Some New Progresses in Black Hole Theory and Cosmololy

====From now on, Black Hole Theory and Cosmogony may go to more perfection====

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Descartes: We could not rely on other's authority to accept the truth, which should be sought by ourselves.

【**Abstract**】There are two Chapters in this article.

Chapter I: [Some New Concepts and New Formulas to BH Theory]. The new positive results are many new exact formulas derived out, such as formulas between Hawking radiation m_{ss} and M_b of black holes (BHs), minimum BH --M_{bm}, information unit -- I_o and entropy S_b of M_b, etc. They can let BH's theory go to more perfection.

Chapter II: [The New Concepts and New Researches to Cosmogony]. According to above new concepts and formulas of BHs, they may be applied to better explain and solve many important problems about the origin and evolution of our Universe.

【**Key words**】Hawking theory of black holes; Hawking quantum radiation; minimum BH-- M_{bm}; Planck particles m_p; information amount I_m of BHs; the origin and evolution of our Universe; cosmic-BH; Original Inflation;
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【**Preface**】It wouldn't be impossible to solve the problems exactly about black holes and the origin of our Universe with Einstein's Equation of the General Theory of Relativity (EGTR), because its general solution had no way to be solved. From what Einstein's said, his EGTR could be too perfect to be added anything into it. After that, all scholars had to find out some special solution to EGTR. For that purpose, they wanted to simplify EGTR and to propose a lot hypotheses, in which two common and important hypotheses were bound to violate the thermodynamic laws**; one is the movement and contraction of energy-matters with the equal amount, another is the isobaric(zero pressure) universal model. Just those two hypotheses would lead to the appearance of Singularity from solving EGTR and other wrong concepts and conclusions,** such as Schwarzchild metric and Freidmann-Robertson-Walker metric, etc, which could not accord with the real conditions of The Universe,

The basic principles and laws of black holes (BHs) were originated from the classical theories.

Laplace (1749--1827) firstly proposed the concept of Black Holes(BH) in 1796 on his book, <The Universal System>.

In Dec.1915, Einstain's EGTR was just published one month later, Karl Schswarzschild, an astronomer of Germany, got an precise solution from EGTR, i.e, famous Schwarzchild formula**(1c)**-- **$GM_b/R_b = C^2/2$, it is the existent condition of any spherical BH of no charges and no rotating . It was the first formula for Black Holes(BHs). However, according to above Schwarzchild solution to EGTR, once a black hole(BH) was formed, it could only increase in its mass(M_b) with engulfing energy-matters from outside, and exist in The Universe forever. It must violate the general law of everything having life and death in Universe.** Therefore, it has been in a difficult position to have no sufficient conditions to solve the important problems in BHs and cosmogony with EGTR. So, it is the reason why no more great successes could be achieved by scientists with applying EGTR for near 100 years, except a few special examples.

Hawking's theories about BHs have been the epoch-making significances, they build on the foundations of quantum mechanics and thermo-mechanics. Hawking proposed that, there would be temperature on the Event Horizon (EH) R_b of any BHs**,** and on R_b Hawking quantum radiations(HQR) m_{ee} would be emitted out. As the result, BHs could lose its energy-matters M_b 、 reduce its R_b and disappear at last. It is said, any BH could accord with the same general law of life and death as anything in The Universe.

Most importantly, Hawking derived out the famous temperature T_b formula (1a) on R_b of BHs, i.e, $T_b M_b = (C^3/4G) \times (h/2\pi\kappa)$—(1a), it is the greatest contribution and the second key formula to the theories of BHs. However, two formulas (1c) and (1a) are still not enough to solve many important problems about the properties and destiny of BHs, because the amount of m_{ss} --HQR on the Event Horizon R_b could not be found out by Hawking. He might be over-wholeheartedly busy to find out m_{ss} from virtual particles in Dirac's sea, and Hawking's explanations about BHs to emit m_{ss} with virtual particles in Dirac's sea would purposely make a mystery of simple things. He neglected applying classical theories and formulas.

Author's new and the most important contribution to BH theories and cosmogony is to derive out formua(1d), i.e, $m_{ss}M_b = hC/8\pi G = 1.187\times10^{-10}g^2$（1d）, it is the third important formula to recognize and

decide the essence of BH. Therefore, the precise amount of Hawking's quantum radiuations (HQR = m_{ss}) on the Event Horizon R_b of any BH could be exactly calculated out. As the result, in 4 parameters(M_b, R_b, T_b, m_{ss}) of any BH, if any one could be decided, the other three would be precicely calculated out with 3 formulas--(1a), (1c) and (1d). **From now on, Black Hole Theory and Cosmogony may go to more perfection.**

Sum up, **author's new concepts、formulas and conclusions to BH theories and cosmogony are as follows:**

1；The exactly new formula between m_{ss} and M_b is simply derived out, i.e, $m_{ss}M_b = hC/8\pi G = 1.187\times10^{-10}g^2$（1d）. That formula can open the mystery door of BH theory。

2; Author exactly demonstrated the physical significane of (1d), which shows the balance between the gravitational force of M_b to m_{ss} and the centrifugal force of m_{ss} on R_b.

3； Furthermore，According to axiom of that any part □the whole, at the limited condition, the another exactly new formula is simply derived out**, $m_{ss} = M_{bm} =$ （$hC/8\pi G$）$^{1/2}$ 1.09×10^{-5}g。** Owing to **（$hC/8\pi G$）$^{1/2} \equiv m_p$.** [5] i.e, Planck particle, thus, the last destiny of all BHs could only **become $m_{ss} \equiv M_{bm} \equiv m_p \equiv$（$hC/8\pi G$）$^{1/2}$(1e), and disintegrated in Planck Eda. So, any BH of M_b could impossibly contract to a singularity.**

At the same time, owing to M_b and m_{ss} have nothing to do with the structures and states inside BHs, then**, EGTR can be ignored from the theory of BHs。**

4； The essential attribute of any BHs is that, once a BH formed, it would be a BH forever until it finally become $m_p = M_{bm}$ and then disappear in Planck Era,

5； Auyhor proved that, the lowest and basic information unit □I_o □□of any Hawking radiation m_{ss} is precisely equal **to I_o = □h/2π = □□information basic unit of ($M_{bm} = m_p$) = 1 bit. (63a)**. **Then, I_o of any m_{ss} is a constant = h/2π, and not related to the amount of m_{ss} or M_b. The total information amount I_m of a BH(M_b) is newly derived, $I_m = 4GM_b^2/C$ (63d)。**

6； A new formula of needed time (−dτ$_b$) for any BH to emit a m_{ss} is derived**, $^{-}d\tau_b \approx 3\times10^{-27}M_bhC/8\pi G$**

7； The wave length λ_{ss} of m_{ss} is**, $\lambda_{ss} = 2Ct_s = 2R_b$,**

8; The current theory about BHs just had two formulas (Schwarzchild and Hawking temperature formulas), but no formula of m_{ss}. **Only after many new formulas proposed by author in this article, the theory of BHs may become more complete to solve the problems of Schwarzchild BHs**. As for BHs of angular momentum and electric charges, because their amount on BHs might generally be too little, they could not change the main properties of any Schwarzchild BHs. Thus, BHs of so-called 'naked Singularity' might be only a mathematical game and impossible to appear in The Universe.

9； According to the principle of time symmetry, before the birth of our Universe, suppose the Pre-universe had a Big Crunch, and its last collapsing law was equal to the expansive law of our Universe at its genesis, then, **once Pre-universe lastly collapsed to time $t_m = [k_1(2G\kappa)/C^5]^{2/3} = -0.5563\times10^{-43}$s, all particles in Pre-universe would break off their gravitational connections、become Planck particles, $m_p = M_{bm}$,** and violently explode in Planck Era. After that, all the remains of Pre-universe could re-form into new innumerable $m_p = M_{bm}$ (**in reality, it is $2m_p = 2M_{bm}$**) in Planck Era at the highest density. That's the new birth of our Universe. The combinations of those new innumerable $M_{bl} = 2m_p = 2M_{bm}$ would create the 'Original Inflation' and the continuous expansion of The Universe.

10； Author testified the 'Original Inflation' with a new and simple principle.

11； Author proved that, our Universe would be a really and completely gigantic cosmic-BH. Hubble law could be the expansive law of our Universe caused from the combinations of those new innumerable $m_p = M_{bm}$. Any Schwarzchild BHs is a closed ball, its density ρ_b is only decided by its M_b. For any BH and our Universe as a cosmic-BH,□□ , $\Omega = 1$ □is an inevitable result。Therefore, it was a false proposition for scientists to exert great effort for finding whether $\Omega < 1$ or $\Omega < 1$ □in about past 60 years。

12; In Figure 2, the extremely harmonious and precise relationships between all numerical values of different parameters of various BHs in The Universe can confirm that, the new concepts and formulas about BH's theory and the cosmogony proposed by author in this article are rather identical and effective.

【Author's few words】: My maxim: The genuine scientific knowledge and new ideas may often come from the trivial numerical calculations. In this article, although no profound theories and no complicated mathematical equations, author may only forge ahead a little step from some Hawking formulas of BHs with other classical formulas to derive out many new simple、important and basic formulas，such as formulas (1d), (1e),(63a),(63d), etc and Figure 2. Scholars、experts and professors may not spare a glance at my work in this article. **However,** I believe, at least, my new many formulas and Figure 2 are effective to explain many importantly practical problems in BHs and cosmogony unknown in the past, such as no Singularity appeared at the birth of our Univerde, the origin

of our Universe, the destiny of BHs, etc. In addition, those formulas are simple, reliable and harmonious, and better accord with various observational data. So, they are real science and effective in the objective practice.

Therefore, let future facts testify and people judge which new formulas and concepts got by author in this article will be correct and effective or not.

Chapter I: Some New Concepts and New Formulas of BH Theory

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

【1】。New formula of $m_{ss}M_b = hC/8\pi G = 1.187\times10^{-10}g^2$ is derived，$M_{bm} \equiv$ Planck particle $m_p = (hC/8\pi G)^{1/2} = 1.09\times10^{-5}g$ are proved as below:

M_b —- mass of a BH, **T_b** —-temperature on EH(Event Horizon) R_b of a BH, **m_{ss}** —-mass of a Hawking quantum radiation(HQR, **R_b** —-radius of EH of a BH, **h**—Planck constant = 6.63×10^{-27}g cm^2/s，, **C** —-light speed = 3 × 10^{10}cm/s, **G** —-gravitational constant = 6.67×10^{-8}cm^3/s^2*g, **κ--** Bolzmann constant = 1.38×10^{-16}g*cm^2/s^2*k, **m_p** —- Planck participle, **L_p** ---Planck length, **T_p** ---Planck temperature, **M_{bm}**—mass of minimum BH in The Universe, its corresponding parameters-- **R_{bm}, T_{bm},**

Owing to having temperature T_b on the radius R_b --the Event Horizon of any BH proved by Hawking, then, (1a) below is the famous Hawking temperature formula, T_b —-temperature on R_b of any BH,

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

Let m_{ss} be Hawking quantum radiation(HQR) on R_b; according to formula of energy transformation,

$m_{ss} = \kappa T_b / C^2$ [6] **(1b)**

□□□□□□□□T_b is also valve temperature on R_b.

