy" has not a reliable and certain numerical value right now in any theory and may have no way to be observed and examined forever.

Right now, whether BHs would emit energy-matters or not with other ways except Hawking's radiations remains a question.

【6】。No. 4 essential attribute of any BHs: After plundering all energy-matters outside, any BH could only contract its size R_b, decrease in M_b, increase in T_b and m_{cc} because of emitting HQGs continuously. The final destiny of every BH could only become minimum BH (M_{bm}) equal to Planck particle (m_P), then, explode and vanish in Planck Era at once. See formula (1f),

$$m_{ssm} = M_{bm} = (hC/8\pi G)^{1/2} \equiv m_p \equiv 1.09 \times 10^{-5}g$$

Why could M_{bm} be impossible to become < $\{(hC/8\pi G)^{1/2} \equiv m_p \equiv 1.09 \times 10^{-5}g\}$ and continuous contraction? Surely impossible.

1*. Once $M_{bm} < 1.09 \times 10^{-5}$g, its HQR ($m_{ss}$) $< 1.09 \times 10^{-5}$g too. Thus, $m_{ss}\ M_{bm} << ((hC/8\pi G)$. It violates formula (1d) of BHs.

2*. Once M_{bm} reach 1.09×10^{-5}g, its gravitational energy = $M_{bm}\ C^2 = 10^{16}$erg, its radiation energy = $\kappa T_b = 1.38\times 10^{-16}\times\ 0.71\times 10^{32} = 10^{16}$erg too. . So,

$$M_{bm}\ C^2 = \kappa T_b = 10^{16}\text{erg} \qquad (6a)$$

It can be seen, the reason why BH can emit HQR is that the bigger BH has surplus gravitational energy to transfer to radiation energy of HQR. However, once M_{bm} reach 1.09×10^{-5}g, the whole M_{bm} is a whole particle and has no surplus energy as HQR, it can only throughout explode, and wholly transfer $M_{bm}\ C^2$ to many and many small γ–rays of the highest energy of 10^{32}k.

3*. Owing to M_{bm} reach 1.09×10^{-5}g, $M_{bm}\ C^2 = m_{ss}C^2$, it is said, the whole M_{bm} is a complete particle, no gravitational forces inside could continuously contract to resist the highest temperature of 10^{32}k inside the whole M_{bm}, thus, the whole M_{bm} must crushingly explode.

4*. According to Uncertainty Principle

$$\Delta E \times \Delta t \approx h/2\pi \qquad (6b)$$

To M_{bm}, $\Delta E = M_{bm}\ C^2 = \kappa T_b = 10^{16}$erg, Δt = Compton time = $R_{bm}/C = 1.61\times 10^{-33}/3\times 10^{10} = 0.537\times 10^{-43}$.

$\Delta E \times \Delta t = 10^{16}\times 0.537\times 10^{-43} = 0.537\times 10^{-27}$, but $h/2\pi = 6.63\times 10^{-27}/2\pi = 1.06\times 10^{-27}$,

Obviously, $\Delta E \times \Delta t < h/2\pi$, it violates Uncertainty Principle. Thus, M_{bm} could impossibly exist, but only disintegrate and vanish in Planck Era, so, it has no way to contract to singularity.

【7】。Various substantial structures just are the best and last mechanism to resist the gravitational contraction in nature. Bodies of no gravitational collapse in nature have always a solid and stable core.

From the process of formation of star BHs, the reasons why singularity can impossibly appear and exist in star BHs will be clearly known. In GTRE, the appearance of singularity is base on the hypotheses of that, a ball of definite energy-matters could free and infinitely contract its size with no resistance. However, in reality, the contracted process of anybody must at least overcome two resistances: the first is the heat pressure of its energy-matters, and the second is its substantial structure.

1*. Any body of mass $<10^{15}$g, its chemical structure can support its gravity, needs not a solid core. Mass of 10^{15}g has 10^{39} ($=10^{15}/1.67\times 10^{-24}$) protons. 10^{39} is a Dirac's large number.

2*. Planets of mass between 10^{15}g and 0.08 M_0 (1.6×10^{32}g) must need a core of liquid or solid irons to resist its gravitational collapse outside the core.

3*. Stars of mass > 0.08 M_0 (1.6×10^{32}g) : Owing to existence of the very high and stable pressure and temperature supplied by nuclear fusion, all stars cannot collapse in a long-term period, until nuclear fusion stopping in its core.

The pressure P_s in the core of sun is estimative about as below,

$$P_s = \rho_s\ \kappa T_s/m_p = 10^2\times 1.38\times 10^{-16}\times 1.5\times 10^7/1.67\times 10^{-24} \approx 1.5\times 10^{11}\ \text{atm.} \qquad (7a)$$

4*, White dwarfs: It is generally estimated that, after finishing its nuclear fusion and through red giant star, the original star of mass < 3.5 M_0 could compress its remnant to become a white dwarfs of mass ≤1.44 M_0. 1.44 M_0 is called Chandrasekhar's limit. It is said, after a white dwarf plundering energy-matters outside or colliding with another companion star, its mass might go beyond Chandrasekhar's limit >1.44 M_0, and become a neutron star. White dwarf has a solid core of density about 10^6g/cm^3 and has very long lifetime. In the solid core, the distance between atomic nucleus is 10^{-12}cm, Electrons can freely flow and have the strong exclusive forces to resist the gravitational collapse outside the core. Once mass of a white dwarfs could approach 1.44 M_0 due to absorb matters outside, it would become a carbon-oxygen white dwarf and occur the strongest explosion of Ia supernova, and turn into powders scattered in space.

5*. Neutron stars: It is generally estimated that, after the original star of (3.5~8) M_0 finishing its nuclear fusion and after the strongest supernova explosion, its remnants might be contracted into neutron star of mass between(1.5~2) M_0. It is said, mass of neutron stars may be (0.1~1.5~2) M_0. Their density in core about 10^{14} ~5×10^{15}g/cm^3. Diameter of the biggest neutron star is 33km. The structural figure of neutron stars as below:

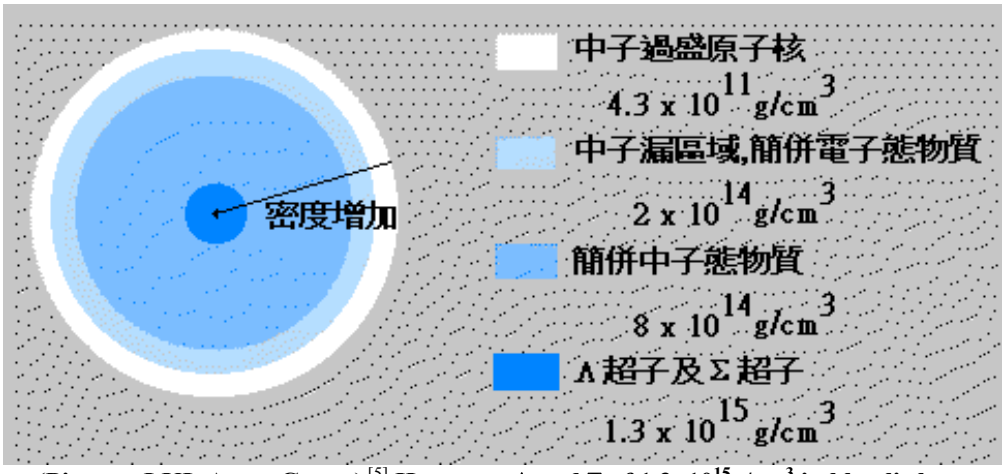
Parameters of neutron stars: mass of most M_n = (1.5~2) M_0; density in core $\rho_n \approx 10^{14}$~ $10^{15.5}$g/cm^3; distance between neutrons, $d_n \approx 1.2\times10^{-13}$ cm; numbers of neutron in cm^3, $n_n = 10^{39}$ /cm^3; Λ and Σ are hyperons or solid neutrons in core.

Conclusions: 1. It shows clearly from above analyses and demonstrations that, before overcoming the very high density and crushing the extremely solid structure of its core formed by supernova explosion, any stars, no matter how great its mass is, can't continue or complete its gravitational collapse to compress matters to >10^{16}g/cm^3 in core.

2. From figure.1 below, the core of the density of neutron stars $\rho_n \approx 10^{14}$~ $10^{15.5}$g/cm^3. The formation of core of neutron star may be solid neutrons, or hyperons Λ and Σ.

3. If a neutron star could become a BH due to absorb energy-matters outside, only matters outside the core can be greatly compressed, the density in core can hardly increase any more, because the density between a little BH of $2M_0$ and a neutron star of $2M_0$ is almost the same, just their sizes have the great difference. Diameter of a neutron star of $2M_0$ is about 33km, but diameter of little BH of $2M_0$ is about 12km.

Figure. 1. Structural figure of neutron stars,



(Picture: LKL Astro-Group)[5] Hyperons Λ and Σ of 1.3×10^{15}g/cm^3 in blue little core.

【8】。Star BHs: Singularity could be impossible to occur in star BHs. The formation of star BHs, Generally, the mass of star BHs may be between (3~10) M_0.

How could star BHs be formed? It is said, after nuclear fusion having finished and through supernova explosion, the remnants of the original stars of mass > $8M_0$ might become a star BH of mass≥3 M_0. Besides, if a neutron star could engulf energy-matters outside or collide with its companion white dwarf (or another neutron star), it might become a star BH of mass ≥ $3M_0$. $3M_0$ is so=called Oppenheimer-Volkoff limit. However, those two conditions are just the theoretical inference, but no real observations can be as evidences.

Parameters of a BH of mass = 3 M_0: $M_{b3} = 3M_0 = 6\times10^{33}$g, its $R_{b3} = 8.89\times10^5$cm≈9km, $T_{b3} = 1.3\times10^{-7}$k, HQR--$m_{ss3} = 2\times10^{-44}$g. $\rho_{b3} = 2\times10^{15}$g/cm^3, [see formulas (1a), (1b), (1c), (1d), (2c)]

In 2006, a smallest star BH called XTE J1650-500 [6] was discovered, its mass = 3.8 M_0. According to imagination and calculations by scientists, limit of mass of the smallest star BHs not still discovered in universal space might be (1.7~2.7) M_0, then its density calculated is about $\rho_{b2} \approx 5\times10^{15}$g/cm^3.

