**The Originative Blackhole-Cosmology**

**==From now on, the Black Hole Theory and Cosmogony may be better integrated==**

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**Descartes：We couldn’t rely on other’s authority to accept the truth, which should be sought by ourselves.**

**Abstract：**What is a brand-new blackhole-cosmology? In brief, it would be a new branch of blackhole-theory developed by author, which could better explain and demonstrate the laws from the birth to growth、decline and up to death of our Universe. There are two Chapters in this article.Chapter I: <The new concepts and new formulas of the black-hole (BH) theory>. Chapter II: <The New Concepts and New Researches to Cosmology with New BH-theory >. According to the new concepts and formulas of BHs in Chapter I, they can be applied to better explain and solve many important problems about the origin and evolution of our Universe.

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**Key words：**Hawking theory of black holes (BH); Hawking quantum radiation mss; minimum BH-- Mbm; Planck particles mp; the origin and evolution of our Universe; cosmic-BH; Original Inflation of our Universe; information amount Im of any BH; entropy SB of any BH; minimum information unit—Io;

**【Author’s new and important contributions in this article】：**

**In this article, all concepts, formulas, inferences and conclusions to BH-theory and cosmology in every paragraph and section are newly proposed and derived out by author as follows:**

**1: The exact and new general formula between mss and Mb is simply derived out, i.e, mssMb = hC/8πG =1.187×10--10g2（1d）, which can develop and complete the BH-theory.**

**2:** The author demonstrated exactly the physical significance of (1d), which shows the balance between the gravitational force of Mb to mss and the centrifugal force of mss on Rb.

**3:** Furthermore, according to the axiom of any part ≦its whole , at the limited condition, the exact new formula (1e) is simply derived out**, mss = Mbm = （hC/8πG）1/2 = 1.09×10—5g. Thus,** owing to**（hC/8πG）1/2 ≡ mp.** i.e, Planck particle, [3] the last destiny of all BHs could only **become mss ≡ Mbm ≡mp ≡（hC/8πG）1/2(1e), and disintegrated in Planck Era. So, any BH of Mb could impossibly contract into a Singularity.**

At the same time, since Mb and mss have nothing to do with the structures and states inside BHs**, EGTR (The Equation of The General Theory of Relativity) can be given up from the BH-theory in this article。**

**4:** The essential attribute of any BHs is that, once a BH was formed, it would be a BH forever until it finally becomes mp = Mbm and then disappears in the Planck Era,

**5:** Theauthor proved that, the information unit Io of any Hawking radiation mss is precisely equal **to Io = h/2**π = ** the basic and the smallest information unit**. **Then, Io of any mss is not related to the amount of mss or Mb. The total information amounts Im of a BH of Mb is newly derived, Im = 4GMb2/C (63d)。**

**6:** A new formula of needed time (dτb ) for any BH to emit a mss is derived**, --dτb ≈ 3×10--27MbhC/8πG**

**7: The author proved that, our Universe would be a really and completely gigantic cosmic-BH**. Hubble law could just be the expansive law of our Universe caused from the combinations of new innumerable Mbm= mp**.** For any BH and our Universe as a cosmic-BH (CBH), **≡**is an inevitable result.

**8:** According to the principle of time symmetry, before the birth of our Universe, the Pre-universe supposedly 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 collapsed lastly to time, --tm= [k1 (2Gκ)/C5]2/3 = --0.5563×10--43s, all particles in the Pre-universe would break off their gravitational links, become Planck particles, mp = Mbm,** and disappear in the Planck Era. After that, all the remains of the Pre-universe could reform into new innumerable Mbl = 2mp = 2Mbm at +tm to recover their gravities in the Planck Era at the highest density. The appearance and combinations of countless Mbl would instantly create the ‘Original Inflation’ and the continuous expansion of our Universe afterwards. As a result, The Pre-universe at **--tm could directly reach to our Universe at** +tm through Planck Era, but had no way reach to

**--tm = 0 of Singularity.**

**9:** The Author testified the ‘Original Inflation’ with a new and simple principle.

**10: In Form 2, the extremely harmonious and precise relationships between all data of 7 different BHs in our Universe can confirm in that the new concepts and formulas of the BH-theory and cosmogony proposed by the author in this article are rather identical and effective.**

**【A few words from the author】: My maxim: The genuine scientific knowledge and new ideas may often come from the trivial numerical calculations.** In this article although there are no profound theories nor complicated mathematical equations, the author can only forge ahead a little from some Hawking formulas of BHs with other classical formulas to derive out many new simple and basic but important formulas，such as the formulas (1d), (1e),(63a),(63d), etc and Form 2. Although scholars, experts and professors may not glance at my work in this article I believe, however, that the new formulas and Form 2 can be effective in explaining many important and practical problems in BHs and cosmogony which were unknown in the past, such as that of no Singularity appearance at the birth of our Universe, the origin of our Universe, the destiny of BHs, etc. In addition, those formulas are simple, reliable, harmonious, and are in better accordance with various observational data. Therefore, **let facts testify and judge of which new formulas and concepts gotten by the author in this article will be correct or not in the future.**

**Chapter I: The New Concepts and New Formulas of BH-Theory**

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**==In this article, only Schwarzschild (gravitational) BHs of no charges,**

**no rotating and spherical symmetry will be studied.==**

**【Preface】。**It would not be possible to solve any important problems about black holes and the origin of our Universe with Einstein’s Equation of the General Theory of Relativity **(EGTR),** because its general solutions had no way to be solved. From what Einstein said, his EGTR could be too perfect to have anything added into it. After that, scholars had to find out some special solution to EGTR. For that purpose, they wanted to simplify EGTR and to propose some hypotheses in which two common and important hypotheses were bound to **violate the thermodynamic laws; one was the movement and contraction of equal energy-matters; another was the isobaric universal model of zero pressure. Just those two hypotheses would lead to the appearance of Singularity from solving EGTR, and to other wrong concepts and conclusions,** such as Schwarzschild metric and Freidmann-Robertson-Walker metric, etc,which could be not in accord with the real conditions of our Universe, [6]

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

Laplace (1749--1827) first proposed the concept of Black Holes (BH) in 1796 on his book, ‘The Universal System’. According to the principle of the second universal speed, v2 = (2GMe/Re)1/2 , he supposed that a great star had diameter of 250 **× sun** diameter, and a density of 5.5g/cm3, his calculated result was light as a particle at its boundary, the fleeing speed v2 was extremely approximately equal to light speed C, i.e, v2 = 3.1**×1010cm/s ≈ (C=**3**×1010cm/s**).

In Dec.1915, Einstein’s EGTR was just published and one month later Karl Schwarzschild, a German astronomer, got an precise solution from EGTR, i.e, the famous Schwarzschild formula **(1c)**-- **GMb/Rb = C 2/2, it is the existent condition of any spherical BH of no charges and non-rotating.** **It was the first formula for Black Holes (BHs).** However, according to the above Schwarzschild solution to EGTR, once a black hole (BH) was formed, it could only increase in its mass of Mb with engulfing energy-matters from outside, **and would exist in The Universe forever. It must violate the general law of everything having its life and death in the Universe.** Therefore, it has not been able to solve the important problems in BHs and cosmogony with EGTR for nearly 100 years, except solving a few special examples.

**Hawking theories about BHs have been the epoch-making significances**; they were built on the foundations of quantum mechanics and thermo- mechanics. Hawking proposed that there would be temperature Tb on the Event Horizon (EH) Rb of any BH**,** and on which the **Hawking quantum radiations (HQR) me**e would be emitted to outside. **Most importantly, Hawking derived out the famous temperature Tb formula (1a) on Rb of BHs, i.e, TbMb = (C 3/4G) × (h/2πκ)—(1a),** As a result, BHs could lose its energy-matters Mb, reduce its Rb and disappear at last. It is said, that any BH could be in accordance with the same general law of life and death as anything else in The Universe.

**However, two formulas (1c) and (1a) are still not enough to solve many important problems** about the property and destiny of BHs, because the amount of mss --HQR on the Event Horizon Rb could not be solved by Hawking. He might be over-wholeheartedly busy in finding out mss from virtual particles in Dirac sea. Hawking explanations about BHs to emit mss with virtual particles in Dirac sea would intentionally make a mystery of simple things. He neglected to apply classical theories and formulas.

**The author’s new and most important contributions to BH theories and cosmology are to derive out formulas (1d), i.e, mssMb = hC/8πGand (1e), as they are the other two important formulas to recognize and decide the essence of BH.** As a result, the four parameters (Mb, Rb, Tb, mss) of any BH, if any one of them could be decided, the other three would be precisely calculated out with three formulas-- (1a), (1c) and (1d). **From hence on, the Black Hole Theory and Cosmology may be in more harmony and perfection.**

**【1】。How to derive the new formulas (1d) and (1e), (1d)--mssMb = hC/8πG = 1.187×10-10g2; (1e)--Mbm** ≡ **mp =（hC/8πG）1/2 = 1.09×10—5g:**

**mp –-Planck particles, Mb –-** mass of a BH**, Rb –-**radius of EH of a BH**, Tb**–- temperature on EH (Event Horizon) Rb of a BH**, mss –-** mass of a Hawking quantum radiation--HQR, **h**—Planck constant=6.63×10--27gcm2/s , **C**–-light speed =3×1010 cm/s, **G–-**gravitational constant =6.67×10—8cm3/s2\*g, **κ—**Bolzmann constant **=**1.38× 10—16g\*cm2/s2\*k, **mp–-**Planck participle**, Lp**--Planck length**, Tp**---Planck temperature**, Mbm—**mass ofminimum BH in The Universe**.**

Owing to having temperature Tb on the radius Rb of any BH proven by Hawking, then, (1a) below is the famous Hawking temperature formula.

**Tb Mb = (C 3/4G) × (h/2πκ) ≈ 1027gk [1]  (1a)**

**Let** mss be Hawking quantum radiation (HQR) on Rb; according to formula of energy transformation,

**mss = κTb/C2 [2] (1b)**

 Tb is the valve temperature on Rb.

According to Schwarzschild special solution (1c) from EGTR, (1c) shows any light as energy revolves around on Rb, but would have no way to flee out to the outside of BH.

**GMb/Rb = C 2/2 [2] (1c)**

From (1a) and (1b), (1d) is easily derived，

**mss Mb = hC/8πG = 1.187×10--10g2 (1d)**

** (1d) is a new 、general and effective formula on Rb of any BH**。Since mssMb = constant，**according to the third law of thermo-mechanics,** then certainly Tb ≠ 0，from (1a) Mb ≠0. Thus, from (1c) (1d), Rb ≠0 and mss≠0. Consequently, it is impossible for mss, Mb and Rb to equal to zero or infinity. So then, mss, Rb and Mb must have its respective limit. From (1d)，**according to the axiom of any part ≦ its whole, at the limited condition,** Mb = mss = Mbm = (hC/8πG)1/2. Owing to (hC/8πG)1/2≡ mp= Planck particle,[3] then,（1e）is another new important formula of BH-theory,

**mss = Mbm=(hC/8πG)1/2 =mp =1.09×10--5g (1e)**

**∴mssRb= h/(4πC) (1f)**

**Rbm≡**Lp≡ (Gh/2πC3 )1/2**≡1.61× 10—33cm** [5] **(1g)**

**Tbm ≡T p≡** 0.71× 1032k [5]  **(1h)**

Generally,Compton time t c = Schwarzchild ts**,**

**∴tc=ts=Rbm/C**=1.61×10—33/3×1010**=**

**0.537×10—43s （1j）**

**bm ≈ 1092g/cm3** (1k)

From Mb = 4πρRb3/3 and (1c), for any BHs, (1n) is always a sufficient and necessary condition of all BHs.

