The New Concepts to Big Bang and to Black Holes: Both Had No Singularity at All (Part 2)

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Abstract: 1. Our Universe was born from Quantum Micro Black Holes (its mass ≈ 10^{-5} g), but not from Singularity or Big Bang of Singularity. 2. No Singularity existed in star-formed Schwarzchild's black holes, a steady mini black hole (its mass ≈ 10^{15} g) of long lifetime would certainly exist inside as a core to obstruct the collapse of energy-matters to become Singularity. The steady mini black hole (m_{om} ≈ 10^{15} g) in black holes instead of Singularity called by General Theory of Relativity (GTR) could resist the gravitational collapse.

Key Words: universe; singularity; big bang; black holes; Plank's era; cosmology;

Part Two. No Singularity existed in star-formed Schwarzchild's black holes, a steady mini black hole (its mass ≈ 10^{15} g) of long lifetime would certainly exist inside as a core to obstruct the collapse of energy-matters to become Singularity. Only Schwarzchild's star-formed BHs (no charges, no rotating and spherical symmetry) will be studied in this article below.

Introduction: Jean-pierre Luminet said: "Stephen W. Hawking and Roger Penrose, two scholars of Cambridge University in England, had proved in 1960s that Singularity is an indispensable component of General Theory of Relativity (GTR). It is unsure whether the finality of gravitational collapse for a real star would lead to the formation of a BH with its Event Horizon. However, it is no doubt that the termination of gravitational collapse will inevitably cause Singularity in BH." <!>

According to GTR, any BH will be composed by three components. First, the Event Horizon is its boundary. Second, Singularity exists at the geometric center, R = 0, at which all energy-matters in BH would be contracted to infinity, and the space-time would be curved to infinity. Third, a real vacuum space is between its Event Horizon and Singularity. It shows that Singularity is the existent premise of a BH. In addition, according to the explanations of GTR, time and space would exchange between each other in BH, the point at the center R = 0 would become the termination of time. After that, it would be "out of time". GTR could not explain the meaning of "out of time." <!> <3> <6> Thus, it can be seen, the description of GTR above would be inadequate inside BH. If concepts of GTR were correct, BH should disappear almost instantly with its establishment. Any Singularity that contains an infinite amount of energy and density cannot exist too long. The mathematical equations of any theory should have their applied limits, just as the gas state equations cannot be applied to the boiling point of water. Since BHs can be found in universe and have long lifetime, the other suitable concepts gotten from many theories in this article should be accepted instead of sole GTR.

(< >Reference Number.)

In part two of this article, it will be proved that, in any star-formed black hole (BH), a mini BH of mass (m_{om} ≈ 10^{15} g) would occupy the center as a solid core to prevent the energy-matters inside BH from collapse to become a Singularity. The mini BH of long lifetime would lead the whole BH to keep stability. The same numerical values of different physical parameters about mini BH are gotten from six formulas based on different current classical theories. It shows that the existence of mini BH (m_{om} ≈ 10^{15} g) is the true reality.

11. If mass (M_b) has collapsed to a Schwarzchild's BH, R_b is Schwarzchild's radius

According to the definition of GTR,

$R_b=2GM_b/C^2$ or $C^2=2GM_b/R_b$ (11a)

t_b is the passing time of light in BH from its Event Horizon to center,

$C\times t_b=R_b$, or $t_b=2GM_b/C^3$ (11b)

If $M_b = M_\theta$ (mass of sun), $t_b=2\times(6.67\times10^{-8})(2\times10^{33})/(3\times10^{10})^3=3\times10^{-5}$s, $R_b=C\times t_b=3$ km.

To understand the occurrence of a star-formed BH in universe, the contracting process of the original interstellar cloud (OIC) should be known at first. If OIC is in the state of thermodynamic equilibrium, the gas pressure intensity (P) should counterbalance its gravity (F). That is given according to Newton's mechanical equation and thermodynamics.

$dP/dR = -GM\rho/R^2$ <5> (11c)

$P = n\kappa T = \rho\kappa T/m_s$ (11d)

M--mass of OIC, R--radius of M, ρ--density of M, m_s--mass of a particle, T--temperature corresponding to R and M. G--gravitational constant, κ--Boltzmann's constant, n--number of particles in an unit volume.

In order to do the qualitative analysis, the precise solutions of formula (11c) need not to be gotten and are hardly solved. A qualitative solution should be given as below; α--coefficient

$\kappa T \neq GMm_s/R$, or $\alpha\kappa T = GMm_s/R$, (11e)

If $\kappa T < GMm_s/R$, $\alpha > 1$, OIC contracts. If $\kappa T > GMm_s/R$, $\alpha < 1$, OIC expands.

If $\kappa T = GMm_s/R$, $\alpha = 1$, OIC keeps equilibrium.

Three ways can contract (R) in formula (11e); to decrease temperature (T), to increase mass (M) and to change the coefficient (α), (α) is related to structure, location and state in OIC.

12. The mechanisms of objects to resist its gravitational collapse

Universe itself is a gigantic BH (see part one before), if formulas (11c), (11d) and (11e) can be applied to the equilibrium of OIC in our universal BH, they may be used to research the equilibrium and the physical states in star-formed BHs too. No OIC in universe can directly contract to become a BH. In the processes of its contraction, there are many strong resistances. OIC contains about ¾ hydrogen (H_2). When an OIC contracts to temperature over 10^7k in core with its gravity, the nuclear fusion will occur and keep a very long period. Any OIC of mass ($M \approx M_\theta$) can certainly attain to $T \approx 10^7$k of nuclear fusion with its gravitational contraction and form a more solid core of the higher temperature and density to resist the gravitational collapse of materials outside the core.

After all (H_2) of OIC had burned up, the burst of nova or supernova would take place. After that, the collapse of residues M_r of OIC would change into a compact object. In any compact object, a more solid core would become the antagonist to resist the gravitational collapse. Under the different conditions, the collapses of residues M_r of OIC would get the different outcomes: white dwarf, neutron star, BH or a chunk of dust**. In nature, any object or particle has a more solid core to resist the contraction of materials and simultaneously to attract the materials onto core to keep the stability of whole body, such as galaxy, star, cell, atom, quark, etc. It will be without exception for BHs.**

13. The stability and equilibrium of a star-formed BH (Black Hole) (Suppose a BH had formed after nuclear fusion, $5M_\theta > M_b \geq 10^{15}$g, M_b-mass of BH, M_θ-mass of sun)

According to Hawking's theory of BH, the temperature (T_b) on the Event Horizon of BH is showed by formula (13a) below; h-Plank's constant, κ-Boltzmann's constant, C-light speed,

$$T_b = (C^3/4GM_b)\times(h/2\pi\kappa) \approx 0.4\times 10^{-6} M_\theta/M_b \quad (13a)$$

$$R_b = 2GM_b/C^2, \text{ or } M_b/R_b = C^2/2G \quad (11a)$$

$$dP/dR = -GM\rho/R^2 \quad (11c)$$

$$P = n\kappa T = \rho\kappa T/m_s \quad (11d)$$

$$\alpha\,\kappa T = m_s\, GM/R \quad (11e)$$

Five formulas above are all idealized. They will be applied in BHs effectively. They can jointly constitute the stability and equilibrium of a BH and reveal the physical states in a BH.