Many important inferences and conclusions can be got from above calculations and analyses:

1*. Comparing the density of core between neutron star $\rho_n \approx 10^{14}$~ $10^{15.5}$g/cm^3 and density of the smallest star BH, their $\rho_{b3} = 2\times10^{15}$g/cm^3 to $\rho_{b2} \approx 5\times10^{15}$g/cm^3, so, the core of small star BHs and neutron stars are the same thing, which may be all hyperons Λ and Σ. or solid neutrons. They have almost the same density, and are all originated from the explosion of supernovae.

The distance d_n between two adjacent neutrons in the core of neutron stars and star BHs,

$N_n = \rho_n / m_n = 5\times10^{15}/1.67\times 10^{-24} = 10^{39}$

$d_n = (1/ N_n)^{1/3} = 10^{-13}$cm (8a)

From (8a), in the core of neutron stars and star BHs, The distance d_n between two adjacent neutrons is equal to diameter of a neutron or a proton. Thus, under the density of about 5×10^{15} g/cm^3, atomic nucleuses of neutrons or protons are just closely contacted together, but far away from break.

2*. Owing to no star BHs < $2M_0$ existed in nature, the forces and pressures produced by the supernova explosions are the strongest forces in current universe and later. Thus, the matters of density $\rho > 5\times10^{15}$g /cm^3 have impossible to appear and exist in nature afterwards, then, matters of density $\rho_n \approx 5\times10^{15}$g/cm^3 are the highest density in nature.

3*. Since star BHs are all originated from the superstar explosion, supernova explosion would impossibly occur inside any star BHs again. Thus, star BHs inside would impossibly continue its gravitational collapse, so, it have impossibility of appearance of singularity.

4*. Owing to that, the bigger a star BH is, the lower its density can be. Thus, all BHs (> star BH of 10 M_0) inside can be more impossible to produce > density of 10^{16}g/cm^3, so, absolutely impossible to produce singularity inside.

5*. Since matters of density $\approx 5\times10^{15}$g/cm^3 in star BHs are hyperons or solid neutrons, it shows that, protons having become hyperons are not broken or disintegrated, and still keep their own quark chains, i.e. keep their proton formation. Maybe it is reason why protons have so long lifetime of about 10^{30} years.

6*。Since protons can keep their particle formation at about density 5×10^{15}g/cm^3, how great density may let protons disintegrated into quarks? Author consider that, protons may be disintegrated in density about 10^{53}g/cm^3.

According to Hawking's theory of BH, in the collapsing process of any star, its entropy always increased and its information capacity always decreased. Suppose Sm--original entropy before the collapse of a star, S_b--the entropy after collapsing, M_0--mass of sun = 2×10^{33}g,

$S_b/S_m = 10^{18}M_b/M_0$ [2] (8b)

Jacob Bekinstein pointed out at the ideal conditions, $S_b = S_m$, or, the entropy did not change before and behind the collapse of a star. From formula (8b), M_b will be 10^{15}g, and M_b = original mini BH = M_{bo} [1] [2]

Density of (M_{bo} =10^{15}g) is ρ_{bo} =0.7×10^{53}g/cm^3; $R_{bo} = 1.5\times10^{-13}$cm; $T_{bo} = 0.77\times10^{12}$k; $m_{sso} = 12\times10^{-24}$g;

7*. The best important conclusions from Bekinstein's explanation to Hawking formula (8b) about entropy of BHs is as below. Bekinstein only did a well mathematical arrangement to formula (8b), but neglected the profound physical implications of (8b). Author think, (8b) should be applied to explain some significant physical process.

Firstly, the gravitational collapse under the condition of density < 10^{53}g/cm^3, the collapsed process should not be equal entropy. It clearly tell us that, protons can keep its particle formation, and not be disintegrated, so, protons as particles must have heat motions and frictions, and can change entropy more or less.. Hyperons Λ and Σ are only protons of high temperature, and still formed from quarks.

Secondly, however, since in the changed process of density from 10^{53}g/cm^3 to 10^{93}g/cm^3, entropy can impossibly change, it shows that, protons must be disintegrated, and become into quarks. It also shows that, quarks might only be changed in the ideal state between density region from 10^{53}g/cm^3 to 10^{93}g/cm^3, no matter whether they were in expansive or contractive process, which were all the ideal process of equal entropy. In other words, quarks might have no heat motion and frictions changed between 10^{53}g/cm^3 and 10^{93}g/cm^3.

The best important conclusion: The strongest pressure in present universe produced from the supernova can only compress matters into density of about 5×10^{15}g/cm^3, what could be the most powerful force in nature to compress matters to density of 10^{53}g/cm^3, even finally to 10^{93}g/cm^3 of Planck particle (m_p)? The most powerful force is only the contracted force of very small BHs (<< star BH) due to radiating HQRs continuously, it can let BHs (mass <10^{15}g) to contract nonstop to Planck particles. It obviously shows that, BHs only radiating nonstop its HQRs outside can nonstop go on its gravitational contraction until becoming to minimum BH-- $M_{bm} = (hC/8\pi G)^{1/2} \equiv m_p$ and disappearing in Planck Era.

【9】。Original mini BH = $M_{bo} \approx 10^{15}$g, Could those M_{bo} be found in the universe at present? In nature, the great significance of M_{bo} is its density of 10^{53}g/cm^3, only substantial density > 10^{53}g/cm^3, protons can be broken and disintegrated. That may be an important reason why protons have so long lifetime of 10^{30}years,

From formula (8b), the mass of original mini BHs = $M_{bo} \approx 10^{15}$g. Its other parameters are:
$R_{bo} = 1.5\times10^{-13}$cm; $\rho_{bo} = 0.7\times10^{53}$g/cm^3; $T_{bo} = 0.77\times10^{12}$k; $m_{sso} = 12\times10^{-24}$g
From formula (6b), lifetime of M_{bo}, $\tau_{bo} \approx 10^{-27} M_b^3$ (s) $= 10^{18}/3.156\times10^7$s $\approx 3\times10^{10}$yrs.
Compton time $t_{bo} = R_{bo}/C = 5\times10^{-24}$s,
Numbers of proton: $n_{bo} = M_{bo}/1.66\times10^{-24} = 10^{39}$, n_{bo} is other Dirac's large number.
According to calculations above, the lifetime τ_{bo} of original mini BH=$M_{bo} \approx 10^{15}$g , $\tau_{bo} \approx 3\times10^{10}$yrs. The age of our universe is 1.37×10^{10}yrs, which is the same scale with τ_{bo}. In 1971, Hawking proposed, M_{bo} might exist in our universal space, if some of them could be survivals from the newborn time of our universe. However, in 1970s, many scientists attempted to observe and find out such original mini BHs in universal space, but their efforts about 10 years were all in vain. It clearly shows that, no such M_{bo} could remain to the present.

In the newborn time of our universe, at least before the end of Hardron Era, i.e. the expansion of our universe from density 10^{93}g/cm^3 to 10^{53}g/cm^3 could have perfect homogeneity, because that expansive process would be completely equal entropy known from above paragraph. The numerical values of 3 main parameters ρ_{bo}, T_{bo} and t_{bo} of M_{bo} are all in Hadron Era of universal evolution. At that time, all M_{bo} in universe were closely and evenly linked together into a whole, and had no way to exist single. With their expansion later, they could only combine each others and become bigger and bigger. In other words, in the universal expansive process, any original BHs of high density could not exist single at all, no matter how great they were, because BHs linked together could only combine and expand, but have no way to exist independently. Only after Radiation Era of universal evolution, because radiations separated from matters and led to lower temperature in matters, then, matters could do a renew contraction. As a result, the nebulas could have a great gravitational contraction to become the compact stars or a BHs through supernova explosion.

【10】。The super great BHs of（10^7 ~10^{12}）M_0 and Quasars.

In the center of every galaxy and star cluster, there is a super great BH, its mass can reach to（10^7 ~10^{12}）M_0. Recently, a super giant BH called Q0906+6930 discovered by an astronomy group of Stanford University in the remote center of our universe. Its mass more than 10^{10} M_0, and it formed 127×10^8 years ago. i.e. after 10^9 years of the birth of our universe. [9]

Let that BH be $M_{bs} = 10^{10}$ $M_0 = 2\times10^{43}$g, so, its $R_{bs} = 2.96\times10^{15}$cm, its $\rho_{bs} = 1.74\times10^{-4}$g/cm^3.

The simple calculations to Quasars in the 8th chapter of Prof, He Xiangtao's book "Observation Cosmology" [3] are as follows:

The mass of a Quasar must be satisfied by the following formula,

$$M_Q > L_Q M_0/1.5\times10^{38} = 3.3\times10^8 M_0 \qquad (10a)$$

In above formula (10a), $L_Q = 5\times10^{46}$erg/s.

If the light period of a Quasar is 1 hour, its scale D should be:

$$D \le C\Delta t = 1.1\times10^{14}\text{cm}, \qquad (10b)$$

For a Schwarzschild's BH of the same size , its mass M_S should be:

$$M_S = RC^2/2G = 1.9\times10^8 M_0 \qquad (10c)$$

It can be seen, $M_Q \approx M_S$，the numerical values of both are very close.

Conclusion: Really, Quasars should be the predecessor and the childhood of super great BHs, which might all come from the evolution of Quasars.

There has been an important problem in astronomers and cosmologists: Was BHs formed before as a core to contract its outside energy-matters to compose galaxy and star cluster, or substantial particles contract to form nebula at first, and then ignite the nuclear fusion in the core to form BH through supernova explosion? Author think, the later can accord with the real circumstance in nature, because forming a galaxy needed time is << forming a BH needed time.

【11】。The simple summations, further analyses and important conclusions as bellow:

A: No matter whether the EH of any BHs or a large ball of matters (mass of a nebula 5 M_0 ~8 M_0) would be, their finally contracted destinies could be the perfectly same, i.e. $m_{ss} = M_b = M_{bm} = (hC/8\pi G)^{1/2} = m_p = 1.09 \times 10^{-5}$g, but impossible to contract to singularity of infinite density. It proved that, Hawking laws about HQR, Schwarzschild solution to GTRE, uncertain principle and other classical dynamic laws are completely

harmonious and identical, No singularity shows that, General Theory of Relativity Equation (GTRE) has had the fatal weakness.