**bRb2 = 3C2/(8πG) = constant (1n)**

Theoretically, the last contraction of Mb could only reach to a real minimum BH--Mbl = 2Mbm = 2mp = 2mss = 2×1.09×10--5g ≈ 2.2×10--5g. Then i**n reality, the last existent minimum BHs would be Mbl, but not Mbm, because after the last division of Mbl, it became two mss = Mbm= mp, which could only be Planck particles mp of the highest energy, so then,**

**Mbl =** 2**Mbm ≈ 2.2×10--5g (1p)**

It can be seen from the above formulas, the relationship between **Mb and Rb, Tb, and mss are all the simplest and most linear relationship. Thus, BHs are the simplest objects in The Universe.**

**【2】。Why would the final contraction of any BHs only become mss = Mbm = mp and disintegrate in Planck Era, but would be impossible to contract to become Singularity?**

According to (1d) and（1e），mss = Mbm ≡ mp ≡ (hC/8πG)1/2 = 1.09 × 10--5g，

Owing to that Planck Era could not be understood and observed by people at present or even ever, we would have no way to know the conditions after the disappearance of Mbm= mp. We may only deduce from (1e), **Mbl might be the real minimum BH in The Universe, and Planck participle mp might be the maximum energy-particle appearing in Planck Era. Thus, Mbm= mp might be the ‘critical point’ between our Universe and Planck Era.**

**2-1\*.** Once a BH of Mb contracts its mass into Mbm，it becomes

MbmC2= mss C2 = κTb =1016erg, Tb=1032k (2a)

Mbm C2/ κTb = mss C2 /κTb = 1 (2b)

It can then be seen that Mbm had become a complete energy-ball of 1032k. Then, Mbm= mss of which contains no gravity inside would then explode wholly into -rays of high energy.

**2-2\*。** As mp = Mbm，it was not a BH at all since it had no superfluous energy-matters as mss to be emitted out. Otherwise, it would lead to mss > Mbm，and violate formula (1d)--mssMb = hC/8πG and formula（1e**）.**

**2-3\*。**Owing to Schwarzschild timets of **(**mp = Mbm), ts= 0.537×10—43= Rbm/C = 1.61×10—33/3×1010，then, mp = Mbm could not have enough time to transmit gravities between particles mp = Mbm and inside Mbm , so that it could have been the only way for them to be disintegrated by the highest temperature of 1032k.

**2-4\*. According to Uncertainty Principle，**

E **×** **t ≈ h/2π (2c)**

To Mbm, its MbmC2 = κTb = **1016erg,** its **t** = 2×Schwarzschild time 2ts = 2Rbm/C = 2×1.61× 10—33 /3×1010 = **1.074×10—43s**。

**∴** E**×****t** =1016 ×(2×0.537×10—43)=**1.074 10—27**.

However**, h/2π** = 6.63×10—27/2π =**1.06×10—27**。It is said，if Mbm = mp could reduce its mass again, **it would let** E**×****t < h/2π, and violate Uncertainty Principle.**

**2-5\*;  The information amount Io of Mbm = mp is Io = h/2π = the minimum 、basic information unit and cannot be divided again in The Universe。**

**It can be seen, Mbl (=** 2**Mbm) are BHs, but** Mbm = mp = particles of the highest energy = Planck particles.

**Conclusion:** Any BHs could only emit mss, and reduce its mass finally into Mbl = 2Mbm = 2mp = 2mss, and disintegrate in Planck Era, but impossible to contract its size (Rb) into ‘Singularity’ of infinite density. Thus, the density of 1092g/cm3 and temperature of 1032k of Mbl 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 mp = Mbm = (hC/8πG)1/2 = 1.09×10-5g, 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 --mss to outside in the past**.**

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

**Rb = 2GMb/C2, (1c)**

**∴C2dRb = 2GdMb (3a)**

**C2 (Rb± dRb）= 2G(Mb ±dMb) (3b)**

Suppose another Mba could collide and combine with Mb，then,

**C2Rba = 2GMba**

**From (3a) +（3b）+ (1c)**

**∴C2 (Rb+Rba ±dRb)=2G (Mb+Mba ±dMb) (3c)**

From above formula (3c), when a BH could engulf in energy-matters from outside or combine with another BH, it would increase in its Mb and Rb ，and decrease in its Tb and mss, it would be a real BH too. After a BH emitting its mss to outside，it would decrease in its Mb and Rb, and increase in its Tb and mss, but would remain a BH until it finally becomes **mp = Mbm**。

From (3a), C2dRb = 2GdMb, let dRb/dt = Vb,

**∴ Vb = (2G/C2)( dMb/dt) (3d)**

Vb is the expansive speed of Rb of a BH, it is equal to the proportional increase in total mass of Mb in the unit time-- dMb/dt.

From **(1c) and** (Mb = 4πρRb3/3),

C2 = (8πGρo/3) Rb2 (3e)

Let Ho 2 = 8πGρo/3(3f)

**∴** C = Ho Rb, or V = Ho R (3g)

Let ab =dVb/dt, from (3d),

**∴ ab = dVb/dt = (2G/C2)( d2Mb/dt2) (3h)**

**Conclusion:** It can be known from (3g), while Rb of a BH expanded due to engulfing energy-matters outside and under the condition of the speed of Rb is equal to light speed C, the expansive speed V at any point of R in BH had to accord with Hubble law.

**【4】。The mechanism of BHs of mass Mb to emit Hawking quantum radiation (HQR-- mss). Only with classical theories can the mechanism of BHs to emit mss be correctly explained.**

BHs emitting mss, or mss out from Rb of BHs to outside is the same mechanism with which stars or any hot objects emit radiation energy. They are all the same processes by which higher energy (high temperature) naturally flows to lower energy (low temperature).

**4-1\*. The gravitational force Fbg of mass--Mb to mss and the** **centrifugal** **forc**e Fbc of **mss on the radius Rb.**

**The physical significances of formula (1d).**

**mssMb = hC/8πG = 1.187×10--10g2 (1d)**

From (1d), (right side and left side) **× 2G/Rb2,** thus,

**2GMbmss/Rb2 = hC/4πRb2  (4a)**

Owing to mssMb = const, thus, the gravitational force **Fbg** of Mb to m**ss** is only inversely proportional to Rb2, and does not have anything to do with mass Mb and mss. Let

**Fbg = 2GMbmss/Rb2 (4b)**

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

**Fbc =** **hC/4πRb2 = mss× (C2/Rb) (4c)**

**∴ mss = h/4πCRb (4d)**

**Conclusion:** From (4a), (4b) and (4c), **Fbg** shows the gravitational force of BH of Mb as a concentrative mass to mss revolving around BH on its Rb. Fbc shows the centrifugal force of Hawing quantum radiation—mss on Rb with light speed C, and C2/Rb is just the centrifugal acceleration of (**mss = h/4πCRb)**. **Thus, (1d) may show that the reason why combinations of BHs could lead the expansion of their Rb is just to keep the balance of mss between its Fbs and Fbc.**

Owing to that (4a) comes from (1d), mass Mb should scatter in the whole space of radius Rb, but not concentrate at the center of BH, it is the great difference between EGTR and Newton mechanics. Thus,

**Fbg=**Fbc**=2GMbmss/Rb2=hC/4πRb2=mss× (C2/Rb) (4e)**

Similarly, applying Newton mechanics to get the balance between the gravitational force--Fng to mss and its centrifugal force--Fnc, however, Mbn here is the concentrative mass at its center. Let,

Fng = mss× (GMbn/Rb2)(4f)

Fnc = mss× (C2/Rb) (4g)

(GMbn/Rb2) = mss× (C2/Rb) (4h)

Owing to Fnc = mss×(C2/Rb) = **Fbc**

**∴**Mb = Mbn/2, or 2Mb = Mbn (4i)

It can be seen from (4i), the gravitational effect of concentrated Mbn/2 can be equal to the effect of the scattered Mb. **It is said，suppose Mbn=Mb，the total gravity of Mb on Rb to msscan become greater than Mbn’s.** Since Newton mechanics can explain the balance betweenFbg andFbc on Rb of a BH, **is it necessary to apply a complicated concepts of EGTR to solve the problems about BHs and cosmology?**

**4-2\*。Three shapes of radiation energy of mss can be equally transformed with each other.**

**mssC2 = κTb = Ch/2πλss=  ssh/2π (4j)**

**mss—**Hawking quantum radiation on the Event Horizon Rb of a BH, ** ss** frequency of mss, λss—wave length of mss, **Tb—**temperature on Rb = valve temperature transforming mss into radiation energy.

The energy transformation of Hawking quantum radiation mss of BHs on Rb can be in accord with (4j).

As an example, the temperature on the surface of the sun is about 5800k. Let 5800k be the similar valve temperature Tb on Rb of BHs, the corresponding mass msf of the sun’s radiation energy is: msf = κTb/C2 = 10--33g, and its equal wave length λsf = h/(2πCmsf) = 10--5cm =10--7m. It clearly shows that **the sun can only emit electromagnetic waves, visible light, and radio waves of λsf > 10--7m.**

**It shows that the mechanism of BHs to radiate mss is the same mechanism with which the sun radiates visible light,** etc. However, sometimes the sun could radiate X-rays of high energy and project particles outward and due to strong explosions inside the sun, its thrust could push the particles of high energy into the universal space. Similarly, the explosions in large BHs might also project particles outwards as well**.**

From formulas (4d), (4j) and the following(63f),

**mss = h/4πCRb = h/2πλssC (4k)**

**∴2Rb = λss = Db (4l)**

**4-3\*. How could Hawking quantum radiation--mss flee outward from Rb of BH ?**

I think, any mss as energy and not matter particle on Rb of a BH has a certain mean temperature--Tb and wavelength λss. However, mss could always have small vibration so that its speed and amplitude would have a little change at any instant. **Once mss vibrates to a low energy of wave trough, it might flow out from Rb.** The BH would immediately raise the temperature Tb on Rb slightly so that the outside mss of lower energy could not return to Rb of higher Tb, and could then only exist on the outside. Therefore, the process of mss fleeing outwards from Rb is just like the process by which the sun emits light, both processes are that which higher energy flows out naturally towards lower energy.

