Queries about EGTR, it is innate defects----《Part One》 ==No heat to resist the gravities of particles in the item of Energy-momentum Tensor (EMT) can be one of innate defect of The Equation of General Theory of Relativity (EGTR)==

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《Abstracts》: This article aims to demonstrate that, the mainly innate defect of EGTR is **no heat in item of Energy-momentum Tensor (EMT)** of EGTR **to resist the gravitational contraction of particles**, it must let the gravitational contracts of pure matter-particles violate the thermodynamic laws, and finally lead to the appearance of Singularity in the Universe and black holes (BH). However, if the heat energy could be added on every particle of **EMT**, the solution of complex EGTR would not be solved. It has been a selection of dilemma for scientists in about 100 years. Secondly, the law of mass-energy swap $\mathbf{E=MC^2}$ would be widely applied to black holes (BH) and cosmology, but radiations in EGTR could not be considered as having its mass. Therefore, $E=MC^2$ could not applied in EGTR to solve any problems of BHs and cosmology. In BHs and in the process of forming any BH, and in the evolution of our Universe, the mass-energy swap would be inevitably occurred at anytime, how could have no expression of $E = MC^2$ in EGTR? Thirdly, the dot structure of particles in EGTR should be other important reason to produce Singularity in solving EGTR. On the times of Einstein establishing EGTR, there were no BH-theory, no universal expansion, no nuclear fusion, no 'Big Bang' of the Universe, etc. so, above important problems in EGTR were probably limited by the historical reasons and the scientific-technical levels and not be considered into EGTR by Einstein. However, **above important defects of EGTR cannot conceal its great virtues yet.** Einstein's GTR and EGTR could have epoch-making significance in mankind and scientific history. 1*; Einstein established the united time-space world outlook of four dimensions; 2*; Formula $E=MC^2$ had laid on the solid foundation for modern science, even if no EGTR, Einstein had reached to the scientific summit too. 3*; The great success of solving EGTR might be the special solution to EGTR got by Schwarzschild in 1916, i.e., $\mathbf{GM_b/R_b = C^2/2}$, it was the first important formula for BH theory, and defined the exsistent and necessary condition for Schwarzschild BHs (included Kerr BHs) of no charges、no moments of momentum and spherical symmetry. Why can the Schwarzschild solution to EGTR be the sole correct result? Because formula $GM_b/R_b = C^2/2$ is just to expresses the result of existence of any BH, **but has no relevant with the process to form a BH.** However, that process must be a thermo-dynamically irreversible process, instead, EGTR is only considered as a availably reversible process.
[Zhang Dongsheng. **Queries about EGTR, it is innate defects.** *N Y Sci J* 2014;7(4):40-45]. (ISSN: 1554-0200). http://www.sciencepub.net/newyork. 8

《Key Words》: The Equation of General Theory of Relativity (EGTR); innate defects of EGTR; Energy-momentum Tensor (EMT); no thermal resistance; to violate the thermo-dynamical laws; Schwarzschild solution to EGTR; Schwarzschild black holes; blackhole(BH)-theory; Plank Era.

《1》; In modern physics, almost all new concepts, such as Singularity, the universal origination, BHs, zero-point energy, vacuum energy, dark energy, multi-dimension space, etc, can be put into the basket of EGTR as cosmological constant Λ. However, they could almost **deviate from the really physical world and cause many important mistakes.** For example, Singularity have puzzled scientists over 50 years, but no indication showed the existence of Singularity having infinite density in the Universe. For another example, according to the calculations by J. Wheeler and other scientists, the density of vacuum energy might reach to $10^{95}g/cm^3$ [4]. **Those unimaginable results may prove that EGTR has some great innate defects hardly to be overcome.**

However, about 40 years ago, R·Penrose and Hawking discovered EGTR would cause 'Singularity' of no time-space significance; the evolution of galaxies could collapse into 'Singularity'; the beginning of the Universe originated from Singularity, even the naked Singularity might exist. Thus, in order to avoid the theoretical mistakes of EGTR, scientists had to propose many assumptions; such as 'principle of cosmology', '**hypothesis of cosmic censorship**' and 'the universal model of constant (zero) pressure'.

Singularity as a discovery of morbid theory was an important progress in the theoretical research, but it could not tally with the equivalent principle. [3] Besides, it was a wrong result to treat EGTR as a reversible process. However, in reality, from the beginning of the Universe up to the present, the

continuously expansion and decrease in temperature of the Universe expressed that our universal evolution would have been an 'irreversible process', **no force so much great could let the Universe or its part 'reversibly' return back to 'Singularity'.**

《2》; EGTR was a product come from Einstein's head, but not established on the reliably and profoundly experimental foundations, besides, no concept of universal expansion and BHs at that time. From the standpoint of dynamics, EGTR having only gravities between all matter particles, but no thermal resistances **must certainly be a instable equation,** and lead Singularity of infinite density appear at their mass center. So, the running orbits of any particle in EGTR cannot be solved due to the innate defect of no thermal resistances. **The existence of any stable body must be the result of balances between its gravities and repulsions in its internal**. Λ as a cosmological constant added in EGTR by Einstein later as repulsions was put to the outside of the item of Energy-momentum Tensor (EMT), theoretically, Λ as repulsions can only let object move as a whole, but no way resist the contraction of every particle in object to go to Singularity. So, the running orbits of every particle in object are impossibly found out by solving EGTR.

《3》; The greatest contribution of Einstein in modern science and philosophy

Einstein established Equation of The General Theory of Relativity (EGTR) in 1915. Despite EGTR had some great defects, but it as a world outlook of four dimension integrating time and space together has been epoch-making significance as a creatively scientific and philosophic ideas. [3] According to Einstein's common expression, a steel ball put on a paddy rubber film can curve the film. Similarly, the sun like a steel ball would bend its surrounding space. Therefore, EGTR may more precisely calculate the precession of mercury near perihelion, which cannot be explained with Newton mechanics. EGTR foretold that lights would be curved while they passed through near the sun. Newton system is a uncompleted system. [3] Moreover, it was other greatest contribution in modern science that Einstein successfully created the formula of $E = MC^2$. In 1916, Schwarzschild got a special solution to EGTR, i.e., $M_b = C^2R_b/2G$, it defined the existent condition of gravitational BHs. In brief, after Einstein death, scientists could not get some much great achievements in developing EGTR, but derive out some big mistakes in the process to solve EGTR. Einstein system was a uncompleted system too. [3] In his old age, Einstein wrote: "Everybody thinks, when I look back the works all my life, I will feel calm and satisfied. However, on the contrary in fact, in all concepts proposed by me, no one I am sure, is so solid as the rock. I also feel no confident that I have totally been in the correct orbit. " The greatest scientific giant having created marvel and gained the epoch-making successes modestly stated a truth with his glorious life. [3]

《4》; The main problem and innate defects of EGTR hardly to be overcome could be to have no heat effects in Tensor item (EMT) of EGTR. That is to say, EGTR described a reversible process of no time direction. Thus, the absurd conclusions that a great ball of matter particles could contract into Singularity with gravities of all particles themselves would be certainly got from solving EGTR. **The thermo-dynamical laws are the radical laws in the physical world formed from protons,** it can be the reflection of law of causality. In the present world, any theory of universality, such as string theory, film theory, etc, would hardly succeed without thermo-dynamical effects. All old solutions of EGTR had two main essential prerequisites or hypotheses, one is conservation of mass (an isolated system) , another is the model of constant pressure. **Just those two hypotheses are to violate the thermo-dynamical laws,** and