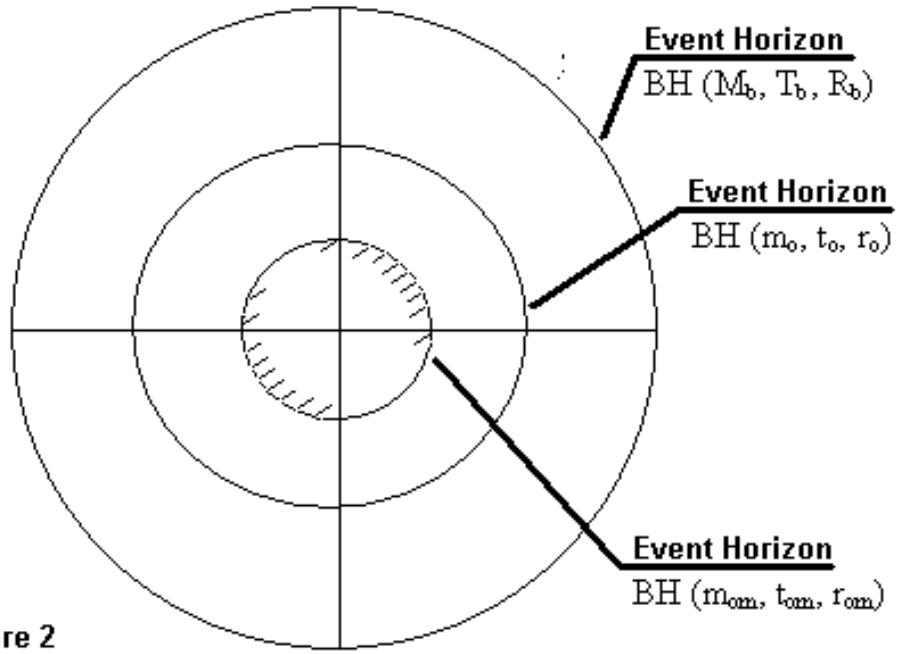

Figure 2

Formula (11a) is the necessary condition to construct a BH according to GTR. Formula (13a) is the necessary temperature on the Event Horizon of a BH derived from Hawking's theory of BH. Formula (11c) is an equilibrium equation between pressure intensity and gravity in any BH and can be simplified and idealized instead of Tolman-Oppenheimer-Volkoff's (TOV) equation.[7] Since TOV equation had been successfully applied to neutron stars, formula (11c) should be better used to BHs inside. Formula (11e) is a balance equation of a particle between gravitational potential energy and heat energy, and (11e) is not independent. Formula (11d) is the ideal (gas or ion plasma) state equation in BH. (α) is a coefficient depended on the state, structure and location in a BH. **It will not need to know the microstructure in a BH in this article.** The purpose of this article is to find out the simplistically special solution of formula (11c) in Schwarzchild's BH of spherical symmetry and to research the macro state or structure in BH.

Furthermore**, five formulas come from the different theories. Thus, the explanations to BHs in this article are completely different with the conclusions of pure GTR**.

Formulas (13aa), (11aa) below are derived from (13a), (11a) and have equally effective.

$T_b \times R_b = (C^3/4GM_b)(h/2\pi\kappa)(2GM_b/C^2) = Ch/4\pi\kappa \approx 0.1154$ cmk (13aa)

$M_b/R_b=m_o/r_o=C^2/2G\approx 0.675\times10^{28}g/cm\approx10^{28}$g/cm, or $T_b \times M_b\approx10^{27}$gk (11aa)

From formula (11aa), there is the equal potential energy in any BH with m_s = constant.

$P_b = P_o$ = constant, $P_b=m_sGM_b/R_b$, $P_o=m_sGm_o/r_o$ (13b)

According to the Uncertainty Principle of Quantum Mechanics (QM), $\Delta E \times \Delta t \geq h/2\pi$

Suppose the energy of each particle $\Delta E=\kappa T$, and $\Delta t \geq 2R/C$, R--the size composed by all particles in a BH, $\Delta E \times \Delta t = \kappa T \times 2R/C$. Thus,

$T \times R \geq Ch/4\kappa\pi$ (13c)

(13aa) = (13c) (13d)

Formula (13d) expresses that the state on the Event Horizon of any BH exactly obeys the Uncertainty Principle of QM. The temperature (T_b) on the Event Horizon of a BH is too low. For example, to a BH of sun mass ($M_b=M_\theta$), $T_b= 0.4\times10^{-6}$ k.

(A). In any BH (mass = M_b), ($5M_\theta > M_b > 10^{15}$g), there is always a small BH (m_o) inside

In Figure 2 on page 13, suppose a small BH in a BH, (M_b,, T_b,R_b)--corresponding to mass, temperature and Schwarzchild's radius of BH; (m_o,r_o,t_o)--corresponding to mass, Schwarzchild's radius and temperature of the small BH inside.

Let $m_o= \beta_1 M_b$, $\beta_1 < 1$, β_1-coefficient,

$R_b = 2GM_b/C^2 = 2G\times m_o/(\beta_1 C^2)$ (13e)

If $R_b=r_o/\beta_1$, or $M_b/R_b= m_o/r_o = C^2/2G \approx 0.675\times10^{28}$g/cm can be proved, then BH (m_o,r_o,t_o) will be a really small BH (m_o) in BH (M_b).

First, from formulas (11a), if BH (m_o,r_o,t_o) were not a small BH in BH, two possibilities would happen. In case of $m_o/r_o > M_b/R_b$, so, $m_o/r_o > C^2/2G$, it is impossible, because $C^2/2G$ is the maximum. In case of $m_o/r_o < M_b/R_b$, as a result, the potential energy of m_s in BH (m_o) will be $P_o < P_b$ (potential energy of M_b). It indicates that all energy-matters in BH (M_b) will rush to its Event Horizon and lead to BH (M_b) disintegrated, that case is impossible too. Thus, the only way of a steady BH is $M_b/R_b= m_o/r_o = C^2/2G$, or $R_b= r_o/\beta_1$.