**Hawking theory and laws of BHs to emit mss are correct and convincing, but the Hawking explanations to emit mss are unconvincing and seem incorrect.**

**Normally, Hawking and most scientists could explain BHs to emit mss with the concepts of vacuum energy in Dirac Sea.** They recognized that virtual bi-particles would suddenly appear and annihilate in vacuum at any instant repeatedly. After a negative virtual particle of bi-particle captures a positive particle--mss on Rb of a BH and annihilate, thevirtual positive particle of the bi-particle would then exist in vacuum. It shows that a mss of BH had fled outward. Such explanations are deliberate myths with the new physical concept. As t**he energy value of mss on Rb of BH was uncertain, and mss was only decided by the changeable Tb on Rb** of Mb**, why then could virtual bi-particles in vacuum have the same energy value with mss on Rb and have both meet at the same time and place? In addition, since the numerical values of different Mb and mss have the greatest difference of approximate 1060 times in universal space, how much more could the greatest differences between virtual bi-particles in Dirac sea of anywhere have? It would certainly lead to the ridiculous conclusion that virtual bi-particles in Dirac Sea everywhere had to have extremely high energy as Wheeler calculated.**

**In addition, at present the explanation of the so-called “virtual bi-particles” does not have a reliable and certain numerical value in any theory, and may have no way to be observed and examined.**

**【5】。The lifetime τb of any BH，the time gap**

**-dτb needed by emitting two neighboring mss。**

** τb ≈ 10--27 Mb 3 [3] （5a）**

To minimum BH, Mbm =mss=mp=1.09×10—5 g，its lifetime **τ**bm ≈ 10—42秒 ≈ Schwarzschild time ts of (1j)，**τ**bm and ts are at the same numerical grade. For star BHs, its mass Mbs ≈ 6×1033g, so that, its lifetime  **τb**bs > 1066 yrs. If our Universe is a gigantic CBH, and no more energy-matters engulfed are from the outside, then its mass Mbu ≈ 1056g, so that its lifetime **τ**bu ≈ 10133years。

Owing to **τb = 10—27Mb3**，so, dτb = 3×10--27 Mb2dMb. **If let dMb = 1 mss**，then dτb was just the time gap needed by emitting two neighboring mss。

**-dτb ≈** 3×10--27 Mb2dMb = 3×10--27Mb× Mbmss

**≈ 0. 356×10--36Mb （5b）**

**Some conclusions: **

**1:\*** Our Universe is a really gigantic CBH（see【1】of Chapter II); if there are more energy-matters outside, then its mass Mbu will be more increased, and its lifetime becomes **τ**bu >> 10133years。

2:\* **According to BH theory , the destiny of our Universe is only decided by its mass--Mb,** but the General Theory of Relativity (GTR) recognized the destiny of our Universe was decided by unknown **(Ω = ρr/ρo >1 or < 1). The conclusions of GTR are not right.**

**3:**\* mss emitted out from star BHs ≈10--44g is much less than any energy-matter particles in universal space. Thus, the big BHs (mass ≥ star BH) will always engulf energy-matters outside are like rapacious plunders, but emitting mss to outside are like misers. For example, our cosmic-BH would emit a weakest mssu ≈ 10—66g/every 1012 years.

4\*；When a big BH--Mbb combined with a small BH--Mbs, Mbs would enter into Mbb , due to that particles in Mbb were always bigger than mss of Mbs, so, Mbs could engulf all energy-matters in Mbb, finally form a new bigger BH of (Mbs + Mbb ) with the new bigger Rb of (Rbs + Rbb).

**【6】。The total information amount Im and the total entropy SB of a BH of Mb. Im = IoMb/mss = 4GMb2/C. SB = (π/Io) Im = (π/Io)×4GMb2/C = 2Rb2C3/hG。[1]**

**The total information amount Io of any mss, Io= h/2π = basic and minimum information unit. The minimum entropy SBbm of (Mbm = mp = mss), SBbm = . **

**6-1\*; According to the analogy of thermo-dynamics in the theory of BHs, the entropy--SB of any BH in Einstein gravity theory is as follows:**

**SB = Lp2**[1] = **2Rb2C3/hG (6a)**

In the above (6a)，A--surface of a BH Mb，A = 4**π**Rb2。L –Planck length，

L = (HG/C3)1/2 [6][3] (6b)

**(6a) is the famous Bekenstein-Hawking formula.**

From (1c)--GMb/Rb = C 2/2，then**,**

 **SB** =Lp2 = 4Rb2/(4GH/C3) = 4Rb2×C3GH = RbRbC3GH = ×Cts×2GMbC3GHC2 = **ts×MbC2/H**

Let ts be Schwarzschild time, Cts = Rb。So，

**∴ SB × (h/2= (2ts×MbC2)，or**

**SB = (2h)×(2ts× MbC2) (6c)**

 **In the above (6c)，H = (h/2.** According to Heisenberg’s Uncertainty Principle, two complementary physical dimensions,such as time and energy, location and momentum, angle and angular momentum, if neither can be precisely measured, then their product is equal to a constant =H=h/2****=1.058×10-34Js=1.058×10-27g\*cm2/s. At the limited condition of (**Mb = Mbm**), then,

**MbmmssC2× 2tsbm= h/2 （d）**

**× t ≈ h/2 π （e）**

In the analogy between（6d）and（6e），(6e) is the mathematical formula of the Uncertainty Principle 2tsbm corresponds to t，and MbmC2 corresponds to  It shows that any mss emitted from BHs are all quantum.

**6-2\*; The information amount and entropy SBbm of Mbm = mss = mp = (hC/8πG)1/2 are the minimum unit.**

In above【1】, it was proven that**,**

**Mbm = mss = mp = （hC/8πG）1/2,** and Rbm≡ Lp≡ (Gh/2πC3)1/2≡1.61× 10—33 cm, tsbm = Rbm/C = 0.537×10—43s。Let the data of Mbm = mss= mp, according to (6c) and（6d）,

**2tsbm×MbmmssC2** = 2×0.537×10—43s×1.09× 10—5 g ×9×1020 = **1. 054×10—27gcm2/s. （**a**）**

 **h/2**6.63×10—27/2**×10—27gcm2/s **b****

**∴**（**62a）=（62b）,**  then,

** tsbm× Mbm C2 = h/2H （**c**）**

Thus, **h/2H =  is the minimum information unit in the Universe.** Owing to the lifetime of Mbm = mp being 0.537×10—43s and  the smallest unit, thus, Mbm = mp could only disintegrate themselves into many smaller energy-particles for prolonging their lifetime in Planck Era.

 From(6c), the entropy SBbm of Mbm = mp, due to SB (h/2) =  2tsbm×MbmC2，as a result,

 **SBbm= tsbm×MbmC2 = h/2**

**SBbm= (2**h)** d**

**It shows the information amount < (Ioh/2π) would 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. [11]

**∴Information＝Existence＝energy × time.** [11]

**Correspondingly, Planck constant H = energy Uncertainty × time Uncertainty**

**Why does existence＝energy × time？**It reflects that existence has two essential factors. Anything existent must have its energy and its living time. A thing of no energy or no living time would not really be in existence.  [11] I think, her concepts to information are rather correct and accepted.

**6-3\*。The information amount of any mss radiated by any BH of Mb is equal to the same amount = Io = h/2**π, **and does not have anything to do with the amount of Mb and mss。**

To get thegeneral formula of information amount of any mss, from (1d)**，**mssMb= hC/8πG = 1.187× 10-10g2。Let Iss = the information amounts of any mss，

**Iss = mssC2×2ts =** C2hC/(8πGMb)×2Rb/C = [C2hC/(8πGMb)] ×2×2GMb/C3 **= h/2π = Io (63a)**

**The above (63a）shows any Iss of any BH is always equal to Iss = Io = h/2**π**, n**o matter whether mss and Mb is big or small. Thus, Io is the minimum and the basic information unit.

To get the total information amount **Im and total entropy SB of a BH of Mb,** let ni = Mb/mss. Then,

**Im = niIo；SB=niπ=(π/Io) Im=(2π2/h) Im, (63b)**

Owing to Mb = ni mss，Im = IoMb/mss， (63c)

From (1d) and (63c)**，**

**Im = IoMb/mss = 4GMb2/C (63d)**

From (63b) and (6a).

**SB = (π/Io) Im** = (2**π2/h**) **Im** = (π/Io) × 4GMb2/C **= 2π2Rb2C3/hG = SB， (63e)**

**For example, to figure out total entropy SB10** of a BH =10M×2×1033g

**SB10 =** (π/Io)×4GMb2/C = 2π24G (10×2×1033)2/hC = 2π2×4×6.67×10—8 (10×2×1033)2

/(6.63×10—27×3×1010× 107) = **10.6×1071J/k.**

In §10.3.7 of References [2], Prof. Su Yi pointed out that, Hawking’s calculations to **SB10 =**10.6×1071J/k.

From（4j）and (62c), mssC2 = (h/2π)×C/**λ**ss，so, any **wave length λss of mss is equal to the diameter of BH of Mb。**

**λss = 2tcC = 2Rb = Db (63f)**

**6-4\*; Some very significant and effective conclusions** can be derived from above:

**A. From (63e)** ≡ **(6a)** it can be proved that 1; the total entropy SB of any BH precisely equals to a constant × its total information Im, **so that** **entropy is just information**. 2. All formulas derived above by author are **perfectly correct and very harmonious.**

**B. The information amount Im in combinations of two BHs (Mb1 + Mb2) cannot be conservative.**

From (63d), owing to Im ∽ Mb2 , i.e., Im are directly proportional to Mb2, after combinations by two BHs of Mb1 + Mb2, their total information amount Im1+m2 ∽(Mb1 + Mb2)2; but Im1 ∽ Mb12, and Im2 ∽ Mb2,then, Im1+m2 > Im1 + Im2. Similarly,if a BH of Mb, its original Im of Mb, Im ∽ Mb2, after Mb emitting mss of 0.5 Mb, the rest of 0.5 Mb will only have 0.25 Im, but the lost 0.5 Mb have brought away 0.75 Im. However, the original total information amount Im of Mb cannot be changed any more, and is equal to a constant in the process of emitting mss. Obviously, from (63a), owing to Io of any mss=h/2π, the bigger Mb can emit the longer **λ**ss of mss, and bring away the less mass. Entropy is the same conditions with the information above.

C. **Any small or large BH could emit only one mss with the equal Io at the same instant,** although the mass amount of every mss would be different. On the contrary, for other bodies, such as stars, radio transmitters, even any hot objects, they could emit many information Io and energy-matter particles outward at the same time, because there are different temperatures at different point on their surface.

D. **Any BH could only emit a radiation mss once a time as quantum, and bring out a I ≡ h/2o**

**【7】。The significant conclusions from Hawking famous entropy formula (7a) of BHs.**

**7-1.\*** According to Hawking famous entropy formula (7a) of black holes, in the process of the collapse of any star it could increase in its entropy and decrease in its information amount.**[1]** Suppose Sb—the entropy before its collapse; Sa—the entropy after its collapse; Mθ—sun mass = 2×10 33g, then,

**Sa/Sb ≈** **1018Mb/Mθ [1] (7a)**

**Jacob Bekinstein** pointed out that **under the ideal condition**, while in the collapse process of a star from its beginning to its end, if Sa = Sb occurred, from (7a), a mini black hole of **Mbo ≈ 1015g** could be formed, it was so-called the **original mini BH** in the Universe proposed by Hawking in 1971.

**The density ρbo of Mbo=1015g, ρbo= 0.7×1053g/cm3,** Rbo=1.5×10—13cm, Tbo=0.77×1012k;, msso=12×10—24g, the proton number nbo of Mbo -- nbo = 1015g/1.66×10—24 = 1039. nbo= 1039 is just a Dirac large number. The lifetime bo of Mbo-- bo ≈ the age of our Universe

In the 1970s Hawking pointed out that although Mbo might remain in universal space, scientists could not seek them for about 10 years.

**However, Bekinstein just performed a simple mathematical treatment to formula (7a), he did not research the profound physical meaning of (7a).**

From Bekinstein’s explanations to the entropy conservation in the collapse process of stars, very important and significant conclusions can be shown. First, formula (7a) shows that entropy could not keep a constant in the collapse process of stars > Mbs ≈ 1015g. It shows that protons as particles are not decomposed with densities--**ρbo < 0.7×1053 g/cm3; so that they are not in the ideal conditions and still keep the structures of protons**. Second, the physical significance of entropy conservation shows that only after protonscould be decomposed into 3 ‘uud’ quarks, they could have no heat movement and no friction, and would enter in the ideal condition. It is said, **the ideal conditions must only be quarks existing either in a contractive or in an expansive process between densities from 0.7×1053g/cm3 of BHs to 1093g/cm3 of Mbm=mss=mp**.