According to Schwarzchild special solution(1c) below got from EGTR, (1c) shows light as energy could revolves round BH of mass M_b on its R_b, but would hardly flee out to outside.

$GM_b/R_b = C^2/2$ [6] **(1c)**

From (1a) and (1b), it is easily got，

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

□□□□□□□□**(1d) is a new generally effective formula on R_b of any BHs**。Now $m_{ss}M_b$ = constant，according to thermo-mechanics, certainly $T_b \neq 0$，from (1a) $M_b \neq 0$，thus, from (1c) (1d), $R_b \neq 0$ and $m_{ss} \neq 0$. Consequently, m_{ss} 、 M_b and R_b are all impossibly equal to zero or infinity. Then, m_{ss} 、 R_b and M_b must have its respective limit。From (1d)， **According to axiom of any part □ the whole, at the limited condition,** $M_b = m_{ss} = M_{bm} = (hC/8\pi G)^{1/2}$。**Owing to $(hC/8\pi G)^{1/2} \equiv m_p$ = Planck particle**, [1][5] so,（1e）is another new formula,

$m_{ss} = M_{bm} = (hC/8\pi G)^{1/2} = m_p = 1.09\times10^{-5}g$ (1e)

$m_{ss}R_b = h/(4\pi C)$ (1f)

$R_{bm} \equiv L_p \equiv (Gh/2\pi C^3)^{1/2} \equiv 1.61\times10^{-33}$cm [5] **(1g)**

$T_{bm} \equiv T_p \equiv 0.7_1\times10^{32}$k [5] **(1h)**

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

Generally, Compton time t_c = Schwarzchild t_s,

$t_c = t_s = R_{bm}/C = 1.61\times10^{-33}/3\times10^{10} = 0.537\times10^{-43}$s （1j）

$\rho_{bm} \approx 10^{92}$g/cm^3 (1k)

From $M_b = 4\pi\rho R_b^3/3$ and (1c), for any BHs, (1n) is only and always valid,

$\rho_b R_b^2 = 3C^2/(8\pi G) =$ constant (1n)

Theoretically, the last contraction of M_b could reach to $M_{bl} = 2M_{bm} = 2m_p = 2m_{ss} = 2\times1.09\times10^{-5}g \approx 2.2\times10^{-5}g$. Then, **$M_{bl}$ would finally divided into a M_{bm} and a m_{ss} ($M_{bm} = m_{ss} = m_p$). In reality, the last existent minimum BH would be M_{bl}, but not M_{bm}, because after the last division of M_{bl} became into two $m_{ss} = M_{bm} = m_p$, they could only be Planck particles m_p of the highest energy, so,**

$M_{bl} = 2M_{bm} \approx 2.2\times10^{-5}g$ (1p)

It can be seen from above formulas, the relationship between M_b and R_b、T_b 、m_{ss} are all the simplest and liner relationship. Thus, BHs are the simplest objects in The Universe.

【2】。Why would the final contraction of all BHs only become to $m_{ss} = M_{bm} = m_p$ and explode in Planck Era, but impossible to become Singularity?

According to (1d) and（1e）, $m_{ss} = M_{bm} = (hC/8\pi G)^{1/2} \equiv m_p \equiv 1.09\times10^{-5}$g，

Owing to that Planck Era could not be understood and observed by people at present or even forever, we would have no way to know the conditions after disappearance of $M_{bm} = m_p$. We may only deduce from（1e）that, **M_{bm} might not exit in The Universe, and Planck participle m_p might be the maximum energy-particle appearing in Planck Era. Thus, $M_{bm} = m_p$ might be the 'critical point' between our Universe and Planck Era，and not independently exist in any one world.**

2-1*. Once a BH of M_b could contract its mass into M_{bm} , so,

$M_{bm}C^2 = m_{ss}C^2 = \kappa T_b = 10^{16}$erg, $T_b = 10^{32}$k (2a)

$M_{bm}C^2/\kappa T_b = m_{ss}C^2/\kappa T_b = 1$ **(2b)**

It can be seen, M_{bm} had become a complete energy-ball of 10^{32}k, then, $M_{bm} = m_{ss}$ could only

wholly explode into a lot □γ-□rays of high energy.

2-2*。 As a $m_p = M_{bm}$, it was not a BH at all, it had no superfluous energy-matters as m_{ss} to be emitted. Otherwise, it would lead to $m_{ss} > M_{bm}$, and violate formula (1d)--$m_{ss}M_b = hC/8\pi G$ and formula（1e）.

2-3*. According to Uncertainty Principle,

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

To M_{bm}, its $\Delta E = \square M_{bm}C^2 = \kappa T_b = \mathbf{10^{16}erg}$, its Δt = 2×Schwarzchild time $2t_s = 2R_{bm}/C = 2\times1.61\times10^{-33}/3\times10^{10} = \mathbf{1.074\times10^{-43}s}$。

$\therefore \Delta E \times \Delta t = 10^{16} \times (2\times 0.537 \times10^{-43}) = \mathbf{1.074\times10^{-27}}$.

However, $h/2\pi = 6.63\times10^{-27}/2\pi = \mathbf{1.06\times10^{-27}}$。 It is said，if $M_{bm} = m_p$ could reduce its mass once again, **it would create to $\Delta E \square\square \times \Delta t < h/2\pi$, and violate Uncertainty Principle.**

2-4*。 □The information amount **I_o of $M_{bm} = m_p$ is $I_o = h/2\pi$, it is the minimum 、basic information unit = 1 bit and cannot be divided again in The Universe。**

It can be seen, M_{bl} (= $2M_{bm}$) are BHs, but $M_{bm} = m_p$ = particles of the highest energy=Planck particles.

Conclusion: Any BHs could only reduce and divide its mass finally into $M_{bl} = 2M_{bm} = 2m_p = 2m_{ss}$, and disintegrate、 explode in Planck Era, but impossible to contract its size (R_b) non-stop into 'Singularity' of infinite density. Thus, the density of $10^{92}g/cm^3$ and temperature of $10^{32}k$ of $M_{bm} = m_p$ would be the highest limit in The Universe.

【3】。The most essential attribute of any BHs: Once a BH could be formed, it would be a BH forever until it finally become Planck particles $m_p = M_{bm} = (hC/8\pi G)^{1/2} = 1.09 \times 10^{-5}g$, then explode and disappear in Planck Era, no matter whether it had expanded because of engulfing energy-matter from outside or it had contracted because of emitting HQR--m_{ss} to outside in the past**.**

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

$$R_b = 2GM_b/C^2, \qquad (1c)$$

$$\therefore C^2dR_b = 2GdM_b$$

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

Suppose another M_{ba} could collide and combine with M_b,

$$C^2R_{ba} = 2GM_{ba} \qquad (3b)$$

From (3a) +（3b）+ (1c)

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

From above formulas (3c), when a BH could engulf in energy-matters from outside or combine with another BH, it would increase in its M_b and R_b , and decrease in its T_b and m_{ss}, it would be a real BH. After a BH emitting its m_{ss} to outside，it would decrease in its M_b and R_b ，and increase in its T_b and m_{ss}, but it would be a real BH。

【4】。The mechanism of BHs of mass M_b to emit Hawking quantum radiation(HQR-- m_{ss})。Only with classical theories, the mechanism of BHs to emit m_{ss} can be correctly explained.

BHs emitting m_{ss} , or m_{ss} fleeing out from R_b of BHs to outside is the same mechanism with stars or any hot thing to emit radiation energy. They are all the processes from high energy (high temperature) naturally flowing to low energy (low temperature).

4-1*. The gravitational force of mass M_b, the centrifugal force of **HQR--m_{ss} on its radius R_b.**

The physical significances of formula (1d).

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

From (1d), (right side and left side) **× G/R_b^2,** so,

$$GM_bm_{ss}/R_b^2 = hC/8\pi R_b^2 \qquad (4a)$$

Owing to $m_{ss}M_b$ = const, so, the gravitational force F_{bg} of M_b to m_{ss} is only inverse proportion to R_b^2, and has nothing to do with mass M_b and m_{ss}. Let

$$F_{bg} = GM_bm_{ss}/R_b^2 \qquad (4b)$$

From (4a), (1c) and (1d), so,

$$F_{bc} = hC/8\pi R_b^2 = m_{ss}\times(C^2/2R_b) \qquad (4c)$$

From (4a), (4b) and (4c), F_{bg} shows the gravitational force of BH of M_b to m_{ss} revolving round BH on its R_b. F_{bc} shows the centrifugal force of Hawing quantum radiation—m_{ss} on R_b, and $C^2/2R_b$ is just the centrifugal acceleration of m_{ss}. **Thus, (1d) shows the balance between F_{bs} and F_{bc}.**

Conclusion: Any BHs could only reduce its mass finally into $M_{bm} = m_p$, and should scatter the whole space in radius R_b, but not concentrate at the center of BH, it is the great difference between EGTR and Newton mechanics. So,

$$F_{bg} = F_{bc} = GM_bm_{ss}/R_b^2 = hC/8\pi R_b^2 = m_{ss}\times(C^2/2R_b) = (1d) \qquad (4d)$$

Similarly, applying Newton mechanics to get the balance between the gravitational force--F_{ng} and the centrifugal force--F_{nc}, but M_{bn} here is the concentrative mass at its center. Let,

$$F_{ng} = m_{ss}\times(GM_{bn}/R_b^2) \qquad (4e)$$

$$F_{nc} = m_{ss}\times(C^2/R_b) \qquad (4f)$$

$$\square(GM_{bn}/R_b^2) = m_{ss}\times(C^2/R_b) \qquad (4g)$$

Let (4g)/2, so,

$$(GM_{bn}/2R_b^2) = m_{ss}\times(C^2/2R_b) \qquad (4h)$$

Comparing (4h) with (4d), both are completely equal under the condition of

$$M_b = M_{bn}/2 \qquad (4i)$$

It can be seen from(4i), the great difference between EGTR and Newton mechanics in calculation is just that, M_b is scattered in the whole space of BH, but M_{bn} is concentraded at the center. Thus, the gravitational effect of concentrated $M_{bn}/2$ can be equal to the effect

of whole scattered M_b. Is it necessary for EGTR to soppose that, lights as energy have no gravitational mass?