B: The fatal weaknesses of GTRE are to neglect the thermodynamic effects to resist the gravitational contraction of matter particles. For simplifying the difficulties to solve GTRE, the most scholars proposed two bad hypotheses which violate thermodynamics, i.e. the contraction of equal matters and the "universal model of zero (constant) pressure". Just those two bad hypotheses lead gravitational contraction to singularity in GTRE. Of course, GTRE may have other important defects, such as, permitting the infinite contraction of particles of point structure. In addition, GTRE is hardly to be solved. The hypothesis of inertial mass equal to gravitational mass has no reliable evidences, etc.

Particles of point structure, which may be infinite contraction in GTRE, must have a limit. It is just Planck Era, in which time and space are not continuous, [8] and it certainly leads GTRE lose effect.

C: Hawking theory and some important laws about BHs based on quantum mechanics and thermodynamics are very correct and effective, they avoid and overcome the important defects of appearance of singularity in GTRE, just as quantum mechanics could demonstrate that, electrons could not fall into atomic nucleus in the past. Similarly, Hawking theory and laws about BHs demonstrated that, GTRE lost effectiveness in Planck Era, just as GTRE demonstrated that, Newton mechanics had lost effectiveness in the movements of near light speed.

However, the explanations of Hawking and modern physicists to HQRs with the concept of "a pair of virtual particles would be suddenly born out from vacuum" may be a deliberately mystifying with the new physical concept. HQRs flow out from the EH of BH to outside, just as energy or matters naturally flow down from high position to low position, or from high temperature to low temperature.

D: Through studying star BHs, the conclusion is that, singularity could have no possibility to occur in BHs. After the Big Bang, the strongest explosions in nature have been the supernova explosions, which explosive forces can only compress matters to density about 10^{16}g/cm^3, i.e. the density of core of neutron stars, in such level of density, protons cannot be broken yet. Only the substantial density reaches to 10^{53}g/cm^3 of original mini BH (M_{bo}), protons can be destroyed. Protons are the most stable and solid particles, and have the longest lifetime of 10^{30} years. The forces to destroy protons have not appeared in nature as yet. Of course, no more powerful forces can compress matters to the density 10^{93}g/cm^3 of Planck particles ($m_p = M_{bm}$), except the contraction of BHs < 10^{15}g due to emitting HQRs.

On the contrary, if there were singularity or smaller BH in BHs, certainly, singularity could explode at once and change into rays of extremely high energy in BHs. At the same time, the smaller BH could absorb energy-matters of its outside, finally, the event horizon (EH) of smaller BH could enlarge to combine with the EH of BH together.

E。Here author makes a guess: In BHs of >10^3 M_0, (10^3 M_0 is guessed by author, because nuclear fusion had finished before any star BHs of <15 M_0 was formed.) owing to no nuclear fusion occurred before BHs forming, so, nuclear fusion might occur in BHs because of the contraction of matter particles. Thus, energy-matters would discharge outside BHs until nuclear fusion finished.

F: Only the contracted forces of mini BH, which mass (M_{bo} = 10^{15}g) due to radiate HQRs, could compress protons disintegrated into quarks. After that, the contracted forces of mini BHs of mass M_{bmi} < (M_{bo} = 10^{15}g) due to radiate HQRs could raise the density of M_{bmi} and decrease in distance between quarks in M_{bmi}. The finally contracted results of M_{bmi} would just become to ($m_p = M_{bm}$), and explode and disappear in Planck Era.

G: A few words out of this article about the destiny of our universe, if the current mass M_u of our universe is about 10^{56}g, and no energy-matters outside can be absorbed. Thus, our universe can only nonstop emit HQRs to contract its size up to become $m_p = M_{bm}$ =10^{-5}g, and explode and vanish in Planck Era. The lifetime of M_u will be (= $10^{-27}M_u^3$) about 10^{132}years.

The problem is to judge whether energy-matters have or no outside our current universe. Author think, if the real lifetimes of some bodies in nature measured by scientists, such as some celestial bodies or aerolites, are the same with Compton time of our current universe (UBH), and Hubble constant has a certainly reliable value as normal, it may shows that, there might still be energy-matters outside our universe. Correspondingly, our universe will plunder all energy-matters outside, after that, it can nonstop contract its size with emitting HQRs until become $m_p = M_{bm}$ =10^{-5}g, and explode and vanish in Planck Era. Thus, its lifetime will prolong to >>10^{132}years. If the real lifetimes of some bodies in nature > Compton time of our UBH, and Hubble constant = 0, it shows no energy-matters outside our UBH.

However, if a insolated star BH of $3M_0$ had no energy-matters outside to be engulfed, it could only contract its size to $m_p = M_{bm} = 10^{-5}$g, then, explode and vanish in Planck Era too. Its lifetime = $10^{-27}(3M_0)^3 \approx 10^{67}$years is too long. It is much longer than lifetime = 10^{30}years of protons.

H: Author's few words: Author may only forge ahead a little step from Hawking theory about BHs with simple explanations and calculations to BHs in this article, and get many important and basic conclusions. It may help people to understand many fundamental and principal concepts to BHs from profound theories and complicated mathematical equations of modern scientists.

====The End====

References:

1. Jean-Pierre Luminet: Black Holes; Hunan Science-Technology Publishing House, China: Chinese Edition. 2000.

2. Wang, Yong-Jiu: Physics of Black Holes; Hunan Normal University Publishing House China. 2000. **

3. He, Xiang-Tao: Observational Astronomy; Science Publishing House, Beijing, China. 2002.

4. John & Gribbin: Companion to the Cosmos; Hainan Publishing House, Hainan, China. 2001. Chinese Edition.

5.Compact star: http://hometown.aol.com/lklstars8/15b.htm

6. http://popul.jqcq.com/big5/natural/2007-08/187918038.html

7. Wu, Shi-Min: A Course in the General Theory of Relativity: Beijing Normal University Publishing House,
Beijing, China. 1998. 8.

8. John & Gribbin: Companion To The Cosmos. Hunan Publishing House. China. 2001, 9

9. An oldest and biggest BH was discovered by astronomers.
http://tech.sina.com.cn/other/2004-06-30/0752381423.shtml

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The New Concepts to Big Bang and to Black Holes: Both Had No Singularity at All

Nov.-2005

====Part 2: Our Universe Didn't Come From Singularity====

《Our Universe Was Originated From Planck Era, Not From Singularity Or The Big Bang Of Singularity . Just The Birth And Combinations Of Very Large Amount Of Minimum BHs $M_{bm} = m_p = 1.09\times10^{-5}$g Created Our Universe And Its Continuous Expansion Until The Present.》

June/2010

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【Abstract】。 In this article, based on some general laws of astronomy, physics and many classical theories, the calculated results can prove that our present expansive Universe was impossibly born from Singularity or from the Big Bang of Singularity but from the Big Crunch of pre-universe in Plank Era. According to the principle of time symmetry, suppose before the birth of our universe, there could be a final Big Crunch of pre-universe. Once the final Big Crunch of pre-universe reached to Planck Era, i.e. time $t \leq [k_1 (2G\kappa)/C^5]^{2/3}$ (3c), $t = -0.5563\times 10^{-43}$s and temperature $T = 0.734\times10^{32}$k, every Planck particle (m_p) simultaneously reached 3 states: 1. Reached Planck Era; 2. The gravitational linkage between the closest particles broke off and the collapse stopped at the state of no gravity; 3. Every particle (m_p)

at that moment would exactly become a minimum gravitational black hole ($M_{bm} = m_p = 1.09\times10^{-5}$g)。Just those 3 states could effectively stop pre-universe continuously collapse to singularity, and let all M_{bm} explode in Planck Era. The strongest explosions of every M_{bm} in whole pre-universe synchronously formed a so-called the Big Bang. After that, the new and bigger $M_{bmn} = 2M_{bm}$ of longer lifetime could certainly occurrence due to decrease in density and temperature caused by the Big Bang. Newborn $2M_{bm}$ became the embryos of our present universe. It was the process of genesis of our present Universe. The collisions and combinations of all newborn $M_{bmn} = 2M_{bm}$ would create an "Original Inflation", and form the present expansion of our universe. The whole process changed from the disappearance of old pre-universe to the genesis of new universe in Plank's Era was not reversible. Other important conclusions got in this article are those: Our universe has been a real universal black hole (UBH), which accords with all laws of general black holes (BH); Hubble law is just the expansive law of our universe to plunder energy-matters outside; the new and simple explanations and demonstrations to " Original Inflation", etc. [Academia Arena, 2010;2(8):1-26] (ISSN 1553-992X).

【Key words】. the genesis of our universe; singularity; the Big Bang; black holes (BH); cosmology; minimum gravitational black holes (M_{bm}); Original Inflation; Planck Era; Planck particle (m_p); Hawking quantum radiations (HQR);

【1】。The Laws and formulas of Our Universal Evolution.