**7-2\*; No singularity could exist in any star of BH at all.**

In the last evolution stage of big stars, after all H2 elements were exhausted in the nuclear fusion, the strong explosions of nova or supernova would appear. The exploded anti-pressure could turn the wreckage of a star into a star-BH or neutron star of density **ρbo≈ 1016g/cm3.** No more nova explosion could occur inside star-BH and no more energy-matters could flee out from star-BH except those of extremely weak Hawking radiations. Thus, the gravitational contractions of all energy-matters inside BH would have no way to contract into Singularity, because the heat resistances could balance the gravitational contraction. Obviously, according to the solution of the Equation of General Theory of Relativity (EGTR), the Penrose and Hawking proposition that Singularity could appear in any BH was a completely wrong inference.

**【8】。Some other important conclusions:**

**A. After the new formulas (1d), (1e), (3a), (4a), (4d), (62d), (63a). (63d), (63e), etc., derived by the author are proved to be correct，the new theory of BHs will go to a rather complete system.** Although **the states and structures inside any BH can be greatly different,** it will still be impossible for them to affect the nature of BH on Rb, because Rb, Tb, mss, are only decided by **Mb** amount.

B. It may be impossible for mankind to manufacture out any artificially real gravitational (Schwarzschild) black holes (BHs) ever.[9] Since all numerical values in the parameters of the minimum BH--Mbm= mp=1.09×10--5g have reached the highest limit in the Universe，its Rbm=1.61× 10--33 cm，Tbm= 0.71×1032k, and its Compton time tc = Schwarzschild time tsbm=0.537×10—43s ≈ its lifetime bm。Thus, BHs ≤ (Mbm= mp=1.09×10--5g) would be impossible to exist in the Universe. Mankind would then only attempt to manufacture out some BHs ≥ (Mbm = mp). But, a Mbm is formed by the mass of 1020 pm (mass of a proton, pm = 1.66×10—24g). Mankind may have no ability ever to let 1020 pm collide together on future Collider at a same precise time. Most difficult of all, the distance between two close pm has only 10—13cm at the density of a neutron star. The time for transmitting gravity between them needs 10—24s at most. However, the lifetime bm of Mbm is just bm ≈ 0.537×10—43s. It is said that although a successful collision was completed, it will be impossible for those many pm can collide and combine together within 10—43s. Therefore, many scientists in some countries had become alarmists to talk about ‘artificial black holes’. Those talks are not convincing because they didn’t know the exact formulas between parameters Mb, Rb, Tb, mss and b on Rb of any BHs.

**Chapter II: The New Concepts and New Researches to Cosmology with New BH-theory**

**\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\***

**====The new concepts in this Chapter are built on the bases of above**

**new concepts and formulas of BHs====**

**【Preface】. In Chapter I above, it was proven that once a BH was formed it would always be a real BH, until it finally becomes Mbm≡ mss = mp and disappears in the Planck Era.**

**In this Chapter, it will be proven in【1】 that our Universe would be a real gigantic cosmic-BH (CBH) of Mu=1056g. From【2】 to 【6】, it will be demonstrated that our Universe was born in the Planck Era from a large number of new BHs-- Mbl = 2Mbm≡ 2mp** ≈ **2.2× 10--5g, but not born from the so-called ‘Singularity’ or ‘the Big Bang of Singularity’. In【7】, a new mechanism of ‘Original Inflation’ of our Universe at its new-born time is proposed and demonstrated by the author. Form 2 in 【8】, the expansive evolution of our Universe as a CBH can be actually and harmoniously illustrated with seven typical BHs. In 【9】， we will be checking the correctness or incorrectness of data in the universal evolution of the standard model of ‘Big Bang’ with the calculated data of new BH-theory and formulas proposed by author. In 【10】，some important inferences and conclusions about BH-theory and cosmology can be explored.**

**【1】。Above all, it must be proven that our Universe should have been a really gigantic Cosmic-Black Hole (Cosmic-BH; CBH);**

**1--1\*. The precise data got from the modern astronomical observational instruments can prove that our Universal spheroid has been a real CBH.**

**(A).** The precise age Au of our Universe from observational instruments was Au = 1.37×1010yrs. Calculating from this,the Event Horizon, Ru= C×Au= 1.3×1028cm, the average density ρu=3/(8πGAu2) = 0.958×10--29 g/cm3, then, the total mass of the Universe **Mu =** 4πRu3ρu/3 **= 8.8×1055g.**

**(B). The precise Hubble constant, Ho = (0.73±0.05)×100kms-1Mpc-1**was recently **observed and calculating from this data,** the real density, ρr=3Ho2 /(8πG)≈10--29g/cm3. The practical age of our Universe, Ar2=3/(8πGρr), ∴ A r=0.423×1018s = (134 ± 6.7) ×108yrs, then, the total mass of the Universe **Mr = 8.6× 1055g。**

(C)。It can be proved that our Universe has been a real Schwarzschild CBH. From formula (1m) in chapter I, any BH must be in accord with (1n) below.

**** ρ**bRb2 = 3C2/(8πG)=1.6×1027g/cm， (1n)**

Taken from the above data, Ru = C×Au=1.3×1028 cm, ρr = 3Ho2 /(8πG)≈10--29g /cm3，so,

**** ρ**r**Ru2=10--29×(1.3×1028)2= **1.7×1027g/cm (1a)**

**As a result (1n) = (1a)。**

From (1c) in chapter I, GMb/Ru = C2/2,

Mb = 8.7×1055g can be gotten. Thus,

**Mu = Mr = Mb (1aa)**

**(1n) = (1a) = (1aa) can completely prove that our Universe has been a real CBH.**

For calculative convenience the main data of our Universe —CBH can be standardized as below:

**Mu = Mb = 8.8×1055g，Ru = 1.3×1028cm，ρu= 0.958 ×10--29 g/cm3.**

**1-2\*。The Hubble law about the expansive evolution of our Universe would have been the expansive law of our Universe as a CBH due to combine numerous small BHs and to engulf energy-matters outside.**

Applying Hubble law on the Event Horizon Ru of our Universal spheroid,

 **Mu =** 4oRu3/3=43H02/8GC3tu3/3 = 43H02 /8 GC3tu/3H02 = C3tu/2G **= C2 Ru /2G (1b)**

From Schwarzschild formula (1c),

2GMb=C2 Rb，

**Mb=**RbC2/2G=C3 tb /2G **= RbC2/2G (1c)**

**Since** our Universe is the same spheroid with our CBH, Ru can be equal to the Event Horizon of the real universal age CAu, and from **(1b),** Ru is also Rb,

**∴ tu = tb, Rb = Ru, Mu = Mb. (1d)**

**Therefore, (1b) = (1c). It is clearly proven that the expansive law of our Universe as a CBH can completely accord with the Hubble law.** It is said that the universal expansive law with speed Ru/Au= C to engulf energy-matters outside is just the Hubble law to show the universal expansion. Hubble law has three forms below:

V=HoR (1e)

While V=C，**R=Ru= Ctu (1f)**

**∴Ho=1/tu (1g)**

It shows that: 1. The Event Horizon Ru of our CBH would have expanded with speed C from its birth to the present, i.e., **Ru≡ Ctu.** So,(1f) is just the Hubble law; 2. There could have been abundant energy-matters and small BHs outside engulfed by CBH, and let CBH always keep its expansion Ctu = Ctb = Rb to the present。

**When shall it reach tu ≠ tb**? Once energy-matters decreased or had no more outside CBH, Hubble constant **Ho** would become smaller even decrease to zero.

**1-3\*。 It can be a simple inference that our CBH of Mu = Mb = 8.8×1055g had to originate only from the combinations of countless minimum BHs--Mbl=2mp.**

**It can be known from ‘The most essential attribute of any BHs in** 【3】of chapter I, **our expansive CBH could only originate from Mbl as it was impossible to have formed like a star-BH that contracted from a big star of (**5~8) Mand likewise **impossible for a giant BHs in the cluster of galaxies to have contracted from the huge energy-matters outside the galaxy. The age** Ab **of those great BHs are all** CAb>>Rb—its Event Horizon。Only the expansive speed of the Event Horizon **Ru of our CBH can have kept light speed C, and in accord with the Hubble law so that its age CAu** ≡ **Ru。 Undoubtedly，our CBH can only originate from the combinations of countless minimum BHs--Mbl=2mp=2Mbm.**

**1-4\*.\* It can be simply be proved with exactness again, that our Universe have been a real and complete CBH formed from the continuous combination of countless Mbl = 2Mbm≡ 2mp。**

**Supposing that our Universe was a gigantic CBH, and then** according to the law of energy-matter conservation, its total mass must certainly come from the continuous combinations of countless original minimum BHs (mm = Mbm = mp) from its birth-time to the present.

Taking known data from above, Mbm ≡ mp =1.09× 10--5g, its Rbm = 1.61×10—33cm, its Tbm = 0.71× 1032k, its Hawking radiations--mss = 1.09×10--5g. bm ≈ 1092g/cm3 .

**Let Nbu be numbers of Nbu = Mu/Mbm**。**If** the calculations below **adopted Mbl ≈ 2Mbm,, then** it is the same results with Mbm.

**Nbu=Mu/Mbm=8.8×1055/1.09×10—5=8.0734×1060 (1h)**

If our Universe Mu come really from Nbu × Mbm, then according to Schwarzschild formula of BHs, its Rbu must be precisely equal to Nbu× Rbm ,

**Nbu=Ru/Rbm=1.3×1028/1.61×10—33=8.075×1060**

**(1j)**

**(1h) = (1j)** is fully and clearly proven again that our Universe Mu is the complete combinations from Nbu × Mbm, and has been a real CBH。

**1-5. \* The flatness (Ω = ρr/ρo≈1) of our Universe is just the essential nature of any BH. So, Ω = ρr/ρo** ≠ **1 was just the false proposition gotten from EGTR.**

**From chapter I, the average density ρo of any BH is only decided by its mass--Mb, so that our Universe as a CBH can be a sealed spheroid, and have a sole ρu decided by its definite total mass-- Mu. Therefore,** (Ω = ρr/ρo**≡**1) is just the natural instinct of BHs.

Owing to the false proposition of (Ω = ρr/ρo ≠ 1) by Friedmann, it let many scientists to propose many new and incorrect viewpoints, such as finding ‘the lost energy-matters in the Universe’, ‘zero point energy’, ’dark energy’, etc. It can be clearly seen from (1h) and (1j)，our CBH has neither decreased in its energy-matters any more nor increased in its extra energy-matters any more too.

It can be known from above 1-1\*，ρo = ρu= 0.958×10--29 g/cm3，and ρr = ρr=3Ho2/(8πG) ≈ 10--29 g/cm3, so, Ω = ρr/ρo=10--29/0.958×10--29 = 1.044. However, Ω = 1.044 is just the tolerances caused from observation, calculations and Friedmann’s incorrect model. **For any BH included our CBH, ρo≡ρr and Ω≡1 forever。**

**【2】。What principle can be used to find the precise birth-time tm of our Universe?**

Since the expansive law of our Universe would have exactly accorded with Hubble law of

**Ru = Ctu (2f)**

Ru –the Event horizon of our Universe as a CBH, tu –-the age of our Universe. **We can suppose letting (2f) to return to its original point, which was the precise birth-time tm of our Universe.**

**Then, while tu returned to tu = 10—43s = tm = tsbm of minimum BH—Mbm, could that tm be the precise birth-time of our Universe?**

It can be known from chapter I and above paragraph 【1】, our gigantic CBH could only originate and combine from countless Mbm= mp, then, Mu as the total mass of our CBH could be only return back to the original point--minimum BHs (Mbm = mp).