4-2*。3 shapes of radiation energy of m_{ss} can be equally transformed each others. ν— frequency,

$$m_{ss}C^2 = \kappa T_b = Ch/2\pi\lambda = \nu h/2\pi \quad (4j)$$

The energy transformation of Hawking quantum radiation m_{ss} of BHs on the R_b can accord with （4j）.

As an example, the temperature on our sun's surface is about 5800k. Let 5800k be the valve temperature like T_b on R_b of BHs, the corresponding mass m_{sf} of sun's radiation energy is: $m_{sf} = \kappa T_b/C^2 = 10^{-33}$g, and its equal wave length $\lambda_{sf} = h/(2\pi C m_{sf}) = 10^{-5}$cm $=10^{-7}$m. It clearly shows that, sun can only emit electromagnetic waves、 visible light、radio waves 、ultraviolet rays of $\lambda_{sf} > 10^{-7}$m.

It shows that, the mechanism of BHs to radiate m_{ss} is the same mechanism with sun to radiate visible light, etc. However, sometimes sun could radiate X-rays of high energy and project particles to outside, because some strong explosions caused inside sun, its thrust could push the particles of high energy into universal space. Similarly, the explosions in great BHs might project particles to its outside too**. In reality, It shows that, EGTR is also a uncompleted great system like Newton's system before.**

4-3*. How did Hawking quantum radiation--m_{ss} flee out to outside from R_b of BH ?

I think, any m_{ss} as energy, but not matter particle, on R_b of a BH has its certain mean temperature--T_b and its wave length λ_{ss}. However, m_{ss} could always do simple vibration, so, its speed and amplitude would have a little change at any instant. Once m_{ss} vibrate to low energy—wave trough, it might flow out from R_b to outside. Then, BH would immediately raise the temperature T_b on R_b a little, so, m_{ss} of low energy could not return back to R_b of higher T_b, and exist outside. Therefore, the process of m_{ss} fleeing out from R_b to outside is just the process like sun emitting lights, both processes are the same one of the higher energy flowing out naturally to the lower energy.

Hawking theory and laws of BHs to emit HQR—m_{ss} are all right, but Hawking's explanations to emit m_{ss} are not correct and convincing.

Normally, Hawking and the most scientists may explain BHs to emit m_{ss} with the concepts of vacuum energy in Dirac's sea. They recognized that virtual bi-particles would suddenly appear and annihilate repeatedly from vacuum. After a negative particle of bi-particle could capture a positive particle--m_{ss} on R_b of a BH, and annihilate, then, the positive particle of bi-particle would exist in vacuum. It shows a m_{ss} of BH had fled out to outside. Such explanations is a deliberate myth with the new physical concept. **The energy value of m_{ss} on R_b of BH is certain, and m_{ss} is decided by T_b on R_b, why could virtual bi-particles in vacuum have the same energy value with m_{ss} on R_b and both could meet at the same time and same place? In addition, the numerical values of different M_b and m_{ss} have the greatest differences of 10^{60} in universal space, how much great differences between virtual bi-particles in Dirac's sea anywhere have?**

In addition, right now, the explanation of so-called "virtual bi-particles" has not a reliable and certain numerical value in any theory, and may have no way to be observed and examined forever.

【5】。The lifetime τ_b of BHs. According to Hawking formula of BH's lifetime,

$$\tau_b \approx 10^{-27} M_b^{\,3}\ [3] \quad (5a)$$

To minimum BH, $M_{bm} = m_{ss} = m_p = 1.09\times10^{-5}$g, its lifetime $\tau_{bm} \approx 10^{-42}$秒 ≈ Schwarzchild time t_s of （1j）, τ_{bm} and t_s are at the same numerical grade. For star BHs, its mass $M_{bs} \approx 6\times10^{33}$g, so, its lifetime $\tau_{bs} > 10^{66}$years。For our Universe as a gigantic BH, if no more energy-matters engulfed from outside, its mass $M_{bu} \approx 10^{56}$g, so, its lifetime $\tau_{bu} \approx 10^{133}$years。

Some conclusions:

1*; Our Universe is a really gigantic BH（see【6】of Chapter II）, if there are more energy-matters outside, its mass M_{bu} will be increased, and its lifetime become $\tau_{bu} >> 10^{133}$years。Thus, according to BH theory , **the destiny of our Universe is only decided by its mass--M_b,** but General Theory of Relativity recognized the destiny of our Universe was decided by unknown **($\Omega = \rho_r/\rho_o$ >1 or < 1). Both conclusions are completely different.**

2*; m_{ss} emitted out from star BHs ≈ 10^{-44} g is much less than any energy-matter particles in universal space. Thus, the big BHs of (mass ≥ star BH) always engulfing energy-matters outside are like rapacious plunders, and radiating m_{ss} to outside are like misers. For example, our cosmic-BH would emit a weakest m_{ssu} ≈ 10^{-66}g every 10^{12}years.

3*; When a big BH M_{bb} combined with a small BH M_{bs}, M_{bs} would enter inside of M_{bb} , due to particles in M_{bb} being always bigger than m_{ss} of M_{bs}, so, M_{bs} could engulf all energy-matters in M_{bb}, and finally form a new bigger BH of ($M_{bs} + M_{bb}$) with new bigger R_b of ($R_{bs} + R_{bb}$).

【6】。The total information amount I_m of a BH of M_b, $I_m = I_o M_b/m_{ss} = 4GM_b^2/C$. The total information amount I_o of any m_{ss}, $I_o = h/2\pi$ = basic information unit = 1 bit = information amount of minimum BH--$M_{bm} = m_p$. The entropy S_{Bbm} of ($M_{bm} = m_p = m_{ss}$), $S_{Bbm} = \pi$. The total entropy S_{BM} of a BH

of M_b, $S_{BM} = (\pi/I_o)\ I_m = (\pi/I_o) \times 4GM_b^2/C = 2\pi^2R_b^2C^3/hG$。[4]

6-1*; According to analogy of thermo-dynamics in the theory of BHs, the entropy of BHs in Einstein gravity theory is as follow:

$$S_B = A/4l^2 \ [2] = 2\pi^2R_b^2C^3/hG \quad (6a)$$

In above (6a)，A—surface of a BH M_b，$A = 4\pi R_b^2$。 l –Planck length，

$$l = (HG/C^3)^{1/2} \ [6][3] \quad (6b)$$

(6a) is the famous Bekenstein-Hawking formula。

From (1c) $GM_b/R_b = C^2/2$， then, $S_B = A/4l^2 = 4\pi R_b^2/(4GH/C^3) = 4\pi R_b^2 \times C^3/4GH = \pi R_bR_bC^3/GH = \pi \times Ct_s \times 2GM_bC^3/GHC^2 = 2\pi t_s \times M_bC^2/H$,

t_s –Schwarzschild time, $Ct_s = R_b$。So，

$$S_B \times (h/2\pi) = \pi(2t_s \times M_bC^2), \text{ or } S_B = \pi(2\pi/h) \times (2t_s \times M_bC^2) \quad (6c)$$

In above (6c)，$H = (h/2\pi) = I_o$， According to Heisenberg's Uncertainty Principle, two complementary physical dimensions; such as time and energy, location and momentum, angle and angular momentum, if both have no way to be measured precisely, their product is equal to a constant = $H = h/2\pi = 1.058\times10^{-34}$Js = $1.058\times10^{-27}g_*cm^2/s$/。Then,

$$M_bC^2 \times 2t_s = h/2\pi = I_o \quad (6d)$$

$$\Delta E \times \Delta t \approx h/2\pi = I_o \quad (6e)$$

Doing analogy between（6d）and（6e），（6e）is mathematical formula of Uncertainty Principle. $2t_s$ is corresponding to Δt，and M_bC^2 is corresponding to ΔE 。It shows that, BHs emitting m_{ss} are all quantum.

6-2*; The information amount I_o and entropy S_{Bbm} of $M_{bm} = m_{ss} = m_p = (hC/8\pi G)^{1/2}$

In above【1】of Chapter I, it was proved that, $M_{bm} = m_{ss} = m_p = (hC/8\pi G)^{1/2}$, and $R_{bm} \equiv L_p \equiv (Gh/2\pi C^3)^{1/2} \equiv 1.61\times10^{-33}$cm, $t_{sbm} = R_{bm}/C = 0.537\times10^{-43}$s。Let check up data of $M_{bm} = m_{ss} = m_p$, according to (6c) and（6d)：

$$2t_{sbm} \times M_{bm}C^2 = 2\times0.537\times10^{-43}s \times 1.09\times10^{-5}g \times 9\times10^{20} = 1.054\times10^{-27}gcm^2/s. \quad (62a)$$

$$h/2\pi = 6.63\times10^{-27}/2\pi = 1.06\times10^{-27}g_*cm^2/s. \quad (62b)$$

It can be seen, **（62a）=（62b）, so,**

$$2t_{sbm} \times M_{bm}C^2 = h/2\pi = H = I_o \quad (62c)$$

Thus, **$h/2\pi = H = I_o = 1$ bit is the minimum information amount in the Universe, and I_o = minimum information unit of $M_{bm} = m_{ss} = m_p$.** Owing to the lifetime of $M_{bm} = m_p$ being 0.537×10^{-43}s and $I_o = 1$ bit, the sole way for $M_{bm} = m_p$ could disintegrate themselves into many smaller energy-particles for prolonging their lifetime.

From (6c), the entropy S_{Bbm} of $M_{bm} = m_p$, due to $S_B\ (h/2\pi) = \pi\ 2t_s \times M_{bm}C^2$， so,

$$S_{Bbm} = \pi, \text{ and } I_o = 2t_{sbm} \times M_{bm}C^2 = h/2\pi \quad (62d)$$

It shows, the information amount < ($I_o = h/2\pi$) could be impossible to exist in the Universe.

An amateur physicist, Ms. Fang (方舟の女) explained：[On philosophy, existence is just perceived by sensory organs, and perceptibility is just the information to be got and transformed. Anything bringing no information could have no way to be perceived. Thus, information is just existence. Thus,

Information＝ Existence＝ energy × time.