The laws of our universal evolution can be simply and precisely described by two different methods, which are based on the achievements of modern physics and astro-cosmology. [3][4][2]

First, Figure 1 specifies the numerical values of time (t) corresponding to Temperature (T) at different time in our universe's evolution.[3][4][2]

Second, Formulas (1a) below precisely describes our universe's evolution relevant from the Big Bang to Radiation Era in Figure (1), (from $t = 10^{-43}$ s to $t = 1/3\times10^6$ years). [3][4][2]

$$Tt^{1/2} = k_1,\ ^{[4][3]},\ R = k_2t^{1/2},\ RT = k_3,\ R = k_4\lambda \qquad (1a)$$

t—Characteristic Expansion Time, T—Temperature of Radiations, R— Characteristic Size or Dimension of the Universe, λ--Wavelength of Radiation, k_1, k_2, k_3, k_4—Constants,

Formula (1b) below precisely describes our universe's evolution relevant within the Matter-Dominated Era in Figure 1, (from $t = 1/3\times10^6$ years to the present).[3][4][2]

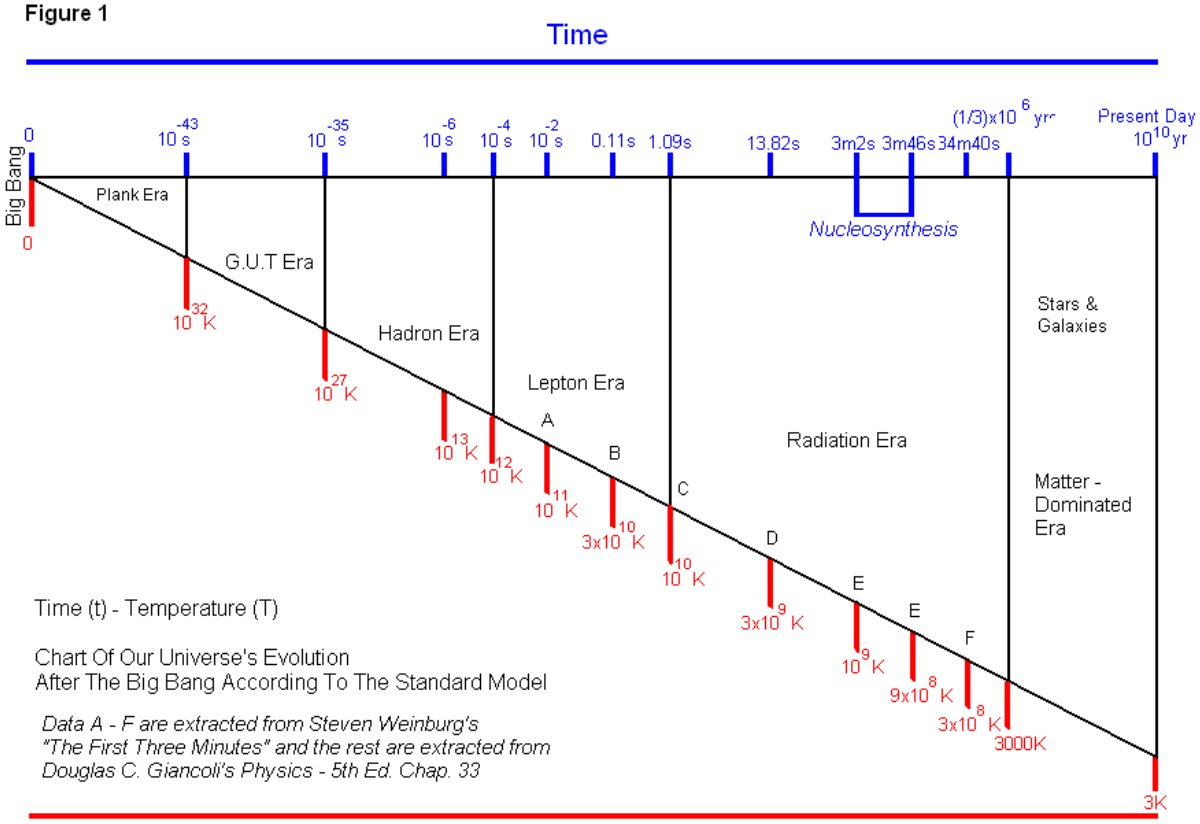
$$Tt^{2/3} = k_6,^{[4][3]}\ R = k_7t^{2/3},\ RT = k_8,\ R = k_9\lambda \qquad (1b)$$

k_6, k_7, k_8, k_9 – Constants

$R = k_2 t^{1/2}$ in Formulas (1a) and $R = k_7 t^{2/3}$ in (1b) conform to cosmological principle, Newton's Mechanics and modern observations.

Right now, it has not been known all problems in Planck Era on the top of Figure 1 below by modern sciences, such as the micro structure, physical states and characters, the genesis of our universe in that Era. This article will describe and prove the mechanism of our universe born out from Planck Era.

Figure 1



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For example, in Matter-Dominated Era, the numerical values below calculated out from Formula (1b) accord with the values on Figure 1 above。

$R_1/R_2 = (t_1/t_2)^{2/3}$, [3][4][6] $R_1T_1 = R_2T_2$, $R_1/R_2 = \lambda_1/\lambda_2$,

When $t_1 = (13 \times 10^9$yrs) to $t_2 = (4.0 \times 10^5$ yrs), $t_1/t_2 \approx 32{,}500$, $(t_1/t_2)^{2/3} \approx 1{,}000$

$R_1/R_2 = (12 \times 10^{27}$cm) / $(12 \times 10^{24}$cm) ≈ 1, 000

T_1/T_2 = 3K /3,000K ≈ 1/1,000, λ_1/λ_2 = 0.1cm / 10^{-2}cm ≈ 1, 000,

From the beginnings of the Matter-Dominated Era to the present, the numerical values show that, as time (t) in the universal evolution enlarged 32,500 times, its size (R) enlarged 1,000 times, its radiant temperature (T) decreased 1,000 times, and wavelength (λ) of radiation increased in 1,000 times. The results above are consistent with the modern observations and MBR (Microwave Background Radiation).

【2】. About some essential natures and laws of black holes (BH), They must be obeyed by our universal black holes (UBH). [1] (see Part 1—<black holes> of this article in detail about the essential attributes of BHs)

1*. The minimum BH-- M_{bm}: According to Hawking radiation law of BHs and Schwarzschild special solution to GTRE and other classical formulas, the relationship of many physical parameters on the event horizon (EH) of BHs can be got as below: M_b –- mass of a BH, T_b –- temperature on EH of BH, m_{ss} –-mass of Hawking quantum radiation (HQR) on BH, R_b –- EH of a BH, h—Planck constant = $6.63\times10^{-27}g_*cm^2/s$, C –-light speed =$3 \times 10^{10}$cm/s,, G –-gravitational constant = $6.67\times10^{-8}cm^3/s^2{}_*g$, Bolzmann constant κ = $1.38\times10^{-16}g_*cm^2/s^2{}_*k$, m_p –- Planck participle, L_p ---Planck length, T_p ---Planck temperature,

Hawking temperature formula on the event horizon (EH) of BH,

$T_b = (C^3/4GM_b) \times (h/2\pi\kappa) \approx 10^{27}/M_b$, [2] (2a)

Formula of energy transformation (i.e. gravitational energy can transfer into radiation energy through valve temperature) on EH of BH,

$m_{ss} = \kappa T_b / C^2$ [3] (2b)

According to Schwarzschild special solution to GTRE,

$GM_b/R_b = C^2/2$ [1][2] (2c)

From (2a) and (2b),

$\underline{m_{ss} M_b = hC/8\pi G = 1.187\times10^{-10}g^2}$ (2d)

Formula (2d) is a general law effective on any EH of BHs. Furthermore, according to axiom of any part ≦the whole, m_{ss} is impossible > M_b, at the limited condition, the maximum m_{ss} = the minimum M_b, so, M_{bm} –minimum BH,

$m_{ss} = M_{bm} = (hC/8\pi G)^{1/2} = 1.09 \times 10^{-5}g$ [1] (2e)

Owing to $(hC/8\pi G)^{1/2} \equiv m_p$, [1][6] so,

$\underline{m_{ss} = M_{bm} = (hC/8\pi G)^{1/2} \equiv m_p \equiv 1.09\times 10^{-5}g.}$ (2f)

$R_{bm} \equiv L_p$ [6] $\equiv (Gh/2\pi C^3)^{1/2} \equiv 1.61\times 10^{-33}cm$ (2g)

$T_{bm} \equiv T_p$ [6] $\equiv 0.71\times 10^{32}k$ (2h)

$\underline{R_{bm}m_{ss} = h/(4\pi C) = 1.0557\times10^{-37}cmg}$ (2i)

The best important conclusion: When a BH could get into the gravitational collapse because of emitting Hawking quantum radiations (HQR) after engulfing all energy-matters outside, it would continuously shrink its size R_b, lose mass M_b , increase in T_b, and m_{ss} finally become a perfect minimum BH-- M_{bm} equal to Planck particle--m_p, so, $M_{bm} = m_{ss} = (hC/8\pi G)^{1/2} \equiv m_p$, and explode and disappear in Planck Era,

2*. From formula (2l) below, an essential nature of BHs is that, once a BH was formed, no matter whether it absorbs in or radiates out energy-matters, or collides with other BHs, it will only be a BH forever until it finally contracts to a minimum BH— $M_{bm} \equiv m_p$. In other words, every BH to its owning , losing out and taking in energy-matters knows very clearly, and the event horizon (EH) as a precise recorder can revise its size at any moment as to suit the change of energy-matters in BH.

$2G M_b = C^2 R_b$ (2c)

$2GdM_b = C^2 dR_b$ (2j)

If there is another BH—M_{ba} to collide or combine with M_b, so,

$2G M_{ba} = C^2 R_{ba}$ (2k)

Formulas (2j) + (2k) + (2c), then,

$2G(M_b + dM_b + M_{ba}) = C^2(R_b + dR_b + R_{ba})$ (2l)

3*. The reasons of $\underline{M_{bm} \equiv m_p}$ must explode, disintegrate and disappear in Planck Era.

Owing to once $M_{bm} < \underline{(hC/8\pi G)^{1/2} \equiv m_p \equiv 1.09\times 10^{-5}g}$, its $m_{ss} < 1.09\times 10^{-5}g$, so, $\underline{m_{ss} M_b < hC/8\pi G < 1.187\times10^{-10}g^2}$, it violates formula (2d), which is the general law of BHs.

Furthermore, according to Uncertainty Principle,

$\Delta E \times \Delta t \approx h/2\pi$ (2m)

To M_{bm}, $\Delta E = M_{bm} C^2 = \kappa T_b = 10^{16}$erg,

Δt = Compton time = $R_{bm}/C = 1.61\times10^{-33}/3\times10^{10} = 0.537\times10^{-43}$.

$\Delta E \times \Delta t = 10^{16} \times 0.537\times10^{-43} = 0.537\times10^{-27}$, but $h/2\pi = 6.63\times10^{-27}/2\pi = 1.06\times10^{-27}$,

Obviously, $\Delta E \times \Delta t < h/2\pi$, it violates Uncertainty Principle. Thus, M_{bm} could impossibly exist, but only disintegrate and vanish in Planck Era, so, it has no way to contract to singularity.