As a result, BH (m_o,r_o,t_o) is a small BH in BH (M_b,R_b,T_b).

Second; Formula (11a) can be turned into

$m_sC^2/2=m_sGM_b/R$ (13f)

Formula (13f) indicates that, when a particle (m_s) drops onto the Event Horizon of a BH from infinity, its speed will attain the light speed (C), and its kinetic energy ($K_b=m_sC^2/2$)is equal to its potential energy ($P_b=m_sGM_b/R_b$), or $P_b=K_b$. However, after (m_s) enters inside of BH, (K_b) can keep only a constant with light speed (C). Thus, the potential energy (P_b) should keep a constant in BH too. The result in BH should be: $P_o=K_o$, or $m_o/r_o = C^2/2G = 0.675\times10^{28}$g/cm $= M_b/R_b$ or $R_b = r_o/\beta_1$. It is no doubt that (m_o,r_o,t_o) is a really small BH in BH (M_b,R_b,T_b).

The results above have also proved that formulas (11aa) and (13b) are perfectly correct.

The conclusion above is not relative to the Hawking's theory of BH.

$T_b=0.4\times10^{-6}M_\theta/M_b=0.4\times10^{-6}M_\theta(\beta_1/m_o)=\beta_1 t_o$ (13g)

$T_b \times R_b= (\beta_1 t_o)(r_o/\beta_1) = t_o \times r_o=0.1154$cmk (13h)

(B). In any small BH (m_o), a stable mini BH of ($m_{om}\approx10^{15}$g) can surely exist

First: 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_θ--mass of sun $= 2\times10^{33}$g,

$S_b/S_m= 10^{18}M_b/M_\theta$[2] **(13i)**

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, its mass M_b will be a minimum m_{om} of a mini BH.

From (13i)**,** $m_{om} = M_b/10^{18} = 2\times10^{33}/10^{18} = 2\times10^{15}$g = mass of the mini BH.

. Schwarzchild's radius r_{om} of m_{om} ($=10^{15}$g), $r_{om}=2Gm_{om}/C^2 =3\times10^{-13}$cm,(≈neutron radius),

$r_{om}=3\times10^{-13}$cm$\neq0$, and r_{om} is the minimum size. Singularity cannot appear in any BH. Temperature t_{om} of m_{om}, $t_{om} = 0.1154/r_{om}= 0.38\times10^{12}$ k,

Second: The thermodynamic equilibrium between gravity (F) and pressure intensity (P) inside BH is gotten from the Newton's mechanics and thermodynamics.

From page 13, $\mathbf{dP/dR = -GM\rho/R^2}$ (11c)

$P = n\kappa T = \rho\kappa T/m_s$ (11d)

For a BH, $M = 4\pi\rho R^3/3$, and from (13a),

$T = (C^3/4GM)\times(h/2\pi\kappa)$

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

$\mathbf{dP/dR} = d[3hC^3/(32\pi^2GR^3m_s)]/dR = -(9hC^3)/(32\pi^2Gm_sR^4)$, (proportional to R^{-4}) (13ba)

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

from (11aa) $M_b/R_b=C^2/2G=M/R$,

So. $-GM\rho/R^2 = -3C^4/(16\pi GR^3)$, (proportional to R^{-3}) (13bb)

Take (13ba), (13bb) into (11c),

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

$\therefore\ 3h/(2\pi m_sR^4) = C/R^3$ (13bc)

$\mathbf{R = 3h/(2\pi Cm_s)} = 3\times6.63\times10^{-27}/(2\pi\times3\times10^{10}\times1.67\times10^{-24}) \approx \mathbf{0.63\times10^{-13}cm\ (= r_{om})}$ **(13bd)**

The numerical value of R is the same with the part First section($r_{om}=3\times10^{-13}$cm) above.

So, $R = 0.63\times10^{-13}cm \approx r_{om.} = 3\times10^{-13}cm$ = constant,

$T = 0.1154/R = 10^{12}k = t_{om.}$

From (11aa), (13aa),

$M = RC^2/2G = r_{om}C^2/2G = 0.43\times10^{15}g \approx m_{om,}$

Formula (13bd) above is not relative to the mass of any BH (M_b). A sole value of (R) can be gotten in any BH. R= a constant $\approx r_{om} \approx 0.63\times10^{-13}$cm**. As a result, BH ($\mathbf{m_{om}\approx10^{15}g}$) is the sole mini BH in any BH and is a special solution to formula (11c)**. Except the mini BH, another points in BH cannot get the perfect equilibrium between the contracting gravity (F) and the pressure intensity (dP/dR). It is seen from formula (13bc), if (R) contracted to $R<r_{om}$, the result would be in mini BH, $dP/d(-R) > +GM\rho/R^2$, that case would be impossible to presence. Thus, in BH, $m_{om}= 0.43\times10^{15}g$ is the minimum BH. If $R > r_{om,}$ then $dP/d(-R) < +GM\rho/R^2$, the energy-matters in BH would have the trend contracting to its center, but the mini BH (m_{om}) at the center as a solid core can counteract the surplus of the contracting gravity and obstruct the collapse of energy-matters in BH to become a Singularity.

The lifetime τ_{om} of m_{om}, $\mathbf{\tau_{om}\approx10^{-27}\times m3om\ _{(S)}=10^{10}}$ **years.**[2] **Therefore, the mini BH ($\mathbf{m_{om}\approx10^{15}}$ g) is very stable. Its lifetime of $\mathbf{10^{10}}$ years is equal to the present age of our universe**. In 1970s, many scientists endeavored to find out the primordial black holes of that size ($m\approx10^{15}$ g) coming from our baby universe, but their efforts were all in vain.

Density ρ_{om} of m_{om}, $m_{om} = 4\pi\rho_{om}r^3_{om}/3$, $\mathbf{\rho_{om}\approx10^{53}g.}$ The density of mini BH ($m_{om}\approx10^{15}$g) is very great. Thus, the mini BH cannot be formed from the direct collapse of a star in nature, but can only formed from the collapse of the energy-matters with great density in BH. It can only exist at the center of a star-formed BH with spherical symmetry, because the contracting gravities in Schwarzchild's BH are spherical symmetry.

The proton numbers n_{pom} of m_{om};

$n_{pom} = m_{om}/m_p = 10^{15}/1.67\times10^{-24} = 10^{39}$.

10^{39} = static electric force/gravitational force. It shows that 10^{39} neutrons broken up occupy the space of a present neutron. The number 10^{39} is a mysterious number hidden in nature.

Third; Formulas (13aa), (11a) and (11e) as a group of simultaneous equations can be solved, and the sole solutions of M_b, T_b, R_b can be precisely gotten. From formulas (11e) and (11a), $\alpha\kappa T = m_sGM/R$, let $\alpha = 1$, then $R_b=2GM_b/C^2$, let T_b, R_b, M_b instead of T, M, R.

