

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

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

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

[Dongsheng Zhang. The New Concepts to Big Bang and to Black Holes Both Had No Singularity at All. Academia Arena 2010;2(10):1-4]. (ISSN 1553-992X).

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

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

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

In this article, some Hawking laws about BHs will be applied, as to study the changes of physical parameters on the event horizon of BH. The superiority of Hawking theory about BH is that, the variations of physical parameters on the event horizon of BH can completely obey quantum mechanics and

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

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

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

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

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

2\*. Let  $M = M_1 + M_2$ , according to the thermodynamic laws, in case  $M_1$  in the shrinkable process could only decrease in S and increase in T and pressure with emitting energy-matters outside, and  $M_2$  would get the corresponding increments from  $M_1$ , then  $M_1$  could gradually reduce its energy-matters and shrink its size. Once  $M_1$  could not remove out any energy-matters from inside,  $M_1$  would stop its contraction at once. If  $M_1$  as a original nebula could shrink its size and increase in  $T \approx 2 \times 10^7 \text{k}$  and T reach the temperature of nuclear fusion in its center, thus, a new star would appear in the sky. In the star conditions, once energy produced in a star core ( $M_1$ ) from nuclear fusion could be equal to the amount of energy discharged out from  $M_1$ , star ( $M_1$ ) would keep its constant temperature and pressure inside, and no more shrink its size in a long-term period. Only in the shrinkable process losing energy-matters, the process can really accord with thermodynamic laws. It clearly shows that, if no energy-matters emit outside, a definite amount of energy-matters (M) cannot shrink its size with the sole gravitational forces by itself.

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

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

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

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

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

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

temperature  $T$ , the elastic forces of rubber ball can be neglected.

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

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

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

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

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

【5】。 At first, GTRE has only two items, i.e. the first item is Einstein tensor to describe the geometrical characteristics of time-space; the second one is energy-momentum tensor to describe the field of energy-matters. In reality, GTRE should be a unstable

dynamical equation, it could hardly describe the motions of every particle in or out a ball which is shrinking. It is the reason why GTRE must set up two false hypotheses to violate the thermodynamic laws for getting a solution of stable state, one is "definite energy-matters", another one is "universal model of zero pressure". Just those two false hypotheses let GTRE to inevitable appearance of singularity. It clearly Shows that, only the states of a ball of energy-matters are extremely approximate to above two hypotheses, GTRE may be solved and get some better results. For examples:

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

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

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

【6】。 In our universe, either any stable thing or body, or a stable ball of matters, their stable structures are all the results of balance inside between gravitational forces and heat pressures as exclusive forces under the condition of some definite temperature and pressure. Thus, keeping the limits of permitted temperature and pressure can just be keeping the stable existence of the structures of that thing or body or a ball of matters. It shows that, the stable and solid structures of a matters or a body, but not broken, can resist the gravitational collapse of great amount of matters. If the sole contraction of gravitational forces of definite energy-matters can't overcome the resistance of solid structure, the contraction can only be stopped.

1\*. In our universe, any body of mass  $<10^{15}g$  always has a little solid core, which can support the gravitational collapse of a great amount of mass outside the core. Any planet has a solid or liquid iron core to resist the gravitational collapse of mass outside the core. Sun and all other stars must have a stable core of very high temperature and pressure producing

nuclear fusion, which can maintain the high pressure in core to resist the gravitational collapse of matters outside the core. Every white dwarf has a solid core of high density about  $10^6\text{g/cm}^3$ . Any neutron star has a solid core of high density about  $10^{16}\text{g/cm}^3$ , which can only produced by the strongest explosion of supernova in our universe. Generally, after a supernova of the original mass  $> 8 M_{\odot}$  (sun mass) exploding, its survivals may form a star BH with density of about  $10^{16}\text{g/cm}^3$ . In any star BHs, the highest density in core may  $\leq 10^{16}\text{g/cm}^3$ .

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

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

【7】. It can be seen, 1\*. if wanting to get the stable orbit of any particles  $m_s$  in or out a ball of energy-matters from GTRE, then, the exclusive forces of heat pressure must be added into item of energy-momentum tensor in GTRE, but not  $\Lambda$  added outside the item of energy-momentum tensor. 2\*. In case a ball of energy-

matters have the gravitational collapse, a solid core and its structure must exist. In reality, above two conditions (heat pressure and structure of high density) should just be the mechanisms or origin in nature to obstruct the occurrence of Singularity. However, the current GTRE has no way to be added in those two or any other supplementary conditions, it would certainly break the perfection of GTRE and impossibly be permitted by Einstein and GTRE. Those are reasons why GTRE just has a showy appearance, but hardly had practical use in the past 100 years. Furthermore, R.Penrose and S.Hawking got a monster of inconceivable singularity from GTRE.

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

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

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

【9】. In Part 1 of this article, it will be proved that, the final collapse of any BHs would be minimum BHs-- $M_{\text{bm}} = (hC/8\pi G)^{1/2} = m_p$ , and disappeared in Planck Era. In Part 2 of this article, it will be proved that, our universe was originated from minimum BHs-- $M_{\text{bm}} = m_p$  in Planck Era, not originated from singularity, or the Big Bang of singularity.  $= 1.09 \times 10^{-53}\text{g}$ .

5/5/2010

This article originally published in [Nature and Science. 2004;2(3):1-4].