【3】。The Transitive Condition Occurred from Big Crunch of Pre-universe to Big Expansion of Present Universe. Based on the principle of time symmetry, suppose the final collapse of pre-universe obeyed the same expansive law of our newborn universe.

From formulas (1a), (2b), $R = k_2 t^{1/2}$, when pre-universe contracted its size (R) to the Big Crunch, correspondingly its Temperature (T) would increase, and its time (t) would too much shorten. At an extreme circumstance, when (R) contracted to such an infinitesimal dimension, the real distance between two neighboring particles would finally become greater than the product of (C) (light speed) multiplied by time 2(t). It shows that there would not be time enough to transmit the gravity between neighboring particles. At that moment, all adjacent particles had to instantaneously break off the linkage of gravitational forces and lead the pre-universe to stop contraction and disintegration. No gravity between particles could certainly stop the contraction of particles. Thus, the pre-universe would change its state from the Big Crunch to the Big Expansion caused by the explosions of all $M_{bm} = m_p$ in "universal package". The strongest explosions of all $M_{bm} = m_p$ may be called "the Big Bang" in this article. After that, owing to decrease in density and temperature because of the explosions of old M_{bm}, the new $M_{bmn}=2M_{bm}$ could certainly be formed and become the embryos of our present universe. The combinations of newborn M_{bmn} created the "Original Inflation" at the genesis of our universe and the present universal expansion. That is the simple process of the birth of our present universe. Such a process is different with the Big Bang at an infinitesimal explosive point of Singularity known by most people. Of course, the detailed process of changing states should be extremely complicated in Planck Era.

The transitive condition occurred from the Big Crunch of pre-universe to the Big Expansion of the present universe is demonstrated by Formula (3) below.

$$d_m \geqslant C\times[2t\,],\ \text{i. e. } d_m/2C \geqslant t,\ -t \leq -d_m/2C,\ t = r/C \qquad (3)$$

t – Characteristic Expansion Time, d_m – Distance between two closest particles, C – Light Speed = 3×10^{10} cm/s,

Let ρ = energy-matter density g/cm^3, $M = 4\pi\rho R^3/3$, (3aa)

H = Hubble's Constant, $H = V/R = 1/t$,

From $4\pi\rho r^3/3 = m$, and $m = \kappa T/C^2$, [3] (2b)

$$\therefore\ t^3 \leq 3\kappa T/4\pi\rho C^5 \qquad (3a)$$

From $\rho = 3H^2/8\pi G = 3/(8\pi G t^2)$, [3] (3ba)

$$\therefore\ t \leq T(2G\kappa)/(C^5), \qquad (3b)$$

From (1a), $Tt^{1/2} = k_1$ (3ca)

$$\therefore\ t^{3/2} \leq k_1 (2G\kappa)/C^5,\ \text{or}\ t \leq [k_1 (2G\kappa)/C^5]^{2/3} \qquad (3c)$$

Formulas (3a), (3b), (3c) are all derived from Formula (3), and have the same value of (t).

Now the numerical value of (t) can be calculated as below. First, select two corresponding values (t) and (T) from Figure 1 into formula (1a) to get value of k_1, such as take $t = 10^{-43}$ s, and corresponding to $T = 10^{32}$K, from Figure 1, so,

$$k_1 = Tt^{1/2} = 10^{32}\times10^{-43}\text{s} = 3^{1/2}\times10^{10} \approx 1.732\times10^{10},$$ **and from formula (3c),**

$$t^{3/2} \leq [(2G\kappa)/(C^5)]\times k_1 = 1.732\times10^{10}[(2G\kappa)/(C^5, \qquad (3cb)$$

$G = 6.67\times10^{-8}$cm^3/gs^2, $C = 3\times10^{10}$cm/s, $\kappa = 1.38\times10^{-16}$$g$cm/s^{2}K„

$$t^{3/2} \leq [(2\times6.67\times10^{-8}\times1.38\times10^{-16}) / (3\times10^{10})^5] \times 1.732\times 10^{10})] = 0.075758\times10^{-74}\times 1.732\times10^{10} \approx 0.1312\times10^{-64},$$

$$t^3 = 0.017217\times10^{-128} = 0.17217\times10^{-129},$$ **now let $t = t_m$ below for convenient calculations,**

$$t_m = 0.5563\times10^{-43}\text{s}, \qquad (3d)$$

$$\therefore\ t_m \leq 0.5563\times10^{-43}\text{s},\ \text{and}\ t_m \geq 0.5563\times(-10^{-43})\ \text{s}, \qquad (3d)$$

Let $t = t_m$ be the disintegrated time of all particles m_m and pre-universe. Correspondingly,

$$T_m = k_1/t^{1/2} = 1.732\times10^{10}/(0.5563\times10^{-43})^{1/2} = 0.734\times10^{32}\text{K}, \qquad (3e)$$

mass of a particle m_m corresponding to above temperature 0.734×10^{32}K:

$$m_m=\kappa T/C^2=1.38\times10^{-16}\times0.734\times10^{32}/(9\times10^{20})=1.125\times10^{-5}\text{g}, \quad (3f)$$

$$\rho = 3/(8\pi Gt^2) = 0.5786\times10^{93}\text{g/cm}^3, \quad (3g)$$

From formula (3aa), the radius r_m of m_m,

$$r_m = (3m/4\pi\rho)^{1/3} = 1.67\times10^{-33}\text{cm}, \quad (3h)$$

$$d_m = C\times[2t] = 3.34\times10^{-33}\text{cm}, \quad d_m \geq 2r_m \ (=3.34\times10^{-33}\text{cm}) \quad (3i)$$

$$\therefore (d_m \geq 2r_m) \quad (3j)$$

(3j) shows that, the gravitational links between two adjacent particles were surely broken,

The density ρ_u of the "universal package" formed by infinite particles m_m,

$$\rho_u = m_m/d_m^3 = 0.302\times10^{93}\text{g/cm}^3 \quad (3k)$$

($\rho_u < \rho$) shows that, the density of pre-universe had a little decrease due to particles m_m disintegrated in whole "universal package".

$$m_m C^2 = 1.125\times10^{-5}\times9\times10^{20} = 1.013\times10^{16}, \text{ and } \kappa T = 1.38\times10^{-16}\times0.734\times10^{32} = 1.013\times10^{16}$$

$$n_m = m_m C^2/\kappa T = 1 \quad (3l)$$

Formula (3l) indicates that, in the "universal package", the Crunched every particle m_m was a whole particle of no contracting forces inside. In addition, they were the broken gravitational links between adjacent particles m_m outside. Thus, the only way for all particles m_m of pre-universe could be only disintegrated into powders with pre-universe together at the highest temperature of 0.734×10^{32}K in "universal package",

Conclusions: The calculated values of ($t \leq 0.5563\times10^{-43}$s, $T = 0.734\times10^{32}$K) are almost equal to the beginning values of Planck Era in figure 1. It is said, once the Big Crunch of pre-universe collapsed into particles of above calculated values of ($m_m = 1.125\times10^{-5}$g, $r_m = 1.67\times10^{-33}$cm, $T_m = 0.734\times10^{32}$K), pre-universe reached Planck Era and all particles $m_m = m_p = M_{bm} = 1.09\times10^{-5}$g. No gravity is equal to no power for contractions of particles, so, all m_m could only be disintegrated into rays of the highest energy. and then $T_m \approx 10^{32}$ k become the highest temperature in Universe. With no gravity, the only way for the pre-universe and for all particles m_m had to stop their contraction and then started the expansion. Thus, pre-universe could only disappear in Planck Era, but have no way continuously to collapse to singularity.

Between $t = -10^{-43}$ s and $t = +10^{-43}$ s, there might be appearance of time (t = 0). However, time (t = 0) does not signify the presence of Singularity of infinite density at all, since at the virtual point of (t = 0), the temperature $T \approx 10^{32}$ k, T was not infinity. The density $\rho \approx 10^{92}\text{g/cm}^3 \neq 0$, and the actual radius of universe $R \neq 0$. So, the virtual point of (t = 0) was just a bridge from contracted state ($t = -10^{-43}$ s, +R) into expanded state ($t = +10^{-43}$ s, +R). Above viewpoints let the universal evolution accord with the law of causality and the second law of thermodynamics as well as all classical theories and laws.

Owing to that, the "universal package" was formed by all particles m_m, their simultaneous disintegrations and explosions in Planck Era could certainly lead the disappearance of pre-universe as well as the space expansion and decrease in density inside. Probably, if people used to consider that, there must be a Big Bang as the genesis of our universe, then, the explosions of all above m_m and the disappearance of pre-universe might be called the "Big Bang" creating our present universe in this article. As the result, in the sealed "universal package", the tiny powders of the highest energy caused by exploded m_m had infinite opportunity to re-collide and re-combine into new particles and new minimum black holes (M_{bmn}). The presences of a large amount of new M_{bmn} could become the embryos of our new universe, their combinations created "Original Inflation" and our present expansive universe.