Correspondingly, Planck constant H = energy Uncertainty × time Uncertainty

Why does existence＝energy×time? It reflects existence has only two essential factors. Any existent thing must have its energy and its living time. A thing of no energy or no living time can be really no existence.] [7] I think, her concept to information is rather correct and accepted.

6-3*。The information amount of any m_{ss} radiated by any BH of M_b is completely equal to the same amount = $I_o = h/2\pi$, and has nothing to do with the amount of M_b and m_{ss}。

To getting the general formula of information amount of any m_{ss}, from (1d)，$m_{ss}M_b = hC/8\pi G = 1.187\times10^{-10}g^2$。Let I_{SS} = the imfofmation amounts of any m_{ss}，

$$I_{ss} = m_{ss}C^2 \times 2t_c = C^2hC/(8\pi GM_b) \times 2R_b/C = C^2hC/(8\pi GM_b) \times 2 \times 2GM_b/C^3 = h/2\pi = I_o \quad (63a)$$

Above (63a）shows, any I_{ss} of any BH is always equal to $I_o = h/2\pi$, no matter whether m_{ss} and M_b is big or small. Thus, I_o is the minimum、the most basic information unit = 1 bit.

To getting the total information amount **I_m and total entropy S_{BM} of a BH of M_b,** let $n_i = M_b/m_{ss}$. So,

$$I_m = n_iI_o \qquad S_{BM} = n_i\ \pi = (\pi/I_o)\ I_m, \quad (63b)$$

Owing to $M_b = n_i\ m_{ss}$，$I_m = I_oM_b/m_{ss}$， (63c)

From (1d) and (63c)，

$$I_m = I_oM_b/m_{ss} = 4GM_b^2/C \quad (63d)$$

From (63b)， $S_{BM} = (\pi/I_o)\ I_m = (\pi/I_o) \times 4GM_b^2/C = 2\pi^2R_b^2C^3/hG = S_B$， (63e)

(63e) ≡ (6a)， it can be proved that, all formulas derived above by author are perfectly correct and **very harmonious.**

From（4j）and (62c), $m_{ss}C^2 = (h/2\pi) \times C/\lambda_{ss}$, so, any **wave length λ_{ss} of m_{ss} is equal to the diameter of BH of M_b。**

$$\lambda_{ss} = 2t_cC = 2R_b = D_b \quad (64a)$$

Conclusions; Some very significant and effective conclusions from above calculations.:

A; If our CBH having energy-matters outside , they will be thoroughly engulfed. After that, the bigger CBH in future will nonstop emit HQRs(m_{ss}) to contract its

size finally to become $M_{bm} = m_p$, and disappear in Planck Era, and the lifetime of the bigger CBH $>>10^{134}$years. Then, the destiny of our Universe from the viewpoints of BH's theory can be very great different with the General Theory of Relativity. Thus, □□ □□ **Ω ≠ 1 got out from GTR can be a false proposition**.

B; After new formulas(1d), (1e), (4a), (4b). (4d), (4f), (5b) derived by author, the theory of BHs will go to a rather complete system. The relationships between various parameters are very harmonious. Although the states and structures inside any BH can be very great different, but can be igrored, because they have nothing to do with their mass--$\mathbf{M_b}$.

C; The wave length λ_{ss} of m_{ss} of our universal BH, $\lambda_{ss} = 2R_{bu} = 3\times10^{28}$cm, so, m_{ss} emitted by our Universe BH should be the gravitational waves. Owing to I_o = constant, the smaller m_{ss} is, the longer its λ_{ss}.

D; The information amount I_m of combinations of two BHs($M_{b1} + M_{b2}$) can not be conservative.

From(4b), owing to I_m □ M_b^2(I_m is directly proportional to M_b^2), after combinations of two BHs of $M_{b1} + M_{b2}$, their total information amount I_{m1+m2} □$(M_{b1} + M_{b2})^2$; but I_{m1} □ M_{b1}^2, and I_{m2} □ M_b^2, then, $I_{m1+m2} > I_{m1} + I_{m2}$. Similarly. If a BH of M_b, its original I_m of M_b, I_m □ M_b^2, after M_b emitting m_{ss} of 0.5 M_b, the rest 0.5 M_b will only have 0.25 I_m, but the lost 0.5 M_b bring away 0.75 I_m. However, the original total information amount I_m of M_b does not be increased or decreased any more, and is equal to a constant in the process of emitting m_{ss}. Obviously, from(4f), owing to I_o of any m_{ss} = h/2π, the bigger M_b can emit the longer λ_{ss} of m_{ss}, and bring away the less mass of a m_{ss}. Entropy is the same conditions with the information above.

E; Any small or big BH could emit only one m_{ss} with the same I_o at the same time, although the mass amount of every m_{ss} would be diffirent. On the contrary, any other bodys, such as stars, radio transmitters, even the hot objects, could emit many informations and energy-matter particles to outside at the same time.

Any BH could only emit radiation energy as quantum—m_{ss}, but not emit matter particles to outsid, because the total energy amount of any matter particie is always bigger than a m_{ss}.

【7】。Mankind may be impossible to manufacture out any artificial real gravitational(Schwarzchild) black holes(BHs) forever.[8]

The minimum BH, $M_{bm} = m_p = 1.09\times10^{-5}$g ， its R_{bm} $=1.61\times10^{-33}$cm， and its Compton time t_c = Schwarzchild time t_s $= 0.537\times10^{-43}$s ≈ its lifetime τ□$_{bm}$。Owing to BHs ≤ M_{bm} == m_p $=1.09\times10^{-5}$g impossible to exist in the Universe，then, mankind will only attempt to manufacture out some□BHs ≥ M_{bm} = m_p, but a M_{bm} is formed by the mass of 10^{20} p_m (mass of a proton, $p_m = 1.66\times10^{-24}$g)。Mankind may have no ability forever let 10^{20} p_m collide together on future Collider at an extremely precisely same time. Most difficultly, the distance between two close p_m has only 10^{-13}cm at the density of neutron star, the time for transmitting gravity between them needs 10^{-24}s at least. However, the lifetime τ□$_{bm}$ of M_{bm} is just $\tau_{bm} \approx 0.537\times10^{-43}$s. It is said, although completing a successful collision, those too many p_m must impossibly combine together within 10^{-43}s. Therefore, many scientists in some countries had done some alarmist talks about 'artificial black holes', those cannot be convinced.

Chapter II The New Concepts and New Researches to Cosmogony

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====The new concepts in this Chapter are built on the bases of above new concepts and formulas of BHs====

【preface】. From【1】to【5】, it will be demonstrated that, our Universe was born in Planck Era from a large number of new $M_{bl} = 2M_{bm} \equiv 2m_p = 2(hC/8\pi G)^{1/2} \equiv 2\times1.09\times10^{-5}g \approx 2.2\times10^{-5}g$, but not born from so-called 'Singularity' or 'the Big Bang of Singularity'. In【6】, our Universe would be a real gigantic cosmic-BH of 10^{56}g。In【7】, the new concept and new demonstration to 'Original Inflation' of our newborn Universe。

【1】。The evolution formulas of our expansive Universe.[2]

According to the achievements in modern cosmogony and physics, the law and relationship between t， R and T can be precisely defined. **t**—characteristic time of our Univers**e, R**—characteristic size**, T**—temperature of radiations**, k_1,k_2,k_3**—constants。

Formulas (1a) below precisely describes our Universe's evolution relevant from the so-called 'Big Bang' to the end of Radiation Era, (i.e, **from $t = 10^{-43}$s to $t \approx 1/3\times10^6$ years).**

$$\mathbf{Tt^{1/2} = k_1,\ R = k_2t^{1/2},\quad RT = k_3,} \qquad \mathbf{(1a)}$$

Formula (1b) below precisely describes our Universe's evolution relevant within the Matter-Dominated Era , **(i.e, from $t \approx 1/3\times10^6$ years to the present**). k_6, k_7,k_8—constants,，

$$\mathbf{Tt^{2/3} = k_6,\quad R = k_7t^{2/3},\quad RT = k_8,} \qquad \mathbf{(1b)}$$

【2】。What principle can the precise birth-time t_m of

our Universe be got according to?

Since the expansive law of our Universe would exactly accord with above (1a), we could let (1a) return back to its original point, which was just the precise birth-time t_m of our Universe.

The reason why all particles of energy-matters in our Universe could be linked together to a whole ball is that there would be time enough to delivery gravity between all particles. The full and essential condition must be $R \le Ct$. C—light speed。From above (1a)，in the very long period after the birth-time t_m, the relationship between R and t was: $\mathbf{R = k_2 t^{1/2}}$, but R was not directly proportional to t. When t reduced 4 tines, R only reduced 2 times。It is said，once t went straight back, it could reach a limit, i.e, $R \ge Ct$. At that time t_m, there could not be time enough either to transfer gravity between two close participles, or to transfer gravity from the center of a particle to its boundary, and led all gravitational links broken inside and outside all particles. **Thus, our Universe at its some very earlier time t_m could be impossible to contract its size R continuously to Singularity of $t = 0$, but only disintegrated into innumerably scattered and isolated radiation-particles of no gravity. Thus, t_m might be the birth-time of our Universe; because just at that time t_m , the new particles having combined from energy-matters would recover their gravitational forces inside and outside, they were the cells of our Universe at its birth-time. Since $t_m \neq 0$,** then, $R \neq 0$ at $t = t_m \neq 0$. **What were the newborn particles and what time was t_m?**

【3】。At the time t_m of newborn particles recovering its gravitational links, t_m was the birth-time of our Universe, and it can be confirmed below that, newborn particles were just really $M_{bl} = 2M_{bm} \equiv 2m_p = 2(hC/8\pi G)^{1/2} \equiv 2\times1.09\times 10^{-5}g \approx 2.2\times 10^{-5}g$.[2]

Let d_m—the distance between two neighboring particles, **m** –- mass of a new particle having recovered its gravitational links, **r**—radius of m，**2t** —time needed between two neighboring particles to transfer their gravity, i.e, t_s—Schwarzchild time of m. **C**—light speed, **ρ**—density of m, **H**—Hubble constant. Then,

$$\mathbf{d_m \ge C\times 2t \text{ , i.e, } d_m/2C \ge t, \text{ or } R \ge Ct} \quad (3)$$

Let ρ=density g/cm^3 of m, $\mathbf{m = 4\pi\rho R^3/3}$, (3aa)

H--Hubble constant, i.e, the expanding constant of our Universe everywhere at the same time, $\mathbf{H = V/R = 1/t}$,