So, $T_b = m_sC^2/2\kappa = 5.4\times10^{12}\ k = t_{om.}$ (13be)

$R_b = 0.1154/T_b = 0.2\times10^{-13}cm \approx r_{om,}\neq o$. Thus, no Singularity can appear.

$M_b = R_bC^2/2G = 0.13\times10^{15}g \approx m_{om.}$

The mini BH has the approximately equal numerical values of ($\mathbf{m_{om},r_{om},t_{om}}$) in three sections above and is derived from six formulas of the different theories. ($\alpha = 1$) shows an ideal state. Formula (11e) expresses that the potential energy of a particle (m_s) ($P_{om}= m_sGm_{om}/r_{om}= m_sC^2/2$ = a maximum constant) in mini BH has exactly turned into its heat energy ($Q_{om}= \kappa t_{om}$) from its gravitational collapse. Thus, the heat energy (Q_{om}) is the highest heat energy at the center of BH and then **($\mathbf{m_{om}\approx10^{15}}$g) is a minimum BH in any BH.**

From formula (11e), if $\alpha < 1$, so $\kappa T > m_sGM/R$, that condition is the same with $dP/d(-R) > +GM\rho/R$.) above. If $\alpha > 1$, so $\kappa T < m_sGM/R$, that condition is the same with $dP/d(-R) < +GM\rho/R$ above.

(C). The space in BH (M_b) is full of energy-matters; the states and structures in BH

According to GTR, the space between Event Horizon of a BH and Singularity at its center is a pure vacuum. That corollary of pure GTR would be negated by the concepts in this article below.

Suppose another BH (m_o,t_o,r_o) in the space between the BH (M_b,T_b,R_b) and the mini BH ($m_{om},t_{om},r_{om,}$). Let $m_o = \beta_2 M_b$, β_2--coefficient, $\beta_2 < 1$. From formulas (11a), (13a) and (13aa),

$t_o = T_b/\beta_2$, $r_o = \beta_2R_b$, $to\times ro = (T_b/\beta_2)\times\beta_2R_b = T_b\times R_b = 0.1154$cmk,

The results above show that (m_o,t_o,r_o) is a real small BH between Event Horizon and the mini BH at the center. By the same method, it can be proved that there are innumerable small BHs full of the space in BH. Every small BH composes a concentric sphere with the same radius and contains all smaller BHs in its Event Horizon. Therefore, the space inside Event Horizon of BH (M_b,T_b,R_b) is full of energy-matters and not a vacuum state.

The states and structure in a BH can be expressed by some parameters relative to the different radius r_o in BH (M_b). (suppose M_b --M_θ,R_b,T_b, mini BH--m_{om},t_{om},r_{om}, medium BH--m_o,r_o,t_o, τ--lifetime, ρ--density,)

r_o in (M_b), r_o= radius of m_o, $r_{om}\approx 10^{-13}$cm, $R_b\approx 3\times 10^5$cm
mass of m_o, $m_o=(C^2/2G)\times r_o$, $m_{om}\approx 10^{15}$g, $M_b\approx 2\times 10^{33}$g=$M_\theta$
t_o of (m_o), $t_o = 0.1154/r_o$ $t_{om}\approx 10^{12}$ k, $T_b\approx 10^{-6}$k
ρ_o of (m_o), $\rho_o=(3C^2/8\pi G)/r_o^2$, $\rho_{om}\approx 10^{53}$g/cm^3, $\rho_b\approx 10^{17}$g/cm^3
τ_o of (m_o),$\tau_o=(10^{-27}C^6/8G^3)\times r_o^3$, $\tau_{om}\approx 10^{10}$ yrs, $\tau_b\approx 10^{65}$yrs

(D). How can the different temperatures (t_o) be changed with the different radius (r_o) in a BH in accordance with the Hawking's theory of BH?

The approximately equivalent numerical values of mini BH (m_{om}, r_{om}, t_{om}) in the three sections of (B) are gotten under the condition of every particle possessed the same mass ($m_s=1.67\times 10^{-24}$g =mass of a proton or a nucleon, or mass of a quark $m_q=m_s/3$). Is it really? Why is it so? Do the mass of (m_s) or (m_q) be the maximum particles of long lifetime in any BH and in nature? (see 19th paragraph)

Firstly; In case of ($m_s\neq$ a constant) in a BH, From formula (13aa) $t_o = 0.1154/r_o$, formula (13bd) $R=r_{om}=3h/(2\pi Cm_s)=0.63\times 10^{-13}$cm, and formula (11aa) $m_{om}= r_{om}C^2/2G$. So, (r_{om}) or (m_{om}) or (t_{om}) is decided only by every same (m_s) in BH. As a result, the different (m_s) will lead to the formation of the different mini BHs (m_{om}) in different BHs. In other word, there would be different mini BHs (m_{om}) and different (m_s or m_q) of protons or quarks in nature. Also, **for attaining the different temperature at any point in a BH, (m_s) must be dissolved into the different smaller grains with (r_o) lengthened.** Suppose m_e is the mass of a particle on Event Horizon of a BH (M_θ) and m_s is the mass of a particle in mini BH, $R_b\approx 10^5$cm(radius of M_θ).Thus, $m_s/m_e=R_b/r_{om}=10^5/10^{-13}\approx 10^{18}$. It is said; m_e on Event Horizon must be smaller than $m_s/10^{18}$ on mini BH. There must be a great deal of photons in BH, its equivalent mass $\approx 4.2\times 10^{-33}$g, and may be smaller photons in same BH too.

Secondly; Under the condition of ($m_s=1.67\times 10^{-24}$g = a constant = mass of a proton or $m_q= m_s/3$), mini BH (r_{om}) at the center has the highest temperature (t_{om}), and Event Horizon (R_b) has the lowest temperature (T_b). Thus, at the place of ($r_o> r_{om}$) in BH, there may be the surplus of heat energies. Owing to that, BH can hardly emit out any energies, all the surplus of heat energies in BH must be transferred into mass (m_s) of the particles according to the formula ($T= m_sC^2/2\kappa$ = valve temperature). So**, the lower temperature at the bigger (r_o) in BH can be obtained by turning heat energies into mass of particles.** The general equilibrium equation should be different with formula (11e). Let N_c --particle numbers before transfer, N_h--particle numbers after transfer, The calculations below are not exact and are only a qualitative estimation.