【4】. Minimum Gravitational (Schwarzschild) Black Hole (M_{bm}), Planck particles m_p and particles m_m above were all the perfect same thing, they came from final collapse of pre-universe. Formulas (4a) , (4b), (4c) and (4d) come from formulas (1f), (1g), (1h) and (1i). [1]

$m_{ss} = M_{bm} = (hC/8\pi G)^{1/2} \equiv m_p \equiv 1.09\times 10^{-5}g.$ (4a)

$R_{bm} \equiv L_p^{[3]} \equiv (Gh/2\pi C^3)^{1/2} \equiv 1.61\times 10^{-33}cm$ (4b)

$T_{bm} \equiv T_p^{[3]} \equiv 0.71\times 10^{32}k$ (4c)

$R_{bm} m_{ss} = h/(4\pi C)$ (4d)

Let's compare the numerical values between M_{bm}, m_p and m_m. m_m was particle of the final collapse of pre-universe in the state of no gravitational linkages between any two adjacent particles. M_{bm} was the minimum gravitational BHs come from the final collapse of BHs, they would finally become Planck particles m_p, and explode in Planck Era. [1]

Table 1: comparisons of numerical values between M_{bm}, m_p and m_m

m_m of no gravity	M_{bm}–minimum BH	m_p–Planck particles[3]
$m_m = 1.125\times 10^{-5}g$	$M_{bm} = 1.09\times 10^{-5}g$	$m_p = 1.09\times 10^{-5}g$,
$t_m = \pm 0.5563\times 10^{-43}s$	$t_{bm} = 0.539\times 10^{-43}s$	$t_p = 0.539\times 10^{-43}s$,
$T_m = 0.734\times 10^{32}k$	$T_{bm} = 0.71\times 10^{32}k$	$T_p = 0.71\times 10^{32}k$,
$r_m = d_m/2 = 1.67\times 10^{-33}cm$	$R_{bm} = 1.61\times 10^{-33}cm$	$L_p = 1.61\times 10^{-33}cm$,

It can be seen from table 1, the numerical values of m_m have a little tolerance with values of M_{bm} and m_p. The reasons are that, m_m comes from formula (3f), but in the derived process, the numerical values of time t and temperature T got from Figure 1 are not very precise. Thus, in reality, m_m should be completely equal to M_{bm} and m_p. So,

$m_m \equiv M_{bm} \equiv (hC/8\pi G)^{1/2} \equiv m_p$ (4e)

It can be seen from (4e) that, particles m_m of the final collapse of pre-universe should be the same with minimum BHs--$M_{bm} \equiv m_p$. After m_m became Planck particles m_p, they could explode and disappear in Planck Era at once with the same results of $M_{bm} \equiv m_p$. [1]

【5】. After pre-universe disappeared in Planck Era, how could our universe be born out from Planck Era?

From (4e), once the final collapse of pre-universe came to Planck Era, all particles m_m in "universal package" would become minimum BHs-- $M_{bm} \equiv m_p$, and explode and disappear in Planck Era at once. That explosions could be so-called "the Big Bang" to the genesis of our universe。Energy-matters from pre-universe were the origination forming our universe. It may be said, no death of pre-universe, no energy-matters as the substantial foundation of our new universe.

How could our new universe be born from the ruins of pre-universe in Planck Era? The key problem is that, the waste energy-matters from disintegrated pre-universe could re-gather and re-form to new and stable minimum gravitational (Schwarzschild) BHs-- M_{bmn}.

Once pre-universe finally collapsed into Planck Era, which would have extreme high temperature of 10^{32}k and density of $10^{93}g/cm^3$ in the sealed "universal package" . When all particles $m_m \equiv M_{bm} \equiv m_p$ exploded and formed the Big Bang, it could certainly created the space expansion and lowered the temperature and density of "universal package ".

Acceding to Hawking law (5a) of the lifetime τ_b of BHs due to emitting Hawking quantum radiations (HQR), M_b–mass of a BH, R_b–the event horizon of a BH, t_{bc}–Compton time, which indicates the necessary time to form a stable BH. The necessary condition to form a new stable minimum BH—M_{bmn} was as below.

$\tau_b = 10^{-27} M_b^3$ (s) (5a)

$t_{bc} = R_b/C$ (5b)

$\tau_b > t_{bc}$, i e. $10^{-27} M_b^3 > R_b/C$, from (2c),

$M_b = M_{bmn} = 2.2\times 10^{-5}g$ ($\approx 2\ M_{bm}$) (5c)

$T_b = (C^3/4GM_b)\times(h/2\pi\kappa) \approx 10^{27}/M_b = 0.45\times10^{32}k$,

From (5c) above, a $M_{bmn} \geq 2.2\times10^{-5}g \approx 2\ M_{bm}$ can be got. It is said, once the new and original $M_{bmn} \geq (2.2\times10^{-5}g \approx 2\ M_{bm})$ were formed and occurred, they could impossibly disappear again and only grow up with absorbing energy-matters of very high density outside or combine to other smaller BHs. How could M_{bmn} certainly occur? Owing to decrease in density and temperature in "universal package" occurred from the explosions of all particles $m_m \equiv M_{bm} \equiv m_p$ could lead: 1*. M_{bmn} could easily appear from combinations of two or more $M_{bm} = 1.09\times10^{-5}g$ in Planck Era, because decrease in temperature let M_{bm} have the longer lifetime. 2*. From (2a) above, lower temperature could more easily form the bigger BHs, so, $M_{bmn} \approx 2\ M_{bm}$ would inevitably and easily be formed and become the stable embryos of our new universe. 3* 。 Particles smaller than M_{bmn} could grow up bigger and then collapse to M_{bmn} due to absorb energy-matters outside, just as a neutron star absorbs energy-matters enough outside to collapse a BH. 4*. Particles of mass more than M_{bmn} but density lower than M_{bmn} could contract its size to become a real M_{bmn}. 5*. In Planck Era of the highest temperature and density, energy and particles could only nonstop instantly transfer each others,

Once a M_{bmn} was formed, it could nonstop plunder energy-matters of the highest density outside or combine or collide with other M_{bmn}, and create the "Original Inflation". It just was the birth of our new universe. Thus, through expansions of 137×10^8years, the combined M_{bmn} grew up to a gigantic universal black hole (UBH) of 10^{56}g.

Conclusions: The genesis of our universe came from two key and necessary steps. First, the final explosions and disappearance of pre-universe with its all old $M_{bm} = 1.09\times10^{-5}g$ in Planck Era provided the needed energy-matters for our universe and decreased in temperature and density in "universal package". Second, the new minimum stable BHs-- $M_{bmn} = 2.2\times10^{-5}g$ could be formed to become the embryos of our newborn universe. It must be known, only new minimum stable BHs-- M_{bmn} as the embryos of our newborn universe can nonstop plunder energy-matters outside and lead our universe to grow up bigger and bigger. In a word, no BHs as embryos, no our present gigantic universal BH appears, because only BHs can nonstop plunder energy-matters outside and keep them inside forever. According to the essential nature of BHs stated on above 【2】, once a BH was formed, it would be a BH forever until it finally contracted to become $M_{bm} \equiv m_p$ and vanished in Planck Era.

【6】。Our present universe is a real gigantic universal black hole (UBH) of $\mathbf{M_u} = 10^{56}$g. The complete demonstrations are derived as below. The expansion of our universe is the results of collisions and combinations caused by a very large amount of M_{bm} or M_{bmn} .

1*. The real observational numerical values had demonstrated that, our universe is a ball to have various precise and reliable values. A, The real and precise age A_u of our universe is: $A_u = 13.7\times10^9$yrs.[8], then, the event horizon $R_u = C\times A_u = 1.3\times10^{28}$ cm, density $\rho_u = 3/(8\pi GA_u^2) = 0.958\times10^{-29}$ g/cm^3. so, the total mass of our universe is $M_u = 8.8\times10^{55}$g. B. Hubble constant is another reliable observational value, $H_o = (0.73\pm0.05)\times100$kms^{-1}Mpc^{-1} [9], as a result, the density of our universe ρ_r : $\rho_r = 3H_o^2/(8\pi G) \approx 10^{-29}$g/cm^3. The age of our universe is: $A_r^2 = 3/(8\pi G\ \rho_r)$, $A_r = 0.423\times10^{18}s = (13.4\pm0.67)\times10^8$yrs. The total mass $M_r = 8.6\times10^{55}$g。

Thus, Mass of our universe has a very precisely observational value. For convenient calculations, let $M_u = 8.8\times10^{55}$g, $A_u = 13.7\times10^9$yrs, $R_u = 1.3\times10^{28}$ cm, $\rho_u = 0.958\times10^{-29}$ g/cm^3 below.

2*. If our present universe is a real gigantic universal black hole (UBH), it certainly came from the collisions and combinations of a very large amount of original M_{bmn} or $M_{bm} \equiv m_p = 1.09\times10^{-5}$g, its $R_{bm} = 1.61\times10^{-33}$cm, its $T_{bm} = 0.71\times10^{32}$k, its HQR $m_{ss} = 1.09\times10^{-5}$g. Let N_{bu} is numbers of our present universe M_u owning M_{bm}, then,

$N_{bu} = M_u/M_{bm} = 8.8\times10^{55}/1.09\times10^{-5} = 8.0734\times10^{60}$ (6d)

If our universe is a real UBH formed from $N_{bu} \times M_{bm}$, then, $N_{bu} = 8\times10^{60}$ should be suitable with the same precise proportion of their event horizon as below (if let M_{bm1} replace M_{bm}, the same result can be got):

$$N_{bu} = R_u/R_{bm} = 1.3\times10^{28}/1.61\times10^{-33} = \underline{8.075\times10^{60}} \qquad (6e)$$

Owing to (6d) = (6e), it demonstrates clearly that, M_u are actually formed from $N_{bu}\times M_{bm}$, and M_u is a real UBH.

3*. The Hubble's law of universal expansion is just the expansive law of our UBH due to plunder energy-matters outside.

Apply Hubble's law to the boundary of our universal ball,

$$M_u = 4\pi\rho_o R_u^3/3 = 4\pi(3H_0^2/8\pi G)C^3 t_u^3/3 = 4\pi(3H_0^2/8\pi G)C^3 t_u/3H_0^2 = C^3 t_u/2G = C^2 R_u/2G \qquad (6f)$$

From Schwarzschild solution To GTRE, i.e. formula (2c), $2G M_b = C^2 R_b$

$$M_b = R_b C^2/2G = C^3 t_{bu}/2G = R_{bu}C^2/2G \qquad (6g)$$

Right now, owing to $M_u = M_b$, $t_u = t_{bu}$, so, $R_{bu} = R_u$,. So, our universe is a real UBH, and the Hubble's law is just the expansive law of our UBH due to plunder energy-matters outside. When might $t_u \neq t_{bu}$? Once our UBH plunder all energy-matters outside in future, it can no more expand, Hubble law will be no longer effective, then, the universal age $t_u >$ Compton time t_{bu} of our UBH.