From $4\pi\rho r^3/3 = m$, and $m = \kappa T/C^2$,

$$\therefore \quad \mathbf{t^3 \le 3\kappa T/4\pi\rho C^5} \quad (3a)$$

Owing to $\rho = 3H^2/8\pi G = 3/(8\pi Gt^2$ (3ba）

$$\therefore \quad \mathbf{t \le T(2G\kappa)/(C^5),} \quad (3b)$$

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

$$\mathbf{t^{3/2} \le k_1\,(2G\kappa)/C^5, \text{ or } t \le [k_1\,(2G\kappa)/C^5]^{2/3}} \quad (3c)$$

Formulas (3a),(3b),(3c) are all derived from（3），so, t has the equal numerical value。

Now getting the numerical value of t ：firstly, select correspondingly t and T from Planck Era in above **Chapter【1】to find out k_1. Getting $t \approx 10^{-43}$ s, correspondingly, $T \approx 10^{32}$K, and put them into (1a), $Tt^{1/2} = k_1$. Then,**

$\mathbf{k_1} = Tt^{1/2} = 10^{32}\times10^{-43}\text{s} = 3^{1/2}\times10^{10} \approx \mathbf{1.732\times10^{10}}$,

From (3c),

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

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

$\therefore\ t^{3/2} \le [(2\times6.67\times10^{-8}\times1.38\times10^{-16}) / (3\times10^{10})^5] \times 1.732\times10^{10})] = 0.075758\times10^{-74}\times1.732\times10^{10} \approx 0.1312\times10^{-64}$,

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

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

$$\mathbf{\therefore\ t_m \le 0.5563\times10^{-43}s} \quad (3d)$$

It can be seen，$t = t_m$ was the exact time of newborn particles m_m having just recovered its gravitational links, i. e , the birth-time of our Universe 。Correspondingly, $\mathbf{T_m}$ –-temperature of the Universe at time t_m , $\mathbf{m_m}$—**mass of a newborn particle**,

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

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

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

From (3aa)， radius r_m of m_m,

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

$$\mathbf{d_m} = C\times2t = 3.34\times10^{-33}\text{cm}, \quad (3i)$$

$$\mathbf{\therefore\ (d_m \ge 2r_m)} \quad (3j)$$

(3j) shows that, when our Universe returned back to the time t_m, so, t_m was the time of newborn particles having just gathered energy-matters from Planck Era and recovered its broken gravity. Thus, **t_m was the birth-time of our Universe, and m_m were new cells and the most basic unit (particle)** . Density ρ_u of the Universe at t_m,

$$\mathbf{\rho_u = m_m/d_m^3 = 3.02\times10^{92}g/cm^3} \quad (3k)$$

【4】。At the birth-time t_m of our Universe, 2 newborn particles $2m_m$ could easily combine to $M_{nl} = 2m_m$, and recover its gravity, M_{bl} were just really minimum BHs. In Planck Era, $m_m = M_{bm} = m_p = (hC/8\pi G)^{1/2} = 1.09\times10^{-5}$g. Comparing the numerical values of their parameters in Figure 1 below:

From figure 1 below, in reality, newborn particles **$m_m \equiv M_{bm} \equiv m_p$.** The differences of numerical values between their parameters are caused from the tolerances calculated from k_1 in (3cb)、m_m 、t_m 、T_m and r_m, etc。

Figure 1：Comparisons to parameters between M_{bm}, m_p and m_m

m_m--just getting gravity	M_{bm}–minimum BH	m_p-Planck P.[2]
$m_m = 1.125\times10^{-5}$g	$M_{bm} = 1.09\times10^{-5}$g	$m_p = 1.09\times10^{-5}$g,
$t_m = \pm0.5563\times10^{-43}$s	$t_{bm} = 0.539\times10^{-43}$s	$t_p = 0.539\times10^{-43}$s,
$T_m = 0.734\times10^{32}$k	$T_{bm} = 0.71\times10^{32}$k	$T_p = 0.71\times10^{32}$k,
$r_m = d_m/2 = 1.67\times10^{-33}$cm	$R_{bm} = 1.61\times10^{-33}$cm	$L_p = 1.61\times10^{-33}$cm

【5】。Where could all energy-matters forming newborn particles of our Universe come from? According to the principle of time symmetry and energy-matters conservation, the possible and sole hypothesis in this article was having a Pre-universe, which had a final 'Big Crunch' before our Universe birth and created countless old particles $m_m = M_{bm} = m_p$. Just those 3 states of $m_m = M_{bm} = m_p$ of Pre-universe could immediately explode and disintegrate into γ–rays in Plank Era, and stop the collapse of Pre-universe going onto Singularity, because m_m could have no time enough to transfer gravity each others.

The explosions of countless old particles m_m in Planck Era might be so-called 'Big Bang' for creating our Universe. **(A).** Just the 'Big Bang' could certainly lead the 'phase change' of Pre-universe from collapse into expansion and stop the collapse going onto Singularity. **(B).** Just the 'Big Bang' could certainly lead density lowered in Planck Era, and let a little bigger new BHs forming into stable cells M_{bl}= $2M_{bm}$ of our new Universe. **(C).** Just the 'Big Bang' could certainly let all remains as the energy-matters to form into new particles of $m_m = M_{bm} = m_p$ and recover their gravitational links each others at the highest density of 10^{92}g/cm^3 in Planck Era. The countless newborn particles M_{bl} having just recovered their gravitational links were just the cells and birth of our Universe,

Conclusion: Above 3 results of the 'Big Bang' of Pre-universe in Planck Era could provide the full and necessary conditions for the birth of our new Universe.

What conditions let new particles m_m of our Universe to be born and grow up? We know, in Planck Era of the highest density of 10^{92}g/cm^3, radiations (energy) and particles (matter) would non-stop annihilate 、compose and transform each others with extremely high speed . Therefore, the remains of Pre-universe reforming into new particles m_m and M_{bl} were the certain results. Furthermore**, if only new particles M_{bl} combined by $2m_m$ had lifetime enough longer than its Compton time,** M_{bl} would certainly become into new minimum BHs because of the extremely high pressure and density. The key problem was under what conditions the newborn particles M_{bl} could grow bigger and bigger. According to Hawking lifetime τ_b formula of BHs, Compton time t_{bc} of new particle $M_{bl} = 2m_m$,

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

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

Obviously, only in case $\tau_b > t_{bc}$, i.e, $10^{-27} M_b^3 > R_b/C$, from(1c) of Chapter I, new particles could form into minimum BHs--$M_{bl} = 2m_m = M_b$ and grow bigger and bigger. Then,

$$M_b = M_{bl} = 2m_m = 2.2\times10^{-5}\text{g} \ (\approx 2\ M_{bm}) \quad (5c)$$

τ_{bl}—lifetime of M_{bl}. $t_{sl} = R_{bl}/C = 10^{-43}$s

$$\tau_{bl} = 10^{-27}(2.2\times10^{-5})^3 = 1.06\times10^{-41}\text{s} > t_{sl} \quad (5d)$$

Owing to the 'Big Bang' caused from all old particles m_m of Pre-universe, the universal space would expand and the density become lower, it could easily lead to form the bigger new BHs--$M_{bl} = 2m_m \approx 2M_{bm} = m_p = 2.2\times10^{-5}$g. After that, M_{bl} would non-stop combine each others and become bigger and bigger BHs, because they closely pasted together at the circumstance of extremely high density, and $\tau_{bl} >> t_{sl}$.

The non-stop combinations of countless $M_{bl} \approx 2M_{bm} \approx 2.2\times10^{-5}$g created the 'Original Inflation' and the continuous expansion of our Universe up to present.

As a result, only the new minimum BHs--$M_{bl} = M_b \approx 2M_{bm} \approx 2.2\times10^{-5}$g formed with the longer lifetime than its Compton(=Schwarzchild t_{bl}) time could grow bigger and bigger and their continuous combinations created a present expansive cosmic-BH.

Comparing $M_{bl} = 2m_m = M_b \approx 2M_{bm} = 2m_p \approx 2.2\times10^{-5}$g with formula (1p) in Chapter I, new BHs of $M_{bl} = M_b \approx 2M_{bm} \approx 2.2\times10^{-5}$g were the stable cells forming our Universe.

【6】。It is proved below that，our Universe will have been a really and completely cosmic-BH（CBH）。The expansion of our Universe has been the continuous combination of countless original $M_{bl} = 2m_m = 2M_{bm}$. Hubble law just reflects that expansion caused from the combination of countless $M_{bl} = 2m_m = 2M_{bm}$, and from engulfing energy -matters from outside. The flatness ($\Omega = \rho_r/\rho_o \approx 1$) of our Universe is just the essential nature of any BH. So, $\Omega = \rho_r/\rho_o \neq 1$ was just the false proposition of EGTR.

1*. Many reliable and precise numerical values observed by some modern astronomical telescopes

testified that, our Universe can be a really cosmic-BH (CBH).

（A）, The real and **precise age A_u** of our Universe is, **$A_u = 137\times 10^8$ years**, then , its radius $R_u = C\times A_u = 1.3\times 10^{28}$ cm, its density is, $\rho_u = 3/(8\pi G A_u^2) = 0.958 \times 10^{-29}$ g/cm^3. so, now the total mass of CBH is**, $M_u = 8.8\times 10^{55}$g.**

（B）**.** The reliable Hubble constant observed is , **$H_o = (0.73\pm0.05) \times 100 kms^{-1}Mpc^{-1}$**, thus, the real density calculated is, $\rho_r = 3H_o^2/(8\pi G) \approx 10^{-29}$g/cm^3, and the age A_r of CBH is , $A_r^2 = 3/(8\pi G\ \rho_r)$, $\therefore A_r = 0.423 \times 10^{18}$s $= (134\pm6.7) \times 10^8$ years。As a result，the total mass of CBH is, **$M_r = 8.6\times 10^{55}$g $\approx 10^{56}$g。**

It can be seen, the numerical values observed from two different ways are exactly the same. It shows that, our Universe is a real and definite ball of real BH**. For convenient calculations below,** let our Universe has, $M_u = 8.8\times 10^{55}$g, age $A_u = 137\times 10^8$ years, radius $R_u = 1.3\times 10^{28}$ cm, density $\rho_u = 0.958 \times 10^{-29}$ g/cm^3.

2*. Suppose our Universe was a gigantic cosmic-BH (CBH), according to the law of energy-matters conservation, its total mass must certainly come from the combinations of countless original minimum BHs ($m_m = M_{bm} = m_p$) . In addition, from【3】in Chapter I, the combinations of countless $M_{bl}=2M_{bm}$ must non-stop combine and become our CBH.