$N_h\kappa t_o=N_cm_sGm_o/r_o$, or $N_h/N_c=m_sGm_o/(r_o\times\kappa t_o)$ (13da)

From formulas (11aa) and (13be),

$m_sGm_o/r_o = \kappa t_{om} = \kappa\times 10^{12}$

Hence, $N_h/N_c = 10^{12}/t_o$ (13db)

For example, to mass of a BH (M_b), if $M_b = M_\theta$, T_b is the temperature on the Event Horizon, $T_b\approx 10^{-6}$k. So, on the Event Horizon of a BH (M_θ), $N_h/N_c = 10^{12}/10^{-6}\approx 10^{18}$.The calculations above are just an approximate estimation.

Two conditions above may simultaneously exist in BHs.

(E). The exchange of energy-matters through Event Horizon, unstableness of the Event Horizon of BH

In any BH (M_b) ($5M_\theta>M_b>10^{15}$g), energy emissions are extremely low. The exchange of energy-matters passed only through Event Horizon would lead to Event Horizon oscillated. From formulas (11a) $R_b = 2GM_b/C^2$, and (13aa) $T_bR_b = 0.1154$, If the temperature on Event Horizon is lower than environment outside, BH can take in energy-matters outside and simultaneously increase (M_b), lengthen (R_b) and lower (T_b). That condition will never stop until taking in all energy-matters outside. It is the same condition for a BH to take in materials outside or collide with the star objects. In addition, according to Hawking's theory, if the temperature on Event Horizon is higher than the temperature of its environment outside, BH can radiate energy-matters to outside. It leads to the decrease in (M_b), (R_b), and to the increase in (T_b) and (ρ_b) (density of BH). The process of radiating energy-matters is a contracting process onto the mini BH from Event Horizon.[<1>] A BH is composed by the infinite small BHs of concentric spheres with different r_o. If a BH nonstop radiates energy-matters to outside, its concentric spheres will be split off from Event Horizon to mini BH layer by layer. The finality of the disappearance of whole BH will be the last explosion of the mini BH.

The character of any BH is always nonstop neither emitting energy to outside nor taking in energy-matters from outside until its final vanish, its Event Horizon would be oscillated nonstop.

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

$dE/dt\approx 10^{46}M^{-2}$ erg/s,[<2>] (13k)

Suppose $M = M_\theta = 2\times 10^{33}$g, $dE/dt \approx 10^{-20}$ erg/s, based on such extremely tiny rate, a BH of sun mass (M_θ) needs about 10^{65}years to radiate out all its mass. Lifetime τ_b;

$\tau_b\approx 10^{-27}\ M^3(s) = 10^{-27}\times(2\times 10^{33})^3\approx 8\times 10^{72}$ s $\approx 10^{65}$ years,[<2>] **(13l)**

In reality, the strong gravitational field of star-formed BH can almost absorb in energy-matters from its surrounding, and its radiation speed is extremely slow, BH mostly expands its size, except that its surrounding has become a vacuum state or its temperature lower than BH's.

Right now, whether BHs would emit energy-matters with other ways except Hawking's radiations remains a question.

(F). The formation of BH, its mass =M_b, ($5M_\theta > M_b \geq 10^{15}$ g)

As above-mentioned, the stability and equilibrium in BH (M_b) of ($5M_\theta > M_b \geq 10^{15}$g) have been studied. It is no doubt that $M_b \geq (10^{15}g = m_{om})$ should be right. Why should ($M_b < 5 M_\theta$) be so? For building up a star-formed BH, the density of BH must be greater than the density of the neutron star $\rho_n \approx 10^{15}$g/cm^3. Suppose the density of BH $\rho_b \geq \rho_n \approx 10^{15}$g/cm^3,

From formula (11a), $R_b = C[3/(8\pi G\rho_n)]^{1/2} = 0.423\times10^{-4}C$, $M_b = \rho_n R_b^3 4\pi/3 = 8.5\times10^{33}g \approx 5 M_\theta$

The simple calculation above shows that the density of a BH (mass $M_b < 5M_\theta$) would be $\rho_b > \rho_n \approx 10^{15}$g/cm^3. At that state, neutrons would be broken up and become quarks. That is to say, in the limits of ($5M_\theta > M_b \geq 10^{15}$g), there would be small BHs or quark stars inside. Neutron stars cannot appear. Right now, it is uncertain whether quark stars have the quark degeneracy to resist the gravitational collapse, how quark star turns into BH and what limits of density should be had by quark stars. In any case, there is no Singularity at all.

14. The formation of BH (M_b) in limit of ($10^5M_\theta > M_b > 5M_\theta$) (Suppose BH had established after nuclear fusion)

With the same analysis above, the density of the white dwarf is about $\rho_w \approx 10^6$g/cm^3. The Schwazchild's radius R_b of BH with the density ρ_w is:

$R_b = C\times(3/8\pi G\rho_w)^{1/2} \approx 1.3C$, $M_b = 4\pi\rho_w R_b^3/3 \approx 2.65\times10^{38}g \approx 10^5 M_\theta$,

The simple calculations above express that in BH (M_b) of ($10^5M_\theta > M_b > 5M_\theta$), neutron star or small BH may presence inside BH and become a solid core, but the white dwarf will hardly appear. Probably, with taking in energy-matters from its surroundings, neutron star would become a quark star or a BH. Right now, it is not known what process and mechanism are necessary for the change from a neutron star into a quark star or into a BH.

15. The structure in BH (M_b) of ($10^5M_\theta < M_b < 10^{23}M_\theta$) ($10^{23}M_\theta$ is the total mass of our present universe in its Event Horizon)

Such immense BH looks like our present universe. In our universal BH, the different locations can attain the different relative stability and equilibrium, which can obey the formulas (11a), (11e) and (13a). Everything except Singularity may appear and had existed in our universe. Singularity, which possesses the infinity of some physical quantities, is impossible to attain and keep the relative stability and equilibrium of its inside.

Recently, many super-massive BHs of mass ($M_b \approx 10^9 M_\theta$) were discovered in universal space. According to calculation, its density on average is about $\rho_s \approx 0.0183$g/cm^3. In such BH, the different location can get the different stability and equilibrium to accord with formula (11e) and formulas (11a), (13a). Thus, anything could appear in it; the dust clouds, nuclear fusion, white dwarfs, neutron stars, BHs, etc, except Singularity.

In any case, within the universal endless evolution, everything in universe included white dwarfs and neutron stars will finally turn into BHs. Along with the establishment of a BH, a small stable BH would inevitably appear and exist inside BH as a solid core to obstruct the gravitational collapse of the energy-matters. Through the extremely long evolution, all BHs will disappear with the quantum vaporization according to Hawking's theory of BH.