The reason why all particles of energy-matters in our Universe could be linked together to a whole spheroid is that there would be enough time to deliver gravities between all particles in the whole Mu. The full and necessary condition must be Ru = Ct ≤ Ctu, here t— characteristic time of our Univer**se = Schwarzschild time of our CBH, under the general conditions,** t ≤ tu。Along with t reduced continuously, Ru and Mu would proportionally be decreased, but the universal temperature T and density ρu could be proportionally increased. It is said that the universal mass Mu would be gradually decreased 、contracted and formed by a lot of balls mm of high temperature and density. At last when their temperature and density were high enough to prevent Ru from further contraction then rm of every ball--mm would become rm**≥ Ct**. Thus, the gravitational links inside every mm and between every mm could only then be broken and cause the great explosions at time tm. Those explosions could prevent Mu and every mm from contracting into Singularity**, but disintegrate into scattered radiation-particles of non-gravity in Planck Era. However, if it is seen in an opposite direction from the time of our universal expansion, tm might be the birth-time of our Universe to recover the gravitational links inside and outside all particles —mm, and become the embryo of our Universe.** Therefore, rm ≠ 0 at t = **tm** ≠ 0, and **tm was the birth-time of our Universe.**

**【3】。At the time tm of newborn particles recovering its gravitational links, tm was just the birth-time of our Universe, and it can be confirmed below that newborn particles were just really Mbl = 2Mbm≡ 2mp = 2(hC/8πG)1/2 [3] = 2×1.09× 10-5g** ≈ **2.2× 10--5g.**

**3-1\*;** Above all, according to the new achievements in modern cosmogony and physics there were generally two ways to describe the standard model of our universal ‘Big Bang’ by scientists.

(A). In Form 1, data from the universal evolution of the standard model of “Big Bang” as defined by the relationship between t and T are correct.

**It must be pointed out that data in Form 1 and Tt1/2 =k1 in (3a1) are all right before the end of Radiation Era, and they are a very good coincidence.**

**Form 1: Data of [t – T] of the standard model of our universal “Big Bang”[5][10]**

**t—**characteristic time of our Univer**se,**

**T—**temperature of radiations

**t—time; T—temperature; explanations;**

**1; t = 0; T--- ∞;**  a made-up Singularity

**2; t=10—43s; T=1032k; Planck Era**

**3; t=10—35s; T=1027k; G.U.T. Era**

4; t=10—6s; T=1013k;

**5; t=10—4s; T=1012k; Hardron Era**

6; t=10—2s; T=1011k;

7; t=0.11s; T=3×1010k;

**8; t=1.09s; T=1010k; Lepton Era**

9; t=13.82s; T=3×109k;

10;t=3m2s; T=109k;

11;t=3m46s; T=9×108k;

12;t=34m40s; T=3×108k;

**13;t=4×105yrs; T=3000k; Radiation Era**

**14;t=to the present; 2.7k; Matter-Dominated Era**

 (B).Formulas (3a1) below might describe our Universal evolution relevance from the so-called ‘Big Bang’ to the end of Radiation Era, (i.e, **from t = 10--43s to t ≈ 4 × 105 years).**

**Tt1/2 = k1, R = k2t1/2, TR = k3, (3a1)**

Formula (3a2) below might describe our Universal evolution that is relevant within the Matter-Dominated Era , **( i.e, from t ≈ 4×105 years to the present**). K1, k2—constants,，

**Tt2/3 = k6,** R = k7t2/3, RT = k8, **(3a2)**

**R—**characteristic size**, kn--**-constants,

[Notes]: It will be proved with the new correct formulas of BH in【9】below that, formulas [ R = k2t1/2, TR = k3] in **(3a1) are incorrect, and can be changed into** [R = k2t, TR1/2 = k3].

**3-2\*; Finding the precise tm of the new born time of our Universe, it was then time to recover the gravities inside and outside every mm.**

**Let dm—**the distance between two neighboring particles**, mm –-** mass of the new particles having recovered its gravitational links, **rm—**radius of mm**，2t—**time needed between two neighboring particles to transfer their gravities, i.e, **ts—**Schwarzschild time of mm**. C —** light speed**, ρ—**density of Mu**, H—**Hubble constant. Mu—the total mass of our Universe, Ru—the Event Horizon of Mu. Then**,**

**dm ≥ C×2t , i.e, dm/2C≥t, or Ru ≥ Ct (3)**

dm/2 = rm is the radius of every mm under the condition of gravitational links that are broken. Formula of Mu spheroid is as below:

Mu = 4ρRu3/3, (3aa)

H = Hubble constant, H = V/R = 1/t. (3ab)

**Another decisive condition of Mu contracting to mm** is that while T was raised to valve temperature Tm, mm would change into a complete energy-ball--mm, which caused the broken gravitational links of every mm at that time tm. Every mm could only disintegrate and explode. Then，

mm= κTm/C2, (3ac)

**∴ t3 ≤ 3κTm/4πρC5 (3a)**

From Hubble law, H =1/t，

ρ = 3H2/8πG = 3/(8πGt2), **(3ad）**

**∴ t ≤ Tm(2Gκ)/(C5), (3b）**

**∴ t3/2 ≤ k1 (2Gκ)/C5; or t≤ [k1 (2Gκ)/C5]2/3(3c)**

In above formulas (3a), (3b), and (3c) are all derived from (3), so, **‘t’** has equal numerical value.

Finding out k1 from **(3a1),** Tt1/2 = k1. Taking t = 10--43s and its corresponding T= 1032k from Form 1，then, **k1** = Tt1/2 = 1032×10-43s =31/2 ×1010 ≈**1.732×1010,**

From (3c),

t3/2≤[(2Gκ)/(C5)]×k1=1.732×1010[(2Gκ)/C5] **(3ca)**

G= 6.67×10--8cm3/*gs*2, C= 3×1010cm/s,

κ=1.38 ×10 --16*g*cm/s2k,*,*

**∴t3/2 ≤** [(2×6.67×10-8×1.38×10-16)/(3×1010)5]× 1.732×1010 = 0.075758×10--74×1.732×1010

**≈ 0.1312×10 --64, then，**

t3 = **±**0.017217×10 --128 = **±**0.17217×10 --129,

**For calculative convenience，let t = tm,**

**∴tm = ± 0.5563×10--43s, （3d）**

Correspondingly, the temperature Tm of mm,

**Tm =** k1/tm1/2 = **0.734× 1032k, (3e)**

**∴mm =** κTm/C2  **= 1.125×10--5g, (3f)**

**ρm**=3/(8πGt2)=**0.5786×1093g/cm3, (3g)**

**rm =** (3m /4πρ)1/3 **=1.67×10--33cm, (3h)**

**dm=C×2t=3.34×10-33cm=2rm (3i)**

**Conclusions: It can be seen that t = ± tm was just the time to show the gravitational links of every mm inside and outside that are broken or recovered, and was also the time of every mm, which couldtransform gravities between all its gravitational energy and radiation energy; thus, -- tm showed gravities that are broken, whereas +tm showed gravities that recovered.**

**【4】。Conclusion: Our CBH was surely born and**

**formed from countless mm = Mbm = mp**

**Comparing data of mm derived from above 【3】with Mbm = mp = (hC/8πG)1/2= 1.09×10—5g**

**It can be shown from the above paragraph that when our CBH evolution returned back to its genesis with Hubble law at the birth-time tm,** the new-born particles mm could recover their gravities and combine 2mm into 1 Mnl=2mm. Thus, the bigger Mnl with longer lifetimes could become the stable minimum BHs and cells to form our CBH.

**Table：Comparisons to parameters between Mbm= mp and mm**

**m m = gravity renewed; Mbm ≡mp[3]**

**m m =1.125×10-5g; Mbm =1.09×10--5g=m p**

**t m =±0.5563×10-43s; t bm = 0.539×10-43s=t p**

**T m =0.734×1032k; Tbm= 0.71×1032k=Tp**

**r m =1.67×10-33cm; R bm=1.61×10-33cm=Lp**

From the above figure, newborn particle**s mm = Mbm ≡ mp.** The differences of numerical values between their parameters are from the tolerances calculated from k1 in (3a1), and m m, t m, T m, r m , etc。

**【5】。How would Pre-universe disappear at --tm in Planck Era？**

**Since Mnl= 2mm = 2Mbm= 2mp were minimum BHs and cells to form our present CBH, where could all energy-matters formed of newborn particles Mnl of our Universe come from?**

**According to the principles of time symmetry and energy-matters conservation,** the most likely possibility and hypothesis in this article was that there was **a Pre-universe predecessor** of our Universe, which had a final ‘Big Crunch’ before the birth of our Universe. If the final collapse law to ‘Big Crunch’ of the Pre-universe was like the expansive law of our Universe at its genesis, then that ‘Big Crunch’ would have finally created countless old particles **mm = Mbm = mp of no gravity at --tm; and** immediately explode into rays in Planck Era; thus the collapse of Pre-universe could be prevented towards Singularity, because mm did not have enough time to transfer gravity with each others. **Just below are three states of mm= Mbm= mp of Pre-universe** caused by **‘Big Crunch’, which could provide all needed conditions for creating the original cells of our Universe. (A).** The ‘Big Crunch’ could certainly lead the ‘phase change’ of Pre-universe at --tm from the ‘collapse phase’ into the ‘expansion phase’ and stop the collapse of Pre-universe from going onto Singularity. **(B).** The ‘Big Crunch’ could certainly lead density to lower a bit in Planck Era, and let some bigger new BHs at +tm to form into stable cells--Mbl = 2Mbm of our new Universe. **(C).** The ‘Big Crunch’ could certainly allow all old energy-matters of Pre-universe as remains to form into new particles of Mbl =2mm at +tm and recover their gravitational links at the highest density of 1092 g/cm3 in Planck Era. **The countless newborn particles Mbl having just recovered their gravitational links could become the cells and birth of our Universe,**

**Conclusion: Above 3 results of the ‘Big Crunch’ of Pre-universe in Planck Era could provide the full and necessary conditions for the birth of our new Universe and prevent Pre-universe collapse to Singularity.**

**【6】。How would our new Universe be born from the ruins of ‘Big Crunch’ of Pre-universe？**

**What conditions could let new particles** Mbl= **2mm**=2**Mbm=mp of our Universe to be born and grow up? As we know in Planck Era of the highest density of 1092g/cm3,** radiations (energy) and particles (matter) would annihilate, compose and transform each other with extremely high speed. Therefore, the remains of Pre-universe reforming into new particles mm and Mbl were certain. Furthermore**, if only new particles Mbl combined at time +tm by 2mm which had a lifetime longer than its Compton time = Schwarzschild time,** Mbl would certainly become new minimum BHs and grow up because of their combinations at the extremely high pressure and density. **The key problem was under what conditions the newborn particles Mbl could grow bigger and bigger.** According to Hawking lifetime b formula of BHs,Compton time tbc of new particle Mbl = 2mm,

**b ≈ 10—27 Mb3(s) (6a)**

**tbc = Rb/C (6b)**

Obviously, only in the case b > tbc , i.e,

**10—27 Mb3 > Rb/C,** **(6c)**

Let (1c) -- **GMb/Rb = C 2/2** of Chapter I enter **(6c)**, new particles--Mbl **=** 2mm = Mb could form into minimum BHs and grow bigger and bigger. Then,

**Mb = Mbl = 2mm = 2.2×10--5g (≈ 2 Mbm ) (6d)**

bl—lifetime of Mbl.

tsl = Rbl/C=tsbm =2×0.537×10—43 =**10—43s**

**∴****bl =**10—27(2.2×10--5)3=1.06×10—41s **≈ 100tsbm**

**(6e)**

**bbm = (2.2/1.09)3 = 8** (6f)

Owing to the ‘Big Crunch’ caused from all old particles mm of Pre-universe at --tm, the universal space would expand a little and the density become lower a bit, **it could easily lead to form the bigger new BHs--Mbl = 2mm ≈ 2Mbm = mp = 2.2×10--5g at +tm.** After that, Mbl would combine with each other and become bigger and bigger BHs because they **are closely pasted together** at the condition of extremely high density, and **bl>> tsbm**.