Let known numbers from above: $M_{bm} \equiv m_p = 1.09\times 10^{-5}$g, its $R_{bm} = 1.61\times 10^{-33}$cm, its $T_{bm} = 0.71\times 10^{32}$k, its Hawking radiaions $m_{ss} = 1.09\times 10^{-5}$g. $\rho_{bm} \approx 10^{92}$g/cm^3

Let N_{bu} be numbers of $N_{bu} = M_u / M_{bm}$。If the calculations below **adopting $M_{bl} \approx 2M_{bm}$,** it is the same results with M_{bm}.

$$N_{bu} = M_u/M_{bm} = 8.8\times 10^{55}/1.09\times 10^{-5} = 8.0734\times 10^{60} \quad \textbf{(6a)}$$

If our Universe M_u is really composed from $N_{bu}\times M_{bm}$, so, according to Schwarzchild formula of BHs, its R_{bu} must be $N_{bu}\times R_{bm}$,

$$N_{bu} = R_u/R_{bm} = 1.3\times 10^{28}/1.61\times 10^{-33} = 8.075\times 10^{60} \quad \textbf{(6b)}$$

(6a) = (6b) is fully and clearly testified that, our Universe M_u is the complete combinations from $N_{bu}\times M_{bm}$, and is a real CBH。

3*. Applying Hubble law to the Event Horizon R_u of our UBH,

Then. $M_u = 4\pi\rho_o R_u^3/3 = 4\pi(3H_0^2/8\pi\ G)C^3\ t_u^3/3 = 4\pi(3H_0^2/8\pi\ G)C^3 t_u/3H_0^2 = C^3\ t_u/2\ G = C^2\ R_u/2\ G$ **(6c)**

From Schwarzchild law，$2G\ M_b = C^2\ R_b$

$M_b = R_bC^2/2\ G = C^3\ t_{bu}/2G = R_{bu}C^2/2\ G$ **(6d)**

Owing to $t_u = t_{bu}$, $R_{bu} = R_u$, $M_u = M_b$, and (6c) = (6d). it is also proved that, our Universe is a real gigantic cosmic-BH. Then, Hubble law reflecting the expansion is just the expansive law of our Universe caused from engulfing energy-matters or from combinations of countless $N_{bu} \times M_{bm}$. Once no energy-matters outside engulfed, our Universe will stop its expansion, and Hubble law can be invalid**.**

4*. As for the flatness of our Universe, i.e ($\Omega = \rho_r / \rho_o \approx 1$). The density ρ_o of any BH is only and solely decided by its mass M_b. Our Universe as a real CBH is a gigantic close ball. Then, ($\Omega = \rho_r / \rho_o = 1$) is the essential property of our CBH. Scientists arguing about whether ($\Omega = \rho_r / \rho_o = 1$ or < 1 or > 1) was a false proposition for over 60 years, due to Freidmann model being a unreal proposition.

Owing to the false proposition of ($\Omega = \rho_r / \rho_o \neq 1$), it let many scientists proposed many new wrong viewpoints, such as finding 'the lost energy-matters in the Universe', 'zero point energy', 'dark energy', etc. It can be clearly seen from (6a) and (6b)，our cosmic-BH (CBH) has not increased or decreased in its energy-matters any more.

5*。 From (1n) of Chapter I, For any BHs, $\rho_b R_b^2 = 3C^2/(8\pi G) =$ constant. Then, $\rho_{bm}R_{bm}^2 = 10^{93}(1.61\times 10^{-33})^2 \approx 2.6\times 10^{27}$, and $\rho_u(R_u = A_u)^2 = 0.958 \times 10^{-29}(1.3\times 10^{28})^2 = 2.5\times 10^{27}$. Thus, $\rho_{bm}R_{bm}^2 = \rho_u(R_u = A_u)^2$. It test Universe ifies our is a real CBH again.

【7】。In this section, author proposes a new and simple mechanism causing the 'Original Inflation' of our Universe after the beginning of its birth-time. The mechanism of 'Original Inflation' should be the sudden and voilent space expansion created from the combinations of countless newborn $N_{bu}\times M_{bm}$, The concluded time t_o of 'Original Inflation' should be the time of all M_{bm} ($N_{bu}\times M_{bm} = M_u$) linking together in the whole Universe (CBH).

According to above statements to new mechanism, the total mass of our CBH, $M_u = 8.8\times 10^{55}$g, it came from the combinations of ($N_{bu} = 8\times 10^{60}$) $\times$ ($M_{bm} \equiv m_p = 1.09\times 10^{-5}$)。Let t_o be the concluded time of Original Inflation, so, t_o was just the time of all M_{bm} ($N_{bu}\times M_{bm} = M_u$) linking together in whole CBH , **If t_{bmc} was Compton time and Schwarzchild time of a newborn M_{bm} , its $t_{bmc} = R_{bm}/C = 1.61\times 10^{-33}/3\times 10^{10} = 5.37\times 10^{-44}$s,** then, (2 or 3) $\times\ t_{bmc}$ showed the time needed by all $N_m\times M_{bm}$ connecting together. $R_{bm} = 1.61\times 10^{-33}$cm.

1*. Suppose light(gravity) went through $2\times t_{bmc}$ of a M_{bm}, and $N_{m2}\times M_{bm}$ would be connected together, then,

$$N_{m2}\ R_{bm}^3 = (2R_{bm})^3,$$

$$N_{m\,2} = 8 \quad \textbf{(7a)}$$

(7a) shows, the gravity of a M_{bm} could connect other 8 M_{bm}, while time of M_{bm} from t_{bmc} prolonged to 2

t_{bmc}. Thus, how long time needed by a M_{bm} connecting all $N_{bu} \times M_{bm}$ to a whole? $N_{bu} = 10^{56}$g is a known number below,

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

(7b) shows，after the gravity of a M_{bm} went through time of $\mathbf{2^{67.5} \times t_{bmc}}$， all N_{bu} ($=8^{67.5} \approx 10^{61}$) $\times M_{bm}$ could link together to a 'original universal packet of $M_u = N_{bu} \times M_{bm}$'.

$$\mathbf{(2^{67.5}) \approx (10^{20.3}),\quad let \quad n_{o2} = 10^{20.3}} \quad \textbf{(7c)}$$

Now, seeking N_{m3} with the same method above,

$$\mathbf{N_{m3}\, R_{bm}{}^3 = (3R_{bm})^3,\ \square\ N_{m3} = 27} \quad \textbf{(7d)}$$

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

$$\mathbf{\underline{n_o = n_{o2} = n_{o3} \approx (10^{20.3})}} \quad \textbf{(7e)}$$

From (7a) and (7d), after a M_{bm} connected other $8\times M_{bm}$，its volume would prolong to 8 times，i. e, $8 = 2^3$ times。 At the same time, from (7d), its volume would also prolong to $27 = 3^3$. As a result, it led much more than 2^3 M_{bm} to be connected. It is said，after t_{bmc} prolonged to 2 t_{bmc}，the numbers connecting M_{bm} were not only 2^3, but probably $(2^3)^3 = 2^9$. Similarly，the numbers connecting M_{bm} were 3^9, while t_{bmc} prolonged $3t_{bmc}$,

It can be known from (7c) and (7e)， no matter how many M_{bm} could be connected together at one time, the time needed by connecting all $N_{bu} \times M_{bm} = M_u$ would be the same, i. e, $10^{20.3}$ s。From (7a) and (7d)， owing to the combinations of $N_{bu} \times M_{bm}$ creating the sudden and violent space expansion, it was just the reason causing 'Original Inflation' at the beginning of the birth-time of our Universe,

With the same method to seek the general law of n_o times of t_{bmc} -- $n_o \times t_{bmc}$,

$$\mathbf{Let\quad N_{mn} = n_o^9,\quad and\quad n_o = 10^x} \quad \textbf{(7f)}$$

$$\mathbf{However,\quad N_{bu} \approx 10^{61},\ 10^{61} = 10^{9x}} \quad \textbf{(7g)}$$

$$\mathbf{Let\ x_1 = 61/9 = 6.8,\ \square\ \underline{n_{o1} = (10^{6.8})}} \quad \textbf{(7-1a)}$$

n_{o1} in（7-1a）was the times of $n_{o1} \times t_{bmc}$ under the condition of"**Original Inflation**"。Now, according to the principle of (7e) , another x_2 and n_{o2} under the condition of "**Violent Space Expansion**" might be existent。

$$\mathbf{x_2 = 61/3 = 20.3\ \square\ n_{o2} = 10^{20.3}} \quad \textbf{(7-1b)}$$

$$\mathbf{\underline{n_{o2} = n_{o1}{}^3\ or\quad n_{o2} = 10^{13.5}\, n_{o1}}} \quad \textbf{(7-1c)}$$

2*。(7-1a) and (7-1b) are testified that, there would be two ways to connect all $N_{bu} \times M_{bm} = M_u$ together to form a whole 'original universal packet'. No matter which expansive way was, the concluded time t_{o1} or t_{o2} of 'Original Inflation' or 'Violent Space Expansion' was only decided by the total mass M_u of our Universe.

A.: The concluded time t_{o1} of **'Original Inflation',**

$$\mathbf{t_{o1} = t_{bmc} \times n_{o1} = \underline{5.37\times10^{-44}} \times 10^{6.8} = 10^{-36.5}s。} \quad \textbf{(7-2a)}$$

B. The concluded time t_{o2} of **'Violent Space Expansion':**

$$\mathbf{t_{o2} = t_{bmc} \times n_{o2} = \underline{5.37\times10^{-44}} \times 10^{20.3} = 10^{-23}s} \quad \textbf{(7-2b)}$$

$$\mathbf{t_{o2}/t_{o1} = n_{o2}/n_{o1} = 10^{-23}/2\times10^{-36.5} = 10^{13.5}} \quad \textbf{(7-2c)}$$

3*. From (7-1a) and (7-1b) to (7-2a) and (7-2b), it seems to be inferred that, there might be two ways of "Inflation". **[A]。** The first way was "Original Inflation" in accordance with (7-1a) and (7-2a), its expansive time was from $t_m = \underline{5.37\times10^{-44}}$s of the birth-time to $t_{o1} = 10^{-36.5}$s, but its expansive effect reached the same result with ($t_{o2} = 10^{-23}$s) of 'Violent Space Expansion', it is said, the Event Horizon of CBH at the time of $10^{-36.5}$s reached the same Event Horizon of ($t_{o2} = 10^{-23}$s). However, in the period from $t_{o1} = 10^{-36.5}$s to $t_{o2} = 10^{-23}$s, the CBH seemed to have no expansion. **[B]。** The second way was the 'Violent Space Expansion' in accordance with (7-1b) and (7-2b), its time was from $\underline{5.37\times10^{-44}}$s successively to $t_{o2} = 10^{-23}$s. The Event Horizons above two ways reached the same numerical value at the different time of $t_{o1} = 10^{-36.5}$s and $t_{o2} = 10^{-23}$s. **[C].** From $t_{o2} = 10^{-23}$s up to the present, the expansion of CBH was regular and accorded with Hubble law due to the combinations between a lot of small BHs growing bigger and bigger.