16. The further explanations and two possible models of BHs

In above-mentioned paragraphs, formulas (13a), (13aa), (13i), (13k), and (13l) all come from Hawking's theory about BHs. All BHs collapsed from the mass of few stars and came from broken neutrons, which are in the state of subatomic particles or quantization. Thus, applying Hawking's formulas in this article should be correct and suitable.

In reality, without Hawking's theory of BH, the small BHs or the mini BH except Singularity can surely appear and exist in any BH. [See sections (A) and (B) of 13 above].

There would be two possible models of BHs and two possible different destinies of BHs.

First, under the condition of that, no energy-matters radiate out permanently from BH, after the appearance of the mini BH (m_{om}, r_{om}, t_{om}) except Singularity in a BH, BH will permanently exist in nature. However, a BH can only increase its masses and size with taking in energy-matters or other objects from outside, after that, it will only become an absolutely bigger BH and keep the same size forever. Thus, **all BHs will have the infinite lifetime and will be eternal beings in nature. Is it possible in universe?** That conclusion can be drawn from the principles of GTR, Newton's mechanics and thermodynamics except Hawking's theory of BH. Inside such a model of BH, there would be the same temperature at any point.

Second, under the condition of that, the energy-matters can radiate out from BH, after the appearance of mini BH (m_{om}, r_{om}, t_{om}) except Singularity in a BH, mass of BH will decrease with energy-matters radiated out. Although BH could take in all energy-matters outside, after that, BH will gradually radiate out all energy-matters and disappear with the last explosion of mini BH. **The limited lifetime of BH can be calculated from formula (13l).** That result can be mainly gotten from Hawking's theory of BH and associated with Newton's mechanics, thermodynamics and GTR. In such a model of BH, the different radius (r_o) would have the different temperature (t_o). The concepts in this article accord with the structures of such a model.

17. Conclusions taken out from applying many current classical theories and formulas

(A). Mini BH ($m_{om}\approx10^{15}$ g) is a special solution of formula (11c) [$dP/dR = - GM\rho/R^2$], which is the simplified Tolman-Oppenheimer-Volkoss's equation. The simple analyses above show that pure GTR has no way to solve problems in BH, especially Singularity. In substantiality, principles and equations of GTR are just the space-time geometry with four dimensionalities instead of gravity, and are without thermodynamic effect. Therefore, inside BH described by pure GTR, due to no antagonistic force produced by the thermodynamic effect, the gravitational collapse would inevitably lead to appearance of Singularity**. If there had been no Hawking's theory about BH, there could be no way to find out the mini BHs (mass$\approx10^{15}$g) possessing stability and long lifetime. Just such mini BHs can obstruct the occurrence of Singularity in BH**. **A new formula ($r_{om} = 3h/(2\pi Cm_s)$) of mini BH as a special solution to (11c) can be precisely gotten. Formula (11c) [$dP/dR= -GM\rho/R^2$] is the simplified Tolman-Oppenheimer-Volkoff's** [7] **equation.**. When thermodynamic effect had been applied to GTR equation, which became TOV equation. However, TOV equation is too complicated and has no additional temperature restraints, it cannot be solved in BHs right now. In this article, formula (13a) [$T_b = 0.4\times10^{-6}M_0/M_b$] is used as the additional temperature conditions to (11c), hence formula (11c) can be solved. **Without Hawking's theory of BH, there could be no way to know the lifetime of any size of BHs**, in addition, Hawking's formulas (13k),(13l) can insure the stability and long lifetime of mini BH**. Just from Hawking's theories of BHs, we have known that BHs can change its energy-matters with its surroundings**. Now, BHs have become the living bodies from the dead bodies in the past.

The Hawking's theory about BH extricates the crisis of pure GTR about Singularity in BH. The same condition had already happened in atoms. Just Uncertainty Principle of Quantum Mechanics has obstructed all electrons in our universe from dropping into atomic nuclei so that we can live in an admirable present world.

(B). In any BH, the equilibrium between gravity and thermodynamics can certainly lead to the occurrence of a mini BH ($m_{om} \approx 10^{15}$g) at its center. Mini BH is a perfect equilibrium body; it has extremely long lifetime (10^{10}years) and posses the greatest density. Mini BH would become a solid core to obstruct the collapse of energy-matters in BH to become Singularity. In nature, anybody has its solid core or its bone to support and attract the materials outside the core. There will be no exception for BHs. From six formulas of different theories, the same three values of every physical parameters of BHs have been exactly gotten.

(C). In space of BH, it is full of energy-matters, not a vacuum. The existence of mini BH and its physical state in BH are completely consistent with the natural reality and laws of science.

(D). Structure of star-formed BH, The star-formed Schwarzchild's BHs inside are composed by countless small BHs of concentrically sphere layer by layer, the mini BH ($m_{om} \approx 10^{15}$g) is at the center.

(E). Star-formed BH is a simple object in nature. In all parameters of physical states of a BH ($M_b, T_b, R_b, \tau_b, \rho_b, \ldots$etc), once a parameter such as M_b is decided, correspondingly, single value of all other parameters are respected decided by sole M_b. Thus, in reality, star-formed BH is a simple object in nature. BH is not the mysterious objects at all but only the objects unknown in the past.

(F). Event Horizon of BH would be always oscillated. A BH is always nonstop either to emit energy (Hawking's radiation) to outside, and to contract its size until its disappearance with last explosion or to take in materials from outside until vacuum state outside and to increase in mass and size. Thus, Event Horizon of BH would be always oscillated.

(G). Any BH would be a real BH forever until its final vanish. Once a BH has formed, no matter whether it absorbs in materials from outside or radiates energy to outside, it would be a real BH forever until its final vanish.

18. About the original universal small BHs

According to analyses above, the lifetime of mini BH ($m_{om} \approx 10^{15}$g, $r_{om} \approx10^{-13}$ cm, $t_{om} \approx 10^{12}$ k) is about 10^{10}years, and equal to the present age of our universe. In 1970s, many scientists attempted to observe out such small BHs in universal space, but their efforts were in vain. Let's review our universal evolution at first. Look back the numerical values on figure (1) and chart 1 of Appendix A in part one, at the condition of temperature $T = 10^{12}$ k, corresponding time $t = 10^{-4}$ s, $\rho_c \approx 1.8\times 10^{14}$ g/cm^3. It was said, at that time, the whole expanding universe was like a gigantic neutron star. However, the density $\rho_{om} \approx 10^{53}$g/cm^3 of mini BH($m_{om} \approx 10^{15}$ g) is too high, such ultra-high density were impossible to exist in an expanding universe at time of $t = 10^{-4}$ s. At the another condition, when the evolution of our expanding universe was at the density of ($\rho_c \approx 10^{53}$ g/cm^3), the corresponding universal temperature $T \approx 10^{20}$ k and $t \approx 10^{-23}$ s, but the temperature (t_{om}) of mini BHs is about 10^{12} k, so, mini BHs ($m_{om} \approx10^{15}$ g) had no possibility to appear at that time too. Where is the intersection between temperature T of the universal evolution and temperature T_b of the different BHs?