**The first combinations of countless new-born Mbl ≈ 2Mbm ≈ 2.2×10--5g created the real “Big Bang” of our Universe, it was just the ‘Original Inflation’. After that the non-stop normal expansion of our Universe up to the present was very good according to Hubble law.**

**Conclusions: 1\*.** Only the new minimum BHs--Mbl = Mb = 2Mbm at +tm formed with the longer lifetime than its Compton (=Schwarzchild tbl) time could grow bigger and bigger and their continuous combinations created a present expansive cosmic-BH. **2\*. From time --tm to time +tm, the old and the new Universe was connected through Planck Era as a bridge, the Universe could transition from ‘--tm’ of “collapse phase” directly to ‘+tm’ of “expansive phase” through Planck Era, but in no way would appear time of t = 0 and Singularity. 3\*.** Comparing Mbl = 2mm = 2Mbm = 2mp ≈ 2.2×10--5g with formula (1p) in Chapter I, obviously, new Mbl = 2Mbm ≈ 2.2×10--5g of longer lifetime could become the stable cells forming our Universe.

【7】。**In this section, author proposes a new and simple mechanism causing the ‘Original Inflation’ of our Universe at the beginning of its birth-time. The new mechanism of ‘Original Inflation’ should cause the sudden and violent space expansion created from the combinations of countless newborn Nbu×Mbm. The concluded time to of ’Original Inflation’ should be the time of gravitational linking together of all Mbm (Nbu×Mbm = Mu ) in the whole Universe.**

**Explanations:** 1; In this section, Mbm are still taken as the minimum BHs to replace Mbl. 2; According to (1c), a isolated BH cannot cause expansion, only combinations of 2 or more BHs can cause the strong expansions of Rb. 3; I think, owing to ‘our universal packet’ might be just one of many universal packet. So, single Mbm in the packet could not freely expansion, but only all Nbu×Mbm were linked together as a whole packet, it could cause the sudden and violent space expansion as the ‘Original Inflation’.

According to the above statements of new mechanisms, the total mass of our CBH, Let **Mu = 8.8×1055g** come from the combinations of **(Nbu = 8×1060 )** × (Mbm ≡ mp ). **Let to be the concluded time of ‘Original Inflation’.**

**If tbms was Schwarzschild time of a newborn Mbm, its tbms=Rbm/C=**1.61×10—33/3×1010 **= 5.37× 10—44s** then, (2 or 3)no×tbms showed the time needed by all Nm×Mbm connecting together. Rbm = 1.61× 10—33cm.

**7-1\*. Suppose gravity went through 2×tbms of a Mbm, and Nm2×Mbm would be connected together,** then,

**Nm2 Rbm 3=（2Rbm)3，**

**Nm 2 = 8 (7a)**

(7a) shows that the gravity of a Mbm could connect with other 8 Mbm, while time of Mbm from tbms prolonged to 2 tbms. Thus, how long of a time is needed by a Mbm connecting all Nbu × Mbm to a whole? **Mu = 1056g is a known number , Nbu= Mu/**Mbm**≈ 8.8×1060.**

**∴Nbu= 8.8×1060 ≈1061 = (867.5) (7b)**

(7b) shows after the gravity of a Mbm went through no times of **267.5 × tbms**，all Mu = Nbu **(= 867.5)**× Mbm could link together to a ‘original universal packet ’.

**(267.5 ) ≈ (1020.3)， let no2 =1020.3  (7c)**

Now, seeking Nm3 with the same method above**,**

**Nm3 Rbm 3=（3Rbm)3， Nm3 = 27 (7d)**

**Nbu = 8.8×1060 ≈ 1061 = (2742.6 ),**

**but (342.6 ) ≈ (1020.3)，let no3 =1020.3，**

**∴ no = no2 = no3 ≈ (1020.3) (7e)**

**From (7a) and (7d),** after a Mbm connected other 8×Mbm，its volume would prolong to eight times，i. e, 8 = 23 times。At the same time, from (7d), its volume would also prolong to 27 = 33. **However,** after tbms prolonged to 2tbms, it could lead to much more than 23 Mbm to be connected**,** the numbers connecting Mbm were not only 23, but probably (23)3 = 29.**It is said those Mbm had no time to do the normal expansion would also be included in expanded Mbm.** Similarly，the numbers connecting Mbm were 39, while tbms prolonged 3tbms.

**It can be known from (7c) and (7e)，no matter how many Mbm could be connected together at one time, the total time needed by connecting all Nbu ×Mbm= Mu would be the same, i. e, 1020.3 s.** From (7a) and (7d)，**owing to the combinations of Nbu × Mbm creating the sudden and violent space expansion, it was the cause of ‘Original Inflation’ at the beginning of the birth-time of our Universe,**

With the same method to seek the general law of no times of tbms -- no× tbmc,

**Let Nmn = no9, and no = 10 x (7f)**

**However, Nbu ≈1061 , 1061 = 109x (7g)**

**Let x1 = 61/9 = 6.8, no1= (106.8) (7-1a)**

no1 in（7-1a）was the times of no1× tbmc under the condition of “**Original Inflation**”。Now, according to the principle of (7e) , another x2 and no2 under the condition of “**general combination Expansion**” might be existent。

**x2 = 61/3 = 20.3  no2 = 1020.3 （7-1b）**

**no2 = no13 or no2 = 1013.5 no1 （7-1c）**

**7-2\*;** (7-1a) and (7-1b) testify that there might be two ways to connect all Nbu × Mbm = Mu together **to form a whole ‘original universal packet’.** No matter which expansive way it was, the concluded time to1 or to2 of ‘Original Inflation’ or ‘general combination expansion’ was only decided by the total mass Mu of our Universe.

**[A]. ‘Original Inflation’ created by ‘**violent space expansionandits concluded time t o1;

**t o1**=tbmc×no1=5.37×10—44×106.8=**10—36.5s. (7-2a)**

**[B]. ‘General combination expansion’** and its concluded time to2**：**

**t o2**=tbmc×no2=5.37×10—44×1020.3=**10—23s (7-2b)**

**∴ to2/to1=no2/no1=10—23/2×10—36.5=1013.5 (7-2c)**

**7-3.**\* 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”. **However, the highest-speed ‘Original Inflation’ could certainly let ‘General combination expansion’ to have no opportunity to occur. Therefore, the numerical values of ‘General combination expansion’ can only be the better reference to ‘Original Inflation’** ,

**[A]。The first way was “Original Inflation”** in accordance with (7-1a) and (7-2a), its expansive time was from tm=5.37×10—44s of the birth-time to t o1 = 10—36.5s. But its expansive effect reached the same result with (to2=10—23s) of ‘**general combination expansion**’. **It is said that the Event Horizon Rb of CBH at the time of 10—36.5s reached the same Event Horizon of (to2 =10—23s)**. However, in the period from to1 =10—36.5s to to2=10—23.s, CBH seemed to have a normal expansio**n.**

**[B]. The second way was the** ‘**general combination e**xpansion’ in accordance with (7-1b) and (7-2b). Its time was from 5.37×10—44s successively to to2=10—23. s. The Event Horizons of the above two ways reached the same numerical value at the different time of t o1 = 10—36.5s and to2 = 10—23.s.

**[C]. From to2 = 10—23.s to the present**, the expansion of CBH was regular and accorded with Hubble law due to the combinations between many of small BHs growing bigger and bigger.

**Conclusion:** The concluded time to1 = 10—36.5s and to2 = 10—23.s of ‘Original Inflation’ were almost equal to the numerical values observed by NASA/WMAP。

**7-4\*。Let me compare the calculated data based on the author’s new mechanism of “Original Inflation” with another’s corresponding data**

According to the calculations to the ’Original Inflation’ by Prof. Su Yi in chapter 12.7 of his book《An Introduction to New Astronomy》,[2] he applied the formula**, R = k1t1/2**, R—characteristic size of our Universe，t—characteristic time (age), his calculated results were: **at t = 10—36s，R-36 = 3.8 cm.** R-36 -- the size of our Universe after ’Original Inflation’. However, he couldn’t point and calculate out the concluded time of ‘Original Inflation’ because scientists didn’t find the correct mechanism causing ‘Original Inflation’.

(7-4a) below was Prof. Su’s results.

**R-36** = 1.83×1025cm×(10—36s)1/2/(7×105×3.156 ×107 s)1/2 = **3.8cm** [5] (7-4a)

Author’s check to Su’s calculated results as below:

Owing to the total mass: Mu= 1056g, at R-36= 3.8cm, the density --36,

****  -**-36 = 3Mu /(4R-363) = 4.4×1053g/cm3 (7-4b)**

R-44 of Mu = (3Mu/4u)1/3 =10--13 cm (7-4c)

**R-36/R-44 = 3.8/10—13 = 3.8×1013 (7-4d)**

Su said that the volume of the Universe inflated (3.8×1013)3 = 1040 is right. [2]

Now comparing Su’s results with the author’s calculated results below:

The known numbers: **Mbm=10—5g，its** Rbm= 1.61× 10—33cm，-bm=1093g/cm3, Mu=1056g，[2]

Finding R44 at the birth time of our Universe,

** R-44= 2.8×10—13cm (7-4e)**

It was proved above that while our Universe reached to **t o1 = 10—36.5s** after ‘Original Inflation’, all Mbm could link together and concluded the ‘Original Inflation’ states that the whole Universe was formed from all bigger BHs--Mbo > Mbm.

Finding Mbo at the time **to1=10—36.5s.** Owing to the expansive times of Rbm and tbm of Mbm are the same after ‘Original Inflation’, then Rbo of Mbo was，

**Rbo**=no2Rbm=1020.3×1.61×10—33=**3.2×10—13cm**，

** Mbo =C2Rbo/2G = 2×1015g,**

**Mbo= 2×1015g were the original mini BHs.**

bo=3Mbo/4Rbo3=1.46×1052g/cm3,

Here bo was also the universal density at the time of t o1 = 10—36.5s after ‘Original Inflation’, and Rub (R-36.5) of the Universe-- **Mbo** = Mu was：

Rub3 =3Mu/4bo，** Rub= 12cm**  (7-4f)

**Rub/R-44=**R-36.5/R-44=12/(2.8×10-13)**=4.3×1013**

(7-4g)

**Conclusions：**Prof. Su’s data might be a typical case of ‘Original Inflation’**. Comparing(7-4a) and (7-4e) with(7-4f)and(7-4g), they are almost no difference. It can be seen that author’s new mechanism of ‘Original Inflation’ is correct and accords with the calculated data of scientists in the past.**

**【8】. To recognize the evolution of our comical-BHs (CBH) from seven different typical BHs with new BH-theory by author。**

**In Form 2 the harmonious and precise relationships between all numerical values of different parameters of various BHs in our Universe can confirm that the new BH theory and the new cosmogony proposed by author in this article are identical and effective.**

From above statements once newborn Mbl****=**** 2Mbm appeared in Planck Era, they could paste closely at the highest density of 1092g/cm3. Their combinations would cause violent space expansion, i.e, **‘Original Inflation’ from the birth-time of tm= 5.37×10—44s to 10—36.5s and then to 10—23s**. Thus, countless Mbl** =** 2mp could grow up to mini BHs of 2×1015g. After that mini BHs had to continuously combine, grow, and finally become a gigantic CBH at present. For recognizing the nature of our CBH, seven typical BHs with its numerical values of their parameters were listed on Form 2 below.