4*. So-called "Flatness" ($\Omega = \rho_r/\rho_o \approx 1$) of our universe is really just the essential nature of any BHs included our UBH. Our universe as a real UBH is certainly a sealed giant ball. To any BH, the exact amount of ρ_b must correspond to an exact amount of M_u, so, $\Omega = \rho_r/\rho_o = 1$ is a certain result. Therefore, the argument about ($\Omega = \rho_r/\rho_o \approx 1$) in scientists over 50 yrs is really a false proposition.

Owing to the wrong proposition of ($\Omega = \rho_r/\rho_o \neq 1$), it led a lot of scientists to propose some wrong concepts, such as "Seeking lost energy-matters", "zero energy" and "dark energy", etc. It can be seen from formulas (6d) and (6e), Our UBH has not lost any energy-matters at all, but only has matters not found out.

From now on, if no energy-matters outside to be plundered, our UBH will no more expand, and start to emit HQRs, contract its size very and very slowly. According to Hawking law of lifetime of BHs (5a), the lifetime τ_b of our present universe will be about $\tau_b = 10^{-27} M_b$ (s) $= 10^{-27}(8.8\times10^{55})^3 \approx 10^{132}$yrs, due to emitting HQRs to finally become M_{bm} to disappear in Planck Era. If there are energy-matters outside, our UBH will plunder all energy-matters, and then emit HQRs to contract its size. Thus, the lifetime of our UBH will be much longer than 10^{132}yrs until it contracts to M_{bm} and disappears in Planck Era.

【7】。In this paragraph, author propose a newest and simplest principle to calculate the mechanism, process and terminal of "Original Inflation". it caused from "combinations of the newborn minimum BHs--M_{bm}". Once all M_{bm} in our universe M_u were linked together to a "universal package", "Original Inflation" would go to the end, "universal package" had to turn into slower conventional expansion until to the present.

Let t_o be the time needed by all N_{bu} ($=8.8\times10^{60} \approx 10^{61}$) $\times M_{bm}$ linking them together in the "universal package" in the newborn period of our universe, the total mass M_u of our present UBH is $M_u = 8.8\times10^{55}$g, which formed and expanded from original minimum BHs-- $M_{bm} \equiv m_p = 1.09\times10^{-5}$g, i.e. $M_u = N_{bu}\times M_{bm}$. Therefore, after "Original Inflation", our universal expansion was just the completely expansive result of $N_{ub} \times M_{bb2} = 2.2\times10^{40} \times 4\times10^{15}$ (7-4)(7-6) through their combinations of 137×10^8yrs.

For convenient calculations, let $M_{bmn} = M_{bm}$. Now let's know how $N_{bu}\times(M_{bm} \approx 10^{-5}$g) could combine them together. $R_{bm} = 1.61\times10^{-33}$cm was the event horizon of M_{bm}. Suppose a newborn M_{bm} wanted to combine its adjacent companions in (2 or 3) times t_{bmc}, t_{bmc} is Compton time of M_{bm}, $t_{bmc} = R_{bm}/C = 1.61\times10^{-33}/3\times10^{10} = 5.37\times10^{-44}$s. In case light (gravity) went through $2\times t_{bmc}$, M_{bm} should link with numbers N_{bm2} of M_{bm}, so,

$$N_{m2} R_{bm}^3 = (2R_{bm})^3, \quad \therefore \quad N_{m2} = 8 \qquad (7a)$$

Formula (7a) shows, when t_{bmc} prolonged to 2 t_{bmc}, M_{bm} would link with other 8 M_{bm}. How long could M_{bm} link with all $N_{bu} = 8.075\times10^{60}$ of M_u ($=N_{bu}\ M_{bm}$)?

$$N_{bu} = 8.8\times10^{60} \approx 10^{61} = (8^{67.5}) \qquad (7b)$$

Formula (7b) shows, after original M_{bm} went through $(2^{67.5}) \times t_{bmc}$, all N_{bu} ($=8^{67.5} \approx 10^{61}$)$\times M_{bm}$ would be linked together to become an original "universal package" of M_u. However,

$$(2^{67.5}) \approx (10^{20.3}),\ \text{let}\ \ n_{o2} = 10^{20.3} \qquad (7c)$$

Now, with the same way to get $N_{m3} = 27$,

$$N_{m3}\ R_{bm}{}^3 = (3R_{bm})^3,\ \therefore\ N_{m3} = 27 \qquad (7d)$$

$$N_{bu} = 8.8\times10^{60} \approx 10^{61} = (27^{42.6}),\ \text{and}\ (3^{42.6}) \approx (10^{20.3}),\ \text{let}\ n_{o3} = 10^{20.3},$$

$$\therefore\ n_o = n_{o2} = n_{o3} \approx (10^{20.3}) \qquad (7e)$$

From formulas (7a) and (7d), regardless how many times t_{bmc} could prolong, the needed time to link all M_{bm} together was the same time-- $n_o \times t_{bmc}$. However, owing to that, the combinations of all M_{bm} certainly created the biggest space expansion, it was just "Original Inflation". According to the essential nature of BHs and formula (2c), in (7a), combinations of 8 same BHs certainly created 8 times space expansion of the event horizon R_{bm}, so, $8 = 2^3$. Under the similar condition, in (7d), $27 = 3^3$. It is said, when time from t_{bmc} prolonged to 2 t_{bmc}, the combined numbers of M_{bm} was not 2^3, but $(2^3)^3 = 2^9$. when time from t_{bmc} prolonged to 3 t_{bmc}, the combined numbers of M_{bm} was 3^9.

Furthermore, with the same way to get a general law of n_o,

$$\text{Let}\ \ N_{mn} = n_o^9,\ \text{and}\ n_o = 10^x \qquad (7f)$$

$$\text{But}\ \ N_{bu} \approx 10^{61},\ \ \therefore 10^{61} = 10^{9x} \qquad (7g)$$

$$x_1 = 61/9 = 6.8,\qquad \therefore\ \ n_{o1} = (10^{6.8}) \qquad (7\text{-}1a)$$

Formula (7-1a) shows , under the condition of "Inflation", t_{bmc} only needed to prolong $n_{o1} = 10^{6.8}$ times to link all M_{bm} tohether. Now, according to same principle of (7-1a) , x_2 and n_{o2} can be got from (7e), it was the condition of "no Inflation", it may be called as "conventional expansion".

$$x_2 = 61/3 = 20.3 \qquad \therefore\ \ n_{o2} = 10^{20.3} \qquad (7\text{-}1b)$$

$$\therefore\ n_{o2} = n_{o1}{}^3 \qquad \text{or} \qquad n_{o2} = 10^{13}\ n_{o1} \qquad (7\text{-}1c)$$

1*。Formulas (7-1a) and (7-1b) indicate that, there could be 2 ways to link all M_{bm} together in M_u, the needed time of 2 ways are all decided by value of M_u.

A. "Original Inflation"：t_{o1} was time of the end of "Original Inflation",

$$t_{o1} = t_{bmc} \times n_{o1} = 5.37\times10^{-44}\times10^{6.8} = 0,\ 2\times10^{-36}\text{s} = 2\times10^{-37}\text{s}。 \qquad (7\text{-}2a)$$

B. " conventional expansion"：t_{o2} was time of the end of " conventional expansion",

$$t_{o2} = t_{bmc} \times n_{o2} = 5.37\times10^{-44}\times10^{20.3} = 2\times10^{-24}\text{s} \qquad (7\text{-}2b)$$

$$\therefore\ t_{o2}/t_{o1} = n_{o2}/n_{o1} = 2\times10^{-24}/2\times10^{-37} = 10^{13} \qquad (7\text{-}2c)$$

The event horizon R_{bb2} or R_{bb1} of little BHs-- M_{bb2} or M_{bb1} created after time of t_{o2} or t_{o1},

$$R_{bb1} = C\ t_{o1} = 6\times10^{-27}\text{cm} \qquad (7\text{-}3a)$$

$$R_{bb2} = C\ t_{o2} = 6\times10^{-14}\text{cm} \qquad (7\text{-}3b)$$

$$R_{bb2}/R_{bb1} = 10^{13} = t_{o2}/t_{o1} = n_{o2}/n_{o1} = n_{o1}{}^2 \qquad (7\text{-}3c)$$

2*. From (7-2a) and (7-2b), the newborn M_{bm} might have 2 ways to link all M_{bm} in M_u together and created 2 kinds of great expansions to become to little BH--M_{bb2} or M_{bb1}, A 。"Original Inflation"：from (7-2a), "Original Inflation" can be considered, the event horizons R_{bb1} of newborn little BHs-- M_{bb1} made the total "Inflation" of n_{o2}/n_{o1} included its conventional expansion，after "Inflation of $t_{o1} = 2\times10^{-37}$s, $R_{bb1}\times n_{o2}/n_{o1}$ turned equal to $R_{bb2} = 6\times10^{-14}$cm, so, 2×10^{-37}s was the end of "Original Inflation". B。" conventional expansion": Through." conventional expansion" created by the combinations of all M_{bm} to form little BHs-- M_{bb2}, after $t_{o2} = 2\times10^{-24}$s, R_{bb2} of M_{bb2} reached to 6×10^{-14}cm.