From formulas of BHs before, $M_b/R_b = C^2/3G$, $T_b \times R_b = 0.1154$, $M_b = 4\pi\rho_b R^3/3$. So,

$$\rho_b = (3C^2\times T_b^2)/(8\pi G\times 0.1154^2) \quad (18a)$$

In universal evolution of part one, $\rho_c = 3/(8\pi Gt^2)$,

$$Tt^{1/2} = k_1 \approx 10^{10}, \text{ so, } \rho_c = 3T^4/(8\pi Gk_1^4) \quad (18b)$$

In case $\rho_b = \rho_c$ and $T_b = T$, the double T 's solutions (T_1, T_2) can be gotten as below;

$T^4/k_1^4 = C^2T_b^2/0.1154^2$ (18c)

$T_1 = Ck_1^2/0.1154 = 3\times10^{10}\times(10^{10})^2/0.1154 \approx 10^{32}$ k ($k_1 \approx 10^{10}$) (18d)

$T_2 = 0$ (18e)

Formula (18d) [$T_1 \approx 10^{32}$ k] shows that, only under the condition of 10^{32}k, temperature of BHs T_b was equal to temperature of the universal genesis T, the states of the universal small BHs were exactly consistent with the states of universe at the beginning of Plank's Era. From part one, at that moment, all quantum micro BHs ($m_t \approx 10^{-5}$ g, $T_b \approx 10^{32}$ k, $r_b \approx 10^{-33}$ cm) had jointly obstructed appearance of Singularity at genesis of original universe. That is a sole intersection between T and T_b in the universal endless evolution. Formula (18e) [$T_2 = 0$] expresses no physical meaning, because ($T_2 = 0$) is almost impossible or inconceivable. Is that result a coincident or an inevitable?

Another conclusion is obvious. In universal endless evolution, it was no possible to cause and leave some kinds of originally small BHs in space firstly and then to take in matters outside growing up to a star. Thus, no original universal small BHs could become embryos of stars or galaxies at all in the past.

19. The composition, the state and the vanishing process of mini BH ($m_{om} \approx 10^{15}$g) in star- formed BH, the commonality between universe and BHs,

According to analyses before, originally universal mini BHs ($m_{om} \approx 10^{15}$ g) would be impossible to exist in universe, mini BHs could only form and exist inside star-formed BHs. Mini BH ($m_{om} \approx 10^{15}$ g) is a body of perfect equilibrium between thermodynamics and gravity, it has very long lifetime. The space outside its Event Horizon is full of energy-matters. Mini BH not only emits energy through its Event Horizon into outside, but also absorbs in energy-matters from outside, so that mini BH can keep dynamical equilibrium with outside and its stability. However, the temperature on Event Horizon of a star-formed BH is too low($<10^{-6}$ k). Thus, star-formed BH would almost take in energy-matters from outside, increase in its size and mass. Only temperature on Event Horizon of star-formed BH is a little higher than temperature of outside, such a BH will nonstop radiate energy to outside and decrease in its size and mass until mini BH may become a naked body. What will happen next? **What will be the destiny of mini BH?** See analyses below.

(A). The composition of mini BH inside

Formula (13bd), $R_b=3h/(2\pi Cm_s)=r_{om}$ (13bd)

Formula (13aa), $T_b\times R_b \approx 0.1154$ cmk (13aa)

Formula (11aa), $M_b/R_b \approx 0.675\times10^{28}$ g/cm (11aa)

Formula (13l), $\tau_b \approx 10^{-27}M_b^{3}$ (s) (13l)

The values of physical parameters of mini BH have been gotten in 13th paragraph, $m_{om}\approx10^{15}$ g, $r_{om} \approx 10^{-13}$cm, $t_{om} \approx 10^{12}$k, $\tau_{om} \approx 10^{10}$yrs, $\rho_{om} \approx 10^{53}$g/cm^3, $m_s = 1.67\times10^{-24}$g. Those values are gotten under the condition of every particle ($m_s = 1.67\times10^{-24}$ g ≈ mass of a proton or a quark) in mini BH.

At the time of formation of star-formed BH, neutrons in neutron star must be broken up before a BH formed. From (13bd), perfect equilibrium between gravity and thermodynamics in mini BH is only depend on mass of m_s (quark or proton). The heavier m_s is, the smaller mini BH will be. Are there heavier particles > m_s in mini BH? Impossible. If by any chance heavier particles appeared, they would have shorter lifetime and disintegrate sooner. Thus, in mini BHs, particles of (mass ≈ proton) would steadily exist, its Event Horizon like a wall separated itself from its outside. Protons have extremely long lifetime($\approx10^{31}$yrs).

(B). The vanishing process of mini BHs

After all energy-matters outside Event Horizon of a mini BH were emitted over, mini BH would become naked. Now, we know no way can stop emitting energy of a naked mini BH, because its size is so small as a present neutron and its temperature is high to 10^{12}k. Thus, mini BH cannot choose but nonstop emit energy to outside, at the same time, its size and mass m_{om} are decreased and its temperature t_{om} are increased according to properties of BH. From (13bd), mass of particles m_s must grow up as the size r_{om} shrunk as to keep the equilibrium of mini BH. The characteristic of BH is that, once a BH had made up, no matter whether it enlarge or shrink, it would be a BH forever until it vanished at last. What is a last limit of size r_{om} shortened? The answer is: **once mini BHs shrink to its mass ($m_{om} \approx 10^{-5}$g), i.e. $m_{om} = m_t \approx 10^{-5}$g, mini BH would shrink no more and vanish at a explosion**, here m_t is the same one with original Quantum Micro Black Holes (QMBH) in part one of this article. Check up values of all parameters of m_t as below; $m_t \approx 10^{-5}$ g, $r_b \approx 10^{-33}$cm, $T_b \approx 10^{32}$ k, $\tau_b \approx 10^{-43}$ s, $\rho_b \approx 10^{92}$ g/cm^3. Applying formulas (13aa),(11aa),(13l), when mini BH ($m_{om} \approx 10^{15}$g) shrink to ($m_t \approx 10^{-5}$g), all values of other parameters of m_{om} after shrinking are respectively equal to that of m_t, such as $r_{om} = r_b \approx 10^{-33}$cm. Now calculating m_s in m_{om} from (13bd),

$\mathbf{m_s} = 3h/(2\pi Cr_{om}) = 3\times6.63\times10^{-27}/(2\pi\times3\times10^{10}\times10^{-33}) \approx \mathbf{10^{-5}\,g \approx m_t}$,