Conclusion: The concluded time $t_{o1} = 10^{-36.5}$s and $t_{o2} = 10^{-23}$s of Original Inflation were almost equal to the numerical values observed by NASA/WMAP。

4*. According to the calculations to the 'Original Inflation' by Prof. Su Yi in chapter 12.7 of his book 《An Introduction to New Astronomy》[6] he applied（1a）above **, $\mathbf{R = k_1 t^{1/2}}$**, R—characteristic size of our Universe , t—characteristic time(age), his calculated results were: at $t = 10^{-36}$s，the size R_{-36} after 'Original Inflation, $R_{-36} = 3.8$ cm，

$$R_{-36} = 1.83\times10^{25}\text{cm}\times(10^{-36}\text{s})^{1/2}/(7\times10^5\times3.156\times10^7\,\text{s})^{1/2} = 3.8\text{cm}\ [5] \quad \text{(7-4a)}$$

Owing to $M_u = 10^{56}$g, at $R_{-36} = 3.8$cm, the density ρ_{-36},

$$\mathbf{\rho_{-36} = 3M_u/(4\pi R_{-36}{}^3) = 4.4\times10^{53}g/cm^3} \quad \textbf{(7-4b)}$$

$$\mathbf{However,\ R_{-44}\ of\ M_u = (3M_u/4\pi\rho_u)^{1/3} = 10^{-13}\ cm} \quad \textbf{(7-4c)}$$

$$\mathbf{R_{-36}/R_{-44} = 3.8/10^{-13} = 3.8\times10^{13}} \quad \textbf{(7-4d)}$$

Prof. Su Yi said in his book: 'The results of 'Original Inflation' from $R_{-44} = \square\ 10^{-13}$ cm to $R_{-36} = 3.8$cm , i. e, from $t = \underline{5.37\times}\ 10^{-44}$s to $t = 10^{-36}$s, $R_{-36}/R_{-44} = 3.8\times10^{13}$, and its volume was increased to 10^{40} times,' The above data might be a typical case.

5*. Let's compare data calculated by author with data of Prof. Su Yi above.

Let M_{-23} and R_{23} were mass and radius of the Event Horizon(EH) of small BHs (M_{-23}) forming CBH at the time $t_{o2} = 10^{-23}$s. then,

$$\mathbf{R_{-23} = C\,t_{o2} = 3\times10^{10}\times10^{-23}s = 3\times10^{-13}cm} \quad \textbf{(7-5a)}$$

From(1c) of Chapter I,

$$\mathbf{M_{-23} = 0.675\times10^{28}\,R_{-23} = 2\times10^{15}\,g} \quad \textbf{(7-5b)}$$

Let $R_{b\text{-}23}$ be EH—$R_{b\text{-}23}$ of CBH(M_u) at the time $t_{o2} = 10^{-23}$s, so, $M_u/M_{b\text{-}23} = R_{b\text{-}23}^3/R_{-23}^3$,

$R_{b\text{-}23}^3 = 10^{56}/(2\times10^{15})\times(3\times10^{-13})^3$, so,

$$\mathbf{R_{b\text{-}23} = 11cm} \quad \textbf{(7-5c)}$$

Owing to Prof. Su Yi's data being $R_{-36} = 3.8$ cm at the time 10^{-36}s, but author's data are $R_{b\text{-}23} = 11\text{cm} = R_{b\text{-}36.5}$ in case of 'Original Inflation'. What time is $t_{o1\text{-}36}$ in my case of $R_{b\text{-}23} = 3.8$ cm? because $t_{o1\text{-}36}/t_{o1} = (R_{-36} = 3.8)/(R_{-36.5} = 11)$, so,

$$\mathbf{t_{o1\text{-}36} = 10^{-37}s} \quad \textbf{(7-5d)}$$

Conclusions: [A]. It can be known from (7-5d), according to author's new mechanism and corresponding calculations to 'Original Inflation', the 'Inflation' of CBH should reached $R_b = 3.8$cm at the time-- $t_{o1\text{-}36} = 10^{-37}$s, but not 10^{-36}s. **[B].** Author precisely calculated out the time of 'Original Inflation' might be from $t_m = 5.37\times10^{-44}$s of the birth-time to $t_{o1} = 10^{-36.5}$s, and the concluded time $t_{o1} = 10^{-36.5}$s of 'Original Inflation', as well as the radius $R_{b\text{-}23}$ of EH of CBH expanded to $R_{b\text{-}23} = 11$cm. **[C].** If Prof. Su Yi's data and calculations above was o.k, it indicated that, the first way of "Original Inflation" accorded with the really condition at the beginning of the birth-time of our Universe.

【8】. To recognize our comical BHs (CBH) from the evolution of 7 different typical BHs。In Figure 2, the extremely harmonious and precise relationships between all numerical values of different parameters of various BHs in the Universe can confirm that, the new BH's theory and the new cosmogony proposed by author in this article are rather identical and effective.

From above statements, once newborn $2M_{bm}$ appeared in Planck Era, they could pasted closely at the highest density of 10^{92}g/cm^3. Their combinations would cause sudden and violent space expansion, i.e, **'Original Inflation' from the birth-time of $t_m = 5.37\times10^{-44}$s to 10^{-23}s**. In that period, owing to the continuous combination of minimum BHs--$2M_{bm}$, they could grow up to mini BHs of 2×10^{15} g. After that, mini BHs had to continuously combine and grow up, and finally become a gigantic cosmic-BH at present. For recognizing the nature of our cosmic-BH, 7 typical BHs with the numerical values of their parameters were listed in Figure 2 below.

In Figure 2: M_b—mass of a BH, **R_b**—radius of EH of a BH; **T_b** –temperature on EH; **τ_b** —lifetime; **ρ_b**—average density; **m_{ss}**—mass of Hawking radiation; **their numerical values are got from formulas (1a), (1b) , (1c), (1d), (4c), (5a) of Chapter I。**

$$\mathbf{Let\ n_i = M_b/m_{ss}} \quad \textbf{(8a)}$$

Wave length λ_{ss} of m_{ss} ; $\mathbf{\lambda_{ss} = Ch/(2\pi m_{ss}C^2)}$, owing to $m_{ss}C^2\times2t_s = h/2\pi = I_o$, so,

$$\mathbf{\lambda_{ss} = 2Ct_s = 2R_b,\ frequency\ \nu_{ss} = C/\lambda_{ss}} \quad \textbf{(8b)}$$

$$\mathbf{t_s = R_b/C} \quad \textbf{(8c)}$$

$$\mathbf{E_r = m_{ss}C^2} \quad \textbf{(8d)}$$

Owing to $\tau_b = 10^{-27}M_b^3$, so, $-d\tau_b = 3\times10^{-27}M_b^2dM_b$。 **if let $dM_b = 1\ m_{ss}$**, and $-d\tau_b$ was just the time gap needed by emitting 2 neighboring m_{ss}。

$$\mathbf{-d\tau_b \approx 3\times10^{-27}M_b^2dM_b = 3\times10^{-27}M_b\times M_bm_{ss} \approx 0.356\times10^{-36}M_b} \quad \textbf{(8e)}$$

I_o is information unit of m_{ss}, i.e, the minimum unit of information = 1 bit。 Then, the information unit I_o of all m_{ss} is equal to, $I_o = h/2\pi$. □□and not decided at all by mass of M_b or m_{ss}。 I_m –the total information amount of a BH , $I_m = 4GM_b^2/C$ (63d).

Various numerical values in Figure 2 are the abundant treasure-house and extremely harmonious. They fully show that, the expansion and evolution of out Universe has been the result of the continuous combinations and growth of original countless $M_{bl} = 2M_{bm}$ as derivation and calculations by author.

§1。In Figure 2, it shows the continuously expansive history of our Universe as a cosmic-BH in 137×10^8years. In the expansive process of BHs, they grew up successively from #1M_{bm} of 10^{-5}g ⇒ #2 ⇒#3 ⇒#4 ⇒#5 ⇒#6 ⇒#7 our cosmic-BH(CBH) of 10^{56}g. Any one of 7 BHs would have some special significances.

§2。From #1 ~ #6, the original BHs would be impossible to exist in our Universe, because in the evolution process from 10^{-44} s of Planck Era to about $t_{up} = 4\times10^5$ years of the end of Radiation Era, the diference of energy-matter density in whole space of cosmic-BH varying from 10^{92}g/cm^3 to $\rho_{bu} = 10^{-20}$g/cm^3 was very even.

$$\mathbf{t_{up} = (3/8\pi\,\rho_{bu}G)^{1/2}} \quad \textbf{(8a)}$$

However, the density of #6 BHs--ρ_{b6} $>10^{-1}$g/cm^3。 In the rapidly expansive process of The Universe, uniform energy-matters could have impossible to resist the universal expansion and let original BHs exist and remain in universal space.

After coemic-BH entering Matter-dominated -Era, matters could separate off from radiation energy, the radiation temperature lowered quicker than matter -particles because of cosmic expansion, and led the contractions of matter-particles to become #5、#6 BHs,

they were second-born BHs.

No matter how much mass of a BH is, BHs of the same mass M_b can have the same numerical values of all parameters on their EH--R_b, but the states and structures inside any BH may are very great different.