Conclusion：**Above A and B reached the same results to form $M_{bb2} = M_{bb}$, and $R_{bb2} = R_{bb1}$. The sole difference between both is , "Original Inflation" was prior to "conventional expansion"to form M_{bb1}. M_{bb1} was formed at the end of 2×10^{-37}s, but M_{bb} at the end of 2×10^{-24}s.**

3*。The other parameters of M_{bb1} and M_{bb2}； known number; $R_{bb2}= C\, t_{o2} = 6\times10^{-14}$cm，

$$M_{bb1}= M_{bb2} = 0.675\times10^{28}\ R_{bb2} = 4\times10^{15}\ g \qquad (7\text{-}4)$$

$$\rho_{bb1} =\rho_{bb2} = 3M_{bb2}/(4\pi R_{bb2}^3) = 4.4\times10^{54}\ g/cm^3. \qquad (7\text{-}5)$$

At the time of $t_{o1} = 0{,}2\times10^{-36}$s or $t_{o2}= 2\times10^{-24}$s， density ρ_{bb} of M_u was equal to ρ_{bb2} of M_{bb2}, the event horizon R_{ub} of M_u was:

$$R_{ub} = (3M_u/4\pi\rho_{bb2})^{1/3} = 2.4\ cm \qquad (7\text{-}6)$$

$$N_{ub} = M_u/M_{bb2} = 8.8\times10^{55}/4\times10^{15} = 2.2\times10^{40}$$

$$N_{bbm} = M_{bb2}/M_{bm}=4\times10^{15}/1.09\times10^{-5} =4\times10^{20} \qquad (7\text{-}7)$$

4*。Now, let's study the real conditions of "Original Inflation". According to the information and calculations in paragraph 12.7 of《New Instruction to Astronomy》,[3] from formula（1a）$R = k_1 t^{1/2}$, R is Characteristic Size the Universe, t is Characteristic time, at the time of $t = 10^{-36}$s，the universal size $R_{-36} = 3.8$ cm after "Original Inflation", At that time, the universal density $\rho_{bbb} = 3.8\times10^{53}g/cm^3$, the size R_{-44} of our universe at $t =5.37\times10^{-44}$.

$$R_{-36} = 1.83\times10^{25}cm\times(10^{-36}s)^{1/2}/(7\times10^5\times3.156\times10^7\ s)^{1/2} = 3.8\ cm\ [3] \qquad (7\text{-}8)$$

$$\rho_{bbb} = 3M_u/(4\pi R_{-36}^3) =3.8\times10^{53}g/cm^3\ [3] \qquad (7\text{-}9)$$

$$R_{-44} = (3M_u/4\pi\rho_u)^{1/3} = 10^{-13}\ cm \qquad (7\text{-}10)$$

$$R_{-36}/R_{-44} =3.8/10^{-13} = 3.8\times10^{13} \qquad (7\text{-}11)$$

Above numerical values about "Original Inflation" have broad typical case. It pointed out, when $t = 10^{-36}$s，the size R_{-36} of universe increased in 10^{13} times，the volume suddenly rose 10^{40} times。

5*。Conclusions: A。 The universal size 3.8 cm in (7-8)，and the universal size 2.4 cm got by author in (7-6) are all after "Inflation" of $t = 10^{-36}$s, the numerical values of 3.8 cm and 2.4cm are very approximate. It indicates that, the mechanism, process and terminal of "Original Inflation" proposed by author are all right, i.e. the combinations of all BHs surely created "Original Inflation", which terminal was just all BHs in M_u to be linked together and formed new little BHs—M_{bb1}. B。Owing to "Original Inflation" caused before the universal time of $t = 10^{-32}$s, it might impossibly be observed by mankind forever. If "Original Inflation" before 10^{-36}s would be denied in future, the "conventional expansion" before 10^{-24}s should be recognized. Through calculations in detail in this article, that our universe was come from minimum BHs--M_{bm} should be a convincing proposition. In reality, "conventional expansion" was also a "slower Inflation".

6*。From Figure 1 of page 2，$t_o = 0.2\times10^{-36}$s was in GUT Era。

【8】. Simple Reviews to Our Universe in the past, at present and in future

Our present universe is a gigantic universal black hole (UBH).

The age of our universe is: $A_u = 137\times10^8$years,

Schwarz child's radius of universe: $R_u = 1.3\times10^{28}$ cm,

Density $\rho_u= 3/(8\pi GA_u^2) = 0.958\times10^{-29}\ g/cm^3$.

The total mass of our universe is $M_u = 8.8\times10^{55}$g.

If no energy-matters outside, the lifetime of our present universe may be: $L_u \approx 10^{132}$yrs. If there still are energy-matters outside our present universe to be plundered, then, $L_u >> 10^{132}$yrs.

Our universe was born from new $M_{bm} = (hC/8\pi G)^{1/2} \equiv m_p \equiv 1.09\times10^{-5}$g, The expansion of our universe was originated from the combinations of a large amount $N_{bu} = 8\times10^{60}$ of new M_{bm}.

The size of our original Universe of M_u in Planck Era looks like the size of a present proton $R_{u0} =1.54\times10^{-13}$ cm,

The numbers of proton mass of the Universe are; $N_{op}=M_u/m_{proton}=10^{56}/1.67\times10^{-24}\approx10^{80}$.

After the end of "Original Inflation" at the universal expansive time of 0.2×10^{-36}s, due to all M_{bb} in M_u had linked together, the expansion of our universe was a conventional expansion due to decrease in temperature and density of all ($N_{bb} = 0.33\times10^5$) M_{bb}.

Mankind has exactly lived in the gigantic universal black hole (UBH), a great number of small and big black holes have scattered in the boundless universal space.

【9】. The further explanations, analyses and conclusions:

1*. Singularity is defined a point of infinite density. The conditions of point structure, no resistance (exclusive forces) and universal model of zero pressure in General Theory of Relativity Equation (GTRE) would certainly lead the occurrence of singularity in a contracted ball of definite energy-matters. It was demonstrated from GTRE by S•Hawking and R• Penrose 40 years ago that, our universe was born from singularity or the Big Bang of singularity, and singularity would certainly occur in BHs. In this article, applying Hawking laws about BHs which is based on quantum mechanics and thermodynamics, author has successfully demonstrated and derived out the new and important formula (3c)--$t^{3/2} \le k_1(2G\kappa)/(C^5)$, and calculated out accurately the time (t) of final collapse of pre-universe into Planck Era. Once pre-universe finally collapsed to $t \approx -0.5563\times10^{-43}$s, all particles in pre-universe became minimum BHs of $M_{bm} = (hC/8\pi G)^{1/2} \equiv m_p \equiv 1.09\times 10^{-5}$g, which could prevent pre-universe continuously to collapse to singularity and create new minimum BHs-- M_{bmn}. The new M_{bmn} occurred from Planck Era, would become the embryos of our newborn universe, their combinations created our present expansive universe.

2*. In reality, John & Gribbin pointed out in his book—<Companion To The Cosmos>: "Our universe might originate from such particles-- $M_{bm} \approx 10^{-5}$g." [7] " （Planck Era ） was really the state at genesis of our universe."[7] In this article, author may just better demonstrated John & Gribbin's above suppositions with correct Hawking laws about BHs through the more precise calculations.

3*. Our present universe is a real universal BH (UBH), it completely accords with the laws of general BHs. Hubble law better reflects the expansive law of our universe come from the combinations of original M_{bm} and to engulf energy-matters outside.

4*. The "Original Inflation" of our newborn universe was created by the combinations of all adjacent minimum BHs--M_{bm} of our universe. The end of "Original Inflation" was at universal time $t_{bb} = 0.2\times10^{-36}$s. That mechanism of "Original Inflation" is firstly proposed and demonstrated in this article.

5*. Whether our present universe expand or not in future will not be decided by the real density ρ_r, but only be decided by energy-matters outside the present event horizon of our universe. If there are still energy-matters outside, our universe will continuously expand, and in turn if no energy-matters outside, our universe will contract. Our universe as a UBH, $\rho_r = \rho_c$ or $\Omega = 1$ is its essential nature. Therefore, $\rho_r \neq \rho_c$ or $\Omega \neq 1$ was a false proposition by the most scientists in the past.

6*. The four difficult and complicated problems (Singularity, flatness, Event Horizon and magnetic monopole) at the genesis of our universe had troubled scientists for several decades. After author has negated the occurrence of Singularity and proved the flatness is the essential nature of our UBH in this article, the other two problems may be easily solved. Moreover, the new concepts in this article have given the better explanations to "Original Inflation".

7*. If the new concepts in this article could exclude the occurrence and existence of Singularity at the genesis of our universe, scientists will not need to beg the marvels or to provide some special original conditions for solving the complicated GTRE in future.

8*. All numerical values calculated from Hawking theory about BHs and classical theories and its formulas in this article are precisely consistent with the observational results and the real evolutionary process of our universe in Figure 1. Probably, the new concepts in this article may not be accepted and convinced by the most scientists and scholars, because of no abstruse theory, no complicated mathematical equations as well as the old conventions not broken down. However, as a reasonable explanations to the genesis of our universe, new concepts in this article are much better than "Big Bang" of Singularity, because people do not need to be puzzled by uncertain Singularity.

====The End====

References:

1. **Dongsheng Zhang: Part II of this article above..**
2. **Giancoli, Douglas C. Physics, Principles With Applications. 5th Ed. Upper Saddle River, NJ: Prentice Hall, 1998. 999-1034.**
3. **Su, Yi. New Instruction to Astronomy. Wuhan, People's Republic Of China: Publishing House of Central China. University, 2000. 374-413.**
4. **Weinburg, Steven. The First Three Minutes. Chinese Edition, Beijing, People's Republic of China: Chinese Foreign Language Translation and Publishers, 1999.**
5. **Wang, Yong-jiu. Physics of Black Holes. Publishing House of Hunan Normal University. Hunan, China. 2002.**
6. **He, Xiang-tao. Observational Cosmology. Science Publishing House. Beijing, China. 2002.**
7. **Gribbin, John.<Companion To The Cosmos>.Chinese Edition, Shanghai Science-Techno-Education Publishing House. China. 2000.**
8. **Yichao Wang: <The specter of dark energy>.<Finance and Economics Magazine> . 176, 2007-01-08. China. http://www.caijing.com.cn/newcn/econout/other/2007-01-06/15365 .shtml NASA ● Webmaster: Britt Griswold ● NASA Official: Dr. Gary F. Hinshaw ● Page Updated: Tuesday, 04-29-2008. http://map.gsfc.nasa.gov/universe/uni_age.html**
9. **Changhai Lu: < Universal Constant, Super Symmetry and Film Theory>. http://www.changhai.org/2003-08-17**

马博士：请您在 Nature and Science , 2005=debate 001 上 删去原来的第 1，第 2，第 3 篇旧文，贴上此 3 篇新文。content 页上内容不变。新旧文的篇幅基本一致。Header and Footer 已经改正，只是 page number 我无能力改正。现在的文章删减了许多论述内容，增加了不少新的论证内容，修正了 2 个错误。将《黑洞》作为 Part 1, 将《宇宙起源》作为 Part 2. 自认为比旧文好多了。

谢谢。 **张洞生 拜托**

This article originally published in Nature and Science, 2(3), 2004