Calculation above expresses that, once m_{om} shrinks to $m_t \approx 10^{-5}$ g, then, $\mathbf{m_{om} = m_s = m_t \approx 10^{-5}\,g}$. It is said, **whole Quantum Micro Black Holes (QMBH) is just equal to single particle m_s**. Thus, QMBH(m_t) would be impossible to shrink any more, according to (11aa), r_{om} would shorten with decease in m_t and lead increase in m_s, as a result, $\mathbf{m_s > m_t}$**, it is absolutely impossible.** Could a leg of a person be heavier than his whole body? Thus, **any particle ($m_s = m_t \approx 10^{-5}$ g) of $r_{om} \approx 10^{-33}$cm cannot choose but last vanish at an explosion in**

10^{32}k. That is the last destiny of mini BH ($m_{om}\approx 10^{-5}$g) as well as all BHs. It has been proved once more that, universe absolutely was not born from Singularity and there would absolutely have no Singularity in any BH.

The vanishing conditions between mini BH after shrinking to $m_t \approx 10^{-5}$ g and the big contraction of pre-universe are completely different. Mini BH is just a single particle and emit energy to outside before its vanish, no new thing can be born after its explosion. However, collapse of pre-universe was extruded by countless particles between each other, and our new universe could emerge from ruins of pre-universe, **no collection of enormous energy, and no birth of our universe.**

(C). About the artificial bombs of mini BHs

Some Russian scientists had advertised to produce artificial bombs of mini BHs or Oton. It was not known how they got the exactly calculated values about such bombs. It had been pointed out before that, in reality, BHs are the simplest bodies, once one physical parameter of BH is decided, all others will be respectively and solely decided by the first. For example, if mass of 1 Oton = mass of 40 atoms = $40\times1.67\times10^{-24}$g $\approx10^{-22}$g = m_{ot}, correspondingly, from (13aa),(11aa),(13l),(13bd) above, $r_{ot} \approx 10^{-50}$cm, $t_{ot} \approx 10^{51}$k, $\tau_{ot} \approx 10^{-93}$s, but mass of particle $m_{sot} \approx 10^{14}$g. Utterly absurdly, ($m_{sot} \approx 10^{14}$g)>>($m_{ot} \approx 10^{-22}$g). In addition, could such bomb be well-done with values of any parameter above? Could such bomb exist with lifetime of 10^{-93}s? How could radiations of its energy be obstructed at temperature 10^{51}k? Otherwise, suppose a bomb of mini BH will be wanted to have lifetime $\tau_{30} \approx$ 30yrs, according to (13aa), (11aa), (13l), (13bd) $m_{30} \approx10^{12}$ g, $r_{30} \approx 10^{-16}$ cm, $t_{30} \approx 10^{17}$ k, mass of particle $m_{s30} \approx 10^{-21}$ g $\approx 5\times10^{2}$ GeV. How can mass of 10^{12}g be extruded to the size of 10^{-16}cm? How can control and stop its energy emission? They said, it will be the century of "Oton" after 50 ~60yrs. They also advocated that, mini BHs inside earth would ignite volcanic eruption, and mini BHs would lead to spontaneous combustion in human body, etc. It is really not known what are the scientific foundations about their talking to mini BHs.

(D). The commonality between universe and BHs, For checking up the correctness of used theories, concepts and formulas about the birth of our universe and BHs before, the evolutionary process of a pretended mini universe as a example will be calculated below for reference to others who are interesting in this article.

Suppose a pretended mini universe out of ours was simultaneously born with our universe and both born from the same QMBHs ($m_t \approx 10^{-5}$ g), and the mini universe included $N^{20}m_t$. Thus, mass of mini universe $M_m \approx N_m^{20}\times10^{-5}g\approx10^{15}$ g. It is obvious, $M_m= m_{om} \approx10^{15}$ g, so, all other parameters of M_m are the same with m_{om}', $R_m\approx10^{-13}$ cm, $T_m\approx10^{12}$ k, $\tau_m\approx10^{10}$ yrs, $m_{sm}\approx1.67\times10^{-24}$g.

How long would be the expanded time (t_2) of mini universe from $m_t\approx10^{-5}$ g to $M_m \approx10^{15}$g? Let us return back (1a) of part one, $R_1/R_2 = (t_1/t_2)^{1/2}$, here $R_1\approx10^{-33}$ cm, $R_2\approx10^{-13}$ cm, $t_1\approx10^{-43}$s, so, according to (1a), $t_2 \approx10^{-3}$ s. From calculation before, it is known the vanishing time of $m_{om} \approx 10^{15}$g in emitting energy would be 10^{10} yrs. Therefore, the **whole lifetime** of mini universe M_m from its birth to vanish would be equal to: **10^{10} yrs + 10^{-3} s.**

However, the mass M_u of our universe in Event Horizon is 10^{56}g, numbers of QMBHs are ($N_o\approx10^{61}$) >>($N_m\approx10^{20}$). Are there any surplus mass outside M_u? Have dark energy existed inside Event Horizon of our universe? Does such dark energy have exclusive force? What are dark energy? Such many problems have not been known, no way can calculate out the expansible time of our present universe. At last, our universe would stop its expansion only with no energy-matters taken in from outside, and then instantaneously change to emit energy (Hawking's radiation) to lose its mass gradually until it come to naught finally at an explosion.

Our universe was born from countless QMBHs and would finally vanish at an explosion of QMBH, it is the same with BHs in essence. Both are all BHs and have all commonalties in BHs, but our universe is just a gigantic BH. The tremendous difference in mass between BHs would lead to the enormous differences in their structures, states, developments and lifetimes. The bigger the mass of BH is, the lower its temperature will be, and the much longer its lifetime is, the lifetime of a BH is proportional its mass^3. Thus, the district of lower temperature in gigantic BH would have possibility to evolve out intelligence living beings even mankind.

20. A few words of the writer

The demonstrations in this article are simple, rough and break down the old conventions. It probably will not be welcomed and convinced by the majority of scientists and professors, because of lacking new theory and complicated mathematical equations. However, the new concepts, inferences and all calculated results in this article are derived from many current classical theories, and are very closely consistent with the physical and natural laws in nature. **The important contribution in this article is to have found out mini BH ($m_{om}\approx10^{15}$ g) as a special and simplified solution of formula (11c) [$dP/dR = -GM\rho/R^2$] and TOV equation applied in star-formed BH.** Another contribution is to apply some rough and simplified methods to have effectively researched macro states, structures of mini BH inside the star-formed BHs. Of course, many problems have been solved, much more complicated and knotty problems would have been left for others.

------The End-------

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