**Form 2: Numerical values of various parameters of 7 typical BHs on Rb [4]**

**========================================================**

**BHs; # 1 Mbm #2 mini BH - #3 middle BH- #4 moon BH- #5 star BH- #6 giant BH- #7 our CBH**

Mb (g)， 10-5g 1015g 2×1018g 1026 g 6×1033(3Mθ) 1042g(109Mθ) 1056g

**Rb (cm)， 1.6×10-33， 1.6×10-13， 3×10-10 1. 5× 10-2 9×105 1.3×1014 1.3×1028**

Tb (k)， 0.8×1032 ， 0.8×1012 0.4×109 8 1.3×10-7 7×10-16 7×10-30

**τb (s,yrs)，10-42s 1010yrs 8×1027 1044yrs 1066yrs 1092yrs 10134yrs**

ρb(g/cm3), 7×1092 7×1052 2×1046 7×1030 1.5×1015 7×10--2 7×10-30

**mss (g)， 10--5 10--24 10--27 10--36 1.6×10--44 10--52 10--66**

**ts (s)， 0.5×10-43 0.5×10-23 10-20 0.5×10-12 3×10-5 0.5×104 0.5×1018**

**ss(cm)， 3×10-33 3×10-13 6×10-10 3×10-2 1.8×106 3×1014 3×1028**

dτb(s) 3×10--42s， 3×10--21 10--18 3×10--11 1.7×10--3 3×105 1012yrs

**ss (s-1)， 1043 1023 0.5×1020 1012 0.17×105 10-4 10-18**

**ni， 1 1039 4×1046 1062 4×1077 1094 10122**

Er(erg)， 1016 10-3 10-7 10-15 10-23 10-31 10-45

**Im  (Io)， Io=h/2** **1039 Io  4×1046Io 1062 Io 4×1077Io 1094Io 10122 Io**

**In Form 2: Mb—**mass of a BH**, Rb—**radius of EH of a BH**, Tb**–temperature on **Rb, τb—**lifetime**; ρb—** average density of BHs**, mss—**mass of Hawking radiation**;** their numerical values are obtained from formulas (1a), (1b) , (1c), (1d), (4c), (5a)（5b） of Chapter I。

**Let ni = Mb/mss  (8a)**

Wave length ss of mss ; **ss = Ch/(2mssC2)**，owing to mssC2×2ts = h/2，so，

 **ss = 2Cts = 2Rb, frequency ss = C/ss  (8b)**

**ts = Rb/C (8c)**

**Er = mssC2  (8d)**

Io is information unit of mss, i.e, the minimum unit of information,Io = h/2π, and not decided by mass of Mb or mss. Im –the total information amount of a BH, Im= 4GMb2/C (63d).

**Various numerical values in Form 2 are the abundant treasure-house and rather harmonious for studying BHs and cosmology. They fully show that the expansion and evolution of our Universe as a CBH has been the result of combinations and growth of the continuous original Mbl=2mp=2Mbm, just as the author derived and calculated.**

**§1. Form 2 shows the continuously expansive history of our Universe as a CBH in 137×108years.** In the expansive process of CBHs, they grew successively from #1Mbm of 10—5g ⇒ #2 ⇒#3 ⇒#4 ⇒#5 ⇒#6 ⇒#7 our cosmic-BH(CBH) of 1056g. Any one of the seven BHs would have some special significance.

**§2。From #1-#6, the original BHs could impossibly exist in our Universe** because in the evolution **from 10—44 s of Planck Era to about tup = 4×105 years** of the end of Radiation Era, the difference of energy-matter density in the whole cosmic-BH varies **from 1092g/cm3 to ρbu= 10—20g/cm3 was very even,** it was observed from microwave background radiations (MBR).

**tup =（3/8**π **ρbuG）1/2 （8a)**

**However, the density of #6 BHs--ρb6 >10—1 g/cm3.** In the rapidly expansive process of The Universe the very uniform energy-matters would have impossibly contracted to resist the speedy universal expansion and let original BHs exist and remain in universal space.

After CBH entered the Matter-dominated Era, matters could separate off from radiation energy,the radiation temperature lowered quicker than matter-particles’because of cosmic expansion, and led to the contractions of matter-particles to become #5 and #6 BHs, but **they were second-born BHs.**

No matter how much mass the BH has, BHs of the same mass Mb can have the same numerical values of all parameters on their EH--Rb**, but the states and structures inside any BH may be greatly different.**

**§3。#1 minimum BH of Mbl = 2Mbm = 2,2×10—5g. They were the original cells of our Universe come from Planck Era.** The successive combinations of countless 2Mbm created the **‘Original Inflation’, i.e. so-called ‘Big Bang’.** After that our cosmic-BH went on the non-stop expansion to the present. After no energy-matters could be engulfed outside, our Universe as a CBH will lastly go to contract to Mbm 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, Mbo ≈ 1015g，they were formed at the concluded time of “Original Inflation”. Their lifetime ≈ the age of our Universe. In 1970s,** Hawking predicted, Mbo might exist in universal space; however, scientists could not find them for more ten years. Mass of a mss of Mbo ≈ mass of a proton, Mass of a Mbo ≈ mass of 1039 proton. 1039 was the large number of Dirac’s hypothesis**.**

**§5。 #3 middle BHs,** its mass ≈ 1019g：mass of its HQR-- mese ≈ 10--28g ≈ mass of a electron。

**§6。 #4 moon BHs, its mass ≈ 1026g；temperature on its Rb, Tb ≈ 2.7k, ≈ temperature of microwave background of radiations(MBR) of our Universe at present**. It is said that if there could be an isolated BH of mass <1026g in universal space，it would emit mss > 10--36g to outside and contract its size Rb; if its mass > 1026g, it would absorb in radiation energy from universal space and expand its size Rb. Although their final destiny would be the same and become Mbm = mp and disappear in Planck Era, but their lifetime could be very different.

**§7。 #5 star BHs,** their mass Mb≈6×1033g (3Mθ) or more. They could just be the **second–born and real objects existing in universal space after our Universe entered in the Matter-dominated Era.** After nuclear fusion finished through supernova explosion the remnants of the original stars of mass >（5~8）Mθ might become a star BH of mass ≈ 3Mθ. 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 ≈ 3Mθ. Then **3Mθ is the so-called Oppenheimer-Volkoff limit.**

However, those two conditions are just theoretical inferences and no real observations could provide reliable evidences.

The lifetime of **#5 star BHs** > 1066 years. Temperature on Rb, Tb ≈10--7k. Their Hawking radiations are very weak, mss ≈ 10--44g. They mostly hide in bi-stars system.

**§8；#6 Giant BHs, mass Mb ≈ (107 ~ 1012) Mθ：They could exist in the center of star clusters and the galaxy**. They could increase in its mass and grow bigger due to having much energy-matters outside. Stars and star BHs might be in the #6 Giant BHs. They might be formed in the earlier period of the Matter-dominated Era**. Quasars would be the precursor of some #6 giant BHs.** Their lifetime will be > 1076~101 years.

**§9; #7 Our gigantic cosmic-BH(CBH), its mass Mbu ≈1056g. It has been proven that the Universe would have become a real BH, i.e, CBH ever**. If no energy-matters on the outside were to be engulfed, our CBH could continuously emit Hawking radiations mss up to when it becomes Mbm = mp and then would explode in Planck Era. The lifetime of our CBH may be about 10134years. If having energy -matters outside, they can be thoroughly engulfed by our CBH afterwards. After that CBH will contract its size due to emitting non-stop mss. Finally, it’ll become Mbm ≈ 10--5g and vanish in Planck Era**.** However, its lifetime must >>10134years**。The destiny of our Universe as a BH will be completely different with the forecast of General Theory of Relativity.**

Hawking radiation mss ≈10—66g. Emitting a mss could take 1012 years. That time may be longer than 100 times of the age of our Universe.

**§10；mss of different BHs have greatly different properties.**

**A.** #1 minimum BHs-- Mbm = mp could only explode in Plank Era, and create γ-rays of the highest energy in Planck Era**.**

**B.** mss emitted by #1 minimum BHs ~ #2 mini BHs of 1015g; mss could be γ-rays from the highest energy to even bigger energy than pm =1.66×10--24g of the mass of a proton**.**

**C.** mss emitted by #2 mini BHs of 1015g ~ #3 middle BHs of 2×1018g; mss could be γ-rays from pm =1.66×10--24g of mass of a proton to em =10--28g of mass of a electron.

**D:** mss emitted by #3 middle BHs of 2×1018g ~ #5 star BHs of 6×1033g; mss are x-rays ~ the longest radio waves including light waves。

**E:** mss emitted by #5 star BHs of 6×1033g ~ #7 our gigantic CBH, mss may be all gravitational waves。

**§11；Comparing the numerical values of the parameters between #1 minimum BHs of Mbm = mp = 10—5g and #7 our gigantic CBH of Mbu ≈1056g below：**

**Ratio of parameters of #7Mb7 /#1Mb1**

**Ratio of the average temperature;(see below)**

Tu1/Tmw=0.71×1032/2.7=1031.4

**Tmw = 2.7k is the temperature of microwave background of our Universe at present.** Tu7 is the average temperature of our Universe at present. According to the theoretical law, Tu7 = 0.71×1032/1030.5 =22.4k. Now Tu7 > Tmw, it shows that the practical temperature Tmw is lower than the theoretical temperature Tu7 due to the separation of matters from radiation in Matter-dominated Era.

**Ratio of mass;** Mb7 /Mb1 = 1056 /10-5=1061 = ni;

**Ratio of radius of EH--** Rb**;**

Rb7 /rb 1=1.5×1028/1.5×10-33=1061,

**Ratio of Schwarzschild time;**

ts7/ts1 = 0.5×1018/0.5×10-43 = 1061;

**Ratio of temperature on Rb**;

Tb7 /Tb1= 7×10--30/0.8×1032= 10--61,

**Time ratio of emitting a mss**;

dτb7/dτb1 = 3×1019/3×10—42 = 1061

**Ratio of mss mass**; mss1/mss7 = 10—5/10—66 = 1061,

**Ratio of mss numbers--ni**；ni7/ni1 = 10122/1 =10122;

**Ratio of average density ρb(g/cm3) inside BHs**；

ρb1/ρb7 = 7×1092/7×10—30 = 10122，

**Ratio of total information amount**;

Im7/Im1=10122/1=10122

**Lifetime ratio;** τ b7/τ b7 = 10142/10—42 = 10184;

[Explanatory notes]: 1: Tu7 is not the temperature of microwave background radiations of our Universe at present. 2: TR1/2 = k3 in (9aa) originates from R = k2t in the same (9aa). However, R = k2t is just another manifestation of Hubble law in the evolution of our Universe. Therefore, R = k2t1/2 in (3a1) in many famous books, but it must violate Hubble law, so, it is incorrect and should change into R = k2t.