Figure 2: Numerical values of various parameters of 7 typical BHs on R_b [4]

BHs	# 1 M_{bm}	#2 mini BH -	#3 middle BH-	#4 moon BH-	#5 star BH-	#6 giant BH-	#7 our cosmic BH
M_b (g),	***10^{-5}g***	***10^{15}g***	***2×10^{18}g***	***10^{26} g***	***$6\times10^{33}(3M_\theta)$***	***$10^{42}g(10^9M_\theta)$***	***10^{56}g***
R_b (cm),	1.5×10^{-33},	1.5×10^{-13},	3×10^{-10}	1.5×10^{-2}	9×10^{5}	1.5×10^{14}	1.5×10^{28}
T_b (k),	***0.8×10^{32} ,***	***0.8×10^{12}***	***0.4×10^{9}***	***8***	***1.3×10^{-7}***	***7×10^{-16}***	***7×10^{-30}***
τ_b (s,yrs),	10^{-42}s	10^{10}yrs	8×10^{27}	10^{44}yrs	10^{66}yrs	10^{92}yrs	10^{134}yrs
$\rho_b(g/cm^3)$,	***7×10^{92}***	***7×10^{52}***	***2×10^{46}***	***7×10^{30}***	***1.5×10^{15}***	***7×10^{-2}***	***7×10^{-30}***
m_{ss} (g),	10^{--5}	10^{--24}	10^{--27}	10^{--36}	$1.6\times10^{--44}$	10^{--52}	10^{--66}
ni,	***1***	***10^{39}***	***4×10^{46}***	***10^{62}***	***4×10^{77}***	***10^{94}***	***10^{122}***
λ_{ss}(cm),	3×10^{-33}	3×10^{-13}	6×10^{-10}	3×10^{-2}	1.8×10^{6}	3×10^{14}	3×10^{28}
—$d\tau_b$-(s),	***3×10^{-42}s,***	***3×10^{-21}***	***10^{-18}***	***3×10^{-11}***	***1.7×10^{-3}***	***3×10^{5}***	***10^{12}yrs***
ν_{ss} (s^{-1}),	10^{43}	10^{23}	0.5×10^{20}	10^{12}	0.17×10^{5}	10^{-4}	10^{-18}
t_s (s),	***0.5×10^{-43}***	***0.5×10^{-23}***	***10^{-20}***	***0.5×10^{-12}***	***3×10^{-5}***	***0.5×10^{4}***	***0.5×10^{18}***
E_r(erg),	10^{16}	10^{-3}	10^{-7}	10^{-15}	10^{-23}	10^{-31}	10^{-45}
t_c (s),	***0.6×10^{-43}***	***0.6×10^{-24}***	***0.6×10^{-21}***	***0.6×10^{-12}***	***0.6×10^{-4}***	***0.6×10^{4}***	***0.6×10^{18}***
I_m (I_o),	I_o	10^{39} I_o	$4\times10^{46}I_o$	10^{62} I_o	$4\times10^{77}I_o$	$10^{94}I_o$	10^{122} I_o

§3。#1 minimum BH of $M_{bl} = 2M_{bm} = 2{,}2\times10^{-5}$g. They were the original cells of our Universe. The successive combinations of countless $2M_{bm}$ created the 'Original Inflation' and non-stop expansion of our cosmic-BH. After no energy-matters to be engulfed outside, our Universe will lastly go to contract to M_{bm} and disappear in Planck Era. That will be a complete life-death circle of our Universe.

§4。#2 mini BHs or so-called original mini BH, M_{bom} ≈ 10^{15}g, its lifetime ≈ the age of our Universe. In 1970s, Hawking predicted, M_{bom} might exist in universal space, however, they could not be found by scientists for more 10 years. M_{bom} ≈ 2×10^{15}g were BHs of 'Original Inflation' at its concluded time. Mass of a m_{ss} of M_{bom} ≈ mass of a proton, Mass of a M_{bom} ≈ mass of 10^{39} proton . 10^{39} was the large number of Dirac's hypothesis.

§5。 #3 middle BHs, its mass ≈ 10^{19}g: mass of its HQR--m_{ss}, m_{ese} ≈ 10^{--28}g ≈ mass of a electron。

§6。#4 moon BHs, its mass ≈ 10^{26}g; Temperature on its R_b, T_b ≈ 2.7 k, ≈ temperature of microwave background of radiations(MBR) of our Universe. It is said, if there could be a isolated BH of mass <10^{26}g in universal space，it would emit $m_{ss} > 10^{--36}$g to outside and contract its size R_b; if its mass > 10^{26}g, it would absorb in radiation energy from universal space and expand its size R_b. Although their final destiny would be the same to become $M_{bm} = m_p$ and disappear in Planck Era, but their lifetime could be very different.

§7。 #5 star BHs, their mass $M_b \approx 6\times10^{33}g(3M_\theta)$ or more. They could just be second –birth and real objects existing in universal space after the beginning of Matter-dominated Era of our Universe. After nuclear fusion having finished and through supernova explosion, the remnants of the original stars of mass > $8M_\theta$ might become a star BH of mass ≈ $3M_\theta$.. Besides, if a neutron star could engulf energy-matters outside or collide with its companion-white dwarf (or another neutron star), it might also become a star BH of mass ≈ $3M_\theta$. Then, $3M_\theta$ is so-called Oppenheimer-Volkoff limit.

However, those two conditions are just the theoretical inference, but no real observations can be as reliable evidences.

Their lifetime >10^{66} years. Temperature on R_b, $T_b \approx 10^{--7}$k. Their Hawking radiations are very weak, $m_{ss} \approx 10^{--44}$g. They most hide in bi-stars system.

§8；#6 Giant BHs, mass $M_b \approx (10^7 \sim 10^{12})\ M_0$: They can exist in the center of star clusters and galaxy. They will increase in its mass and grow bigger, due to much energy-matters outside to be absorbed. Stars and star BHs might be in #6 Giant BHs. They might be formed in the earlier period of Matter-dominated Era. **Quasars might be the childhood of giant BHs.** Their lifetimes will be > $10^{76\sim101}$ years.

§9；#7 Our gigantic cosmic-BH(CBH), its mass M_{bu}

$\approx 10^{56}$g. It is testified that our Universe has been a real BH, i.e, CBH. If no energy-matters outside to be engulfed, our CBH could non-stop emit Hawking radiations m_{ss} up to become $M_{bm} = m_p$ to explode in Planck Era, the lifetime may be about 10^{134}years. If having energy-matters outside, they can be thoroughly engulfed by our CBH afterwards. After that, CBH will contract its size due to emitting m_{ss} non-stop; finally, it become $M_{bm} \approx 10^{-5}$g and vanish in Planck Era**.** However, its lifetime must $>>10^{134}$years。The destiny of our Universe as a BH will be completely difference with the forecast of General Theory of Relativity.

Its Hawking radiation $m_{ss} \approx 10^{-66}$g. Emitting a m_{ss} may need 10^{12} years. That time may be longer than 100 times age of our Universe.

§10；m_{ss} of different BHs have greatly different properties.

A.; #1 minimum BHs-- $M_{bm} = m_p$ could only explode in Plank Era, and create γ-rays of the highest energy in Planck Era**.**

B； m_{ss} emitted by #1 minimum BHs ~ #2 mini BHs of 10^{15}g ： m_{ss} could be γ-rays from the highest energy to bigger energy than $p_m = 1.66\times10^{-24}$g of mass of a proton**.**

C； m_{ss} emitted by #2 mini BHs of 10^{15}g ~ #3 middle BHs of 2×10^{18}g; m_{ss} could be γ-rays from $p_m = 1.66\times10^{-24}$g of mass of a proton to $e_m = 10^{-28}$g of mass of a electron.

D； m_{ss} emitted by #3 middle BHs of 2×10^{18}g ~ #5 star BHs of 6×10^{33}g; m_{ss} are x-rays ~ the longest radio waves, included light waves。

E； m_{ss} emitted by #5 star BHs of 6×10^{33}g ~ #7 our gigantic CBH，m_{ss} may be all gravitational waves。

§11。Comparing the numerical values of parameters between #1 minimum BHs of $M_{bm} = m_p = 10^{-5}$g and #7 our gigantic CBH of $M_{bu} \approx 10^{56}$g below：

Mass ratio; $M_{b7}/M_{b1} = 10^{56}/10^{-5} = 10^{61} = n_i$;

Ratio of radius of EH;

$R_{b7}/r_{b\,1} = 1.5\times10^{28}/1.5\times10^{-33} = 10^{61}$,

Ratio of Schwarzchild time;

$t_{s7}/t_{s1} = 0.5\times10^{18}/0.5\times10^{-43} = 10^{61}$;

Ratio of temperature on R_b;

$T_{b7}/T_{b1} = 7\times10^{-30}/0.8\times10^{32} = 10^{-61}$,

Lifetime ratio; $\tau_{b7}/\tau_{b7} = 10^{142}/10^{-42} = 10^{184}$;

Ratio of m_{ss} mass; $m_{ss1}/m_{ss7} = 10^{-5}/10^{-66} = 10^{61}$,

Ratio of m_{ss} numbers-ni;

$ni_7/ni_1 = 10^{122}/1 = 10^{122}$;

Ratio of total information amount;

$II_{m7}/I_{m1} = 10^{122}/1 = 10^{122}$

Time ratio of emitting a m_{ss};

$-d\tau_{b7}/-d\tau_{b1} = 3\times10^{19}/3\times10^{-42} = 10^{61}$

§12。Some other conclusions to our CBH：

A； It can be known from §11 that, ratios of all numerical values proportional to mass M_b of BHs are 10^{61}, ratios of all numerical values proportional to mass M_b^2 are $10^{61\times2} = 10^{122}$, and ratios of M_b^3 are 10^{184}. Thus. it is exactly testified once more that, **our present CBH should exactly come from the combinations of $N_{bu}\times(M_{b1} = M_{bm} = m_p)$.**

The same mass of all BHs can have the completely same numerical values of all parameters on their EHs--R_b, and have the completely same properties, but the states and structures of every BH inside may are completely different. The relationships of all numerical values of each BHs parameters are very identical and harmonious, it may strongly prove that, all new concepts、formulas and conclusions are all right.

B； In 1998, two scientist groups of Australia and America discovered the accelerating expansion of our Universe through their observation to the explosion of remote super-star Ia. The accelerating expansion appeared about 9×10^9years ago. The main stream of present scientists proposed that, dark energy of exclusive force appeared in our Universe 9×10^9 years ago and led our Universe creating accelerating expansion. Their hypothesis may be hardly observed and testified. According to that, BHs in the process of accelerating engulfing energy-matters outside would cause the accelerating expansion, author proposed a simple hypothesis, that our CBH might collide and combine with another CBH about 9×10^9years ago. Author's explanations and calculations may provide another visual angle to recognize our CBH. According to the fact of accelerating expansion, it shows the real existence of multi-universes. [9]

C: In this article, author derived out formula(1d), and applied 3 simple formulas—(1a)、(1c) and (1d) to research the changes of 4 BH parameters—M_b, R_b, T_b, m_{ss} on R_b of BHs, they are all excellent ideas to clearly know the changes and destiny of any BH. Many impoatant formulas and conclusions may be got by author. It is unnecessary for studying the changes of BHs to research the complicated structures and states inside and outside BH, thus, solving the complicated problems of BHs and cosmology with ETGR would certainly meet with inevitable defeat.

====The End====

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