. It can be seen from the data of the above ratios that many new formulas between parameters may be derived, such as:

**Mb = k1Au；Au = tu = Rb/C; tuTb = k2; tu= k3Im2; tu3 = k4τb。 (8b)**

**§12；Some other conclusions to our CBH：**

**A:** It can be known from §11 that ratios of all numerical values proportional to mass Mb of BHs are 1061. Ratios of all numerical values proportional to mass Mb2 are 1061×2 = 10122, and ratios of Mb3 are 10184. Thus. it testifies once more that **our present CBH should exactly come from the combinations of Nbu× (# 1Mb1 = 2Mbm = 2mp).**

**B:** The same mass of all BHs can have the same numerical values of all parameters on their EHs--Rb, and those BHs have the same properties and destiny, but the states and structures of every BH inside may be completely different. The relationship of all numerical values of each BHs parameter is very identical and harmonious. It may prove that all **new concepts, formulas and conclusions proposed by author in this article are all right.**

**【9】； Checking the correctness or incorrectness of (3a1) of the standard model of our universal “Big Bang” with the new BH-theory and formulas proposed by author.**

**Tt1/2 = k1, R = k2t1/2, TR = k3, (3a1)**

Generally, Tt1/2 in formula (3a1) and the figures of (t—T) in Form 1 are correct and coincide in the period from Planck Era to the end of Radiation Era, but formula **R = k2t1/2 and TR = k3 in (3a1) are incorrect, and must be changed to**

**Tt1/2 = k1, R = k2t and TR1/2 = k3.(9aa)**

**Figure 1;The relationship between T and t in the evolution of standard model of our universal “Big Bang”** [10]



For example, let us check the figures in Figure 1 with the BH-theory and formulas as below:

**1\*: Taking the figures of a group (t—T) in Hardron Era of Form 1,** such as: **tu = 10—6s; Tu=1013k;**

From Hubble law, due to **tu = 10—6s;**

ρ = 3H2/8πG = 3/(8πGt2) (9a)

ρutu2 =3/(8πG) = 1.79×106  (9b)

Due to tu =10--6s, so, ρu =1.79×1018g/cm3,

 **Ru** = Ctu = 3×104cm, (9c)

 **Mu = 4πρuRu3/3 = 2.023×1032g, (9d)**

**2\*:**  Finding the universal temperature Tu in Mu **from（3a1）, Tt1/2 = k1,**

From【1】in Chapter 1, the figures of Mbm = mp

Rbm≡L p=1.61×10—33cm；Tbm≡T p= 0.71×1032k;

Compton time t c= Schwarzchild time ts of Mbm

tc=ts=Rbm/C=1.61×10—33/3×1010=0.537×10—43s Tbm(ts/ tu)1/2 = Tu;

 **Tu**=0.71×1032(0.537×10—43/10—6)1/2 = **1.65×1013k**;

Thus, Tu=1.65×1013k of CBH is almost equal to **Tu=1013 k given in Form 1.**

**Checking Rbm/ts and Ru/tu,**

**Rbm/ts=**1.61×10-33/0.537×10—43=3×1010cm/s= C

**Ru/tu =**3×104/10—6 = 3×1010cm/s = C

**Obviously, R = k2t1/2 of (3a1) is wrong,** because **Rbm/ts1/2=0.7**×10—11; but **Ru/tu1/2=**3×107.

**3\*: Mu = 2.023×1032g** of (9d) being a complete Schwarzchild BH can be proved as below.

According to (1c) in Chapter 1, GMb/Rb = C2/2.

**Rb =** 2GMu/C2 = 2×6.67×10--8×2.023×1032g /9×1020 = 3×104cm **= Ru.**

In reality, from figures of (9d)，(9a) and (9c), **Mu and Ru** can be placed into (1c)--GMu/Ru = C2/2. It shows that our expansive Universe **Mu** could have been a complete CBH at any time.

Owing to **R = k2t1/2 of** **(3a1) in the standard universal model is wrong, it must be changed into the correct formula (9e) below,**

**R = k8t,** Correspondingly,

**R1/2T = k9**，  **(9e)** Checking **R1/2T of** Mu;

 (3×104)1/2×**1013k=1.7**×**1015**

Checking **R1/2T of** Mbm：

(1.61×10—33)1/2 ×0.71×**1032 = 4**×**1015**

**4\*: Average temperature Tu in CBH--Mu has always and completely been different with Tb on Rb of CBH.**

According to **(3a1), Tt1/2 = k1, Tutu1/2 = Tbmtsbm1/2.**

But from (8b), tuTb = k2;

 **Tbtu =Tbmtsbm.**

Then, to Mu = 2.023×1032g of (9d); so,

**Tb = 0.38×10--5k;**  but **Tu=1.65×1013k;**

**5\*: Conclusion:**

**All above calculations show that figures in form 2 are completely right. However, figures of (t--T) and (3a1）--Tt1/2 = k1 are right, but R = k2t1/2 and TR = k3 in (3a1) are wrong.**

Moreover, from the numerical values of Mbm = mp, it can be seen that their Rbm/tsbm = 1.61×10—33/0.537 ×10—43 = 2.998×1010cm/s ≡ C—light speed.

**Obviously, only R = Ct should be in complete accord with the expansive law of our Universe as a CBH, i.e, Hubble law.**

**[Annotations]. Formula R = k2t1/2 originates from References [2] and [5].**

**【10】; Explanations、analyses and conclusions to some important problems in BH-theory and cosmology**

**§1:** Singularity was defined as a point having infinitely great density. Owing to particles as point structures in EGTR that have no heat resistance to oppose its gravities; and supposing the universal model have equal pressures and contraction of equal energy-matters for solving EGTR, it could certainly lead the equal energy-matters contract to Singularity. In this article, applying Hawking and other classical formulas about BH theory, the author can further derive out many new formulas about BHs, such as (1d) mss Mb = hC/8πG and (1e) in Chapter I, which **has completely proved that our Universe as a real CBH could only originate from the combinations of countless minimum BHs--Mbl = 2Mbm= 2mp,but impossible from Singularity. Similarly, a ball of equal energy-matters in BH can impossibly contract themselves to Singularity too.**

The author’s new BH-theory shows that it is unnecessary in order to solve the complicated problems of BHs and cosmology to research the complicated structures and states inside BH and to solve ETGR.

**§**2: In reality, John and Gribbin pointed out in his book ***Companion to the Cosmos***，that “Our Universe might originate from particles of Mbm ≈ 10--5g” [7 ]. (Planck Era）was the new-born state of our Universe.”[7] In this article, author can better testify about John and Gribbin’s supposition with new formulas and complicated calculations.

**§3:** **According to formula（1c）, Rb= 2GMu/C2，and Mu=4πρuRu3/3; formula (1n)--****bRb2 = 3C2/(8πG) can be got. Thus, for our Universe of Mu as a CBH, its real average density ρu can be easily and exactly calculated out.**

**** ρu = ρb1 (Rb1/Rb7)2 =1092(10--61)2 = 10—30g/cm3

**ρu = 10—30g/cm3 can completely accord with the real observational values.** **It do clearly prove that our expansive Universe as a CBH can surely originate from the combinations of countless Mbm.** It clearly denies that, applying Friedmann’s model of (Ω = ρr / ρo ≠ 1) to decide the open or close of our Universe is a wrong proposal.

**§4;** 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 9×109years ago. The main stream of present scientists proposed that, dark energy of exclusive force appeared in our Universe 9×109 years ago and led our Universe create 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 of its Ru = Rb, author proposed a simple hypothesis, that our CBH might collide and combine with another CBH about 9×109 years 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. [8]

**§5。The existence of multi-universes could have the greatest possibility.**

**Our present Universe is a** #7 CBH of Mbu≈1056g. According to the exact calculations, the size of our CBH was just like a atomic nucleus of r ≈10—13cm at its new-born time in Plank Era. **It shall hardly imagine that, the gigantic Pre-universe could only collapse a sole Universe of ours so small like an atom.** The greatest possibility was that our Universe could only be one of multi-Universe. Besides, the expansion of our Universe with speed C all the time could show clearly that, there would be full energy-matters outside for our CBH to be engulfed. Energy-matters existing outside could not belong to our Universe , but another Universe.

Early in 2005, theoretical physicist, Laura Mersin Horton in the U.S. University of North Carolina at **Chapel Hill and prof. Richard Horman in Carnegie Mellon University put forward the theory of the cosmic radiation abnormal phenomenon and estimated that this situation is due to other universes gravity attract resulting.**

**In March 2013,** the European Space Agency announced the Planck telescope captured data to map out the Omnimax cosmic microwave background radiation pattern. Piece by far the most accurate radiation patterns show that the universe 13.8 billion years still exists before the radiation emitted by the Big Bang. [13]

Horton accepted an interview and said: “This abnormal phenomenon caused by the gravitational attractions of another Universe to our Universe, that attractions had existed at the time of “Big Bang”. It is a realistic evidence of the existence of another Universe discovered by us up to now.”[13]

**§6。The universal structure may be the smaller BHs covered by the greater BH, layer by layer.**

Since there might be a greater Universe outside our Universe as a CBH and a smaller BH in the center of any cluster galaxy as well as many star BHs inside our CBH, it can be seen, the known structure of BHs from outside our CBH to inside our CBH are just the structures of BHs layer upon layer , i.e., a greater BH can often cover in many smaller BHs. We may know that the star BHs and #6 giant BHs in our Universe, but mankind cannot know forever how greater CBH could wrap our CBH and how many CBHs might be parallel to our CBH outside .

**§7。**Obviously, **the BH-theory and cosmology came from classical theories, many important problems can be better solved by author with classical theories and formulas. It shows,** the classical theories and formulas can have not gone to the end yet.Hawking said recently in California Institute of Technology: “Our Universe was born from Big Bang, this process did not need the helps from God at all,” Author clearly demonstrated that our Universe as a CBH could only originate from countless Mbl = 2Mbm =2mp in Planck Era. Thus, **Some false conclusions about our Universe created from Singularity and Singularity existing in BHs, etc, can be given up.**

**§8。**The material structures of the great Universe may be divided many different states and levers or layers, just as water in the different states of solid、liquid or gas. Every state needs and suit to apply different formulas. It can be seen from this article, there may be 3 different great states at least: first, Planck Era of extremely high density might accord with string theory, supersymmetry and string **theory, quantum** field **theory, e**tc,. Our material world must firstly accord with Newton mechanics, thermodynamics, quantum mechanics and Special Theory of Relativity. After all BHs in our Universe disappear and change into Hawking quantum radiations mss in the remote future, it may be a ice-cold、silent and lethargical world.

**§9;** In near 100 years, many scientists exhausted all their energies, but could not propose the exact data of various parameters in some important evolution period of our Universe, **because they didn’t know the complete theory of BHs and formulas (1d) (1e) derived by author**. From Form 2, the numerical values of different parameters of 7 BHs can exactly describe the actual evolution of our Universe as a CBH, it has been an expansive process of Ru= Rb of our CBH engulfing the suficient energy-matters outside with speed C and according to Hubble law. Besides, in this article, author better proved and explained that, our Universe as a CBH was born from Mbl = 2Mbm =2mp; the new mechanism of ‘Original Inflation’ and all calculated data do not violate the current records observed by modern telescopes and the formulas of all classical theories.

Thus, **‘Blackhole-cosmology’ as the title of this article is worthy of the name.**

**====The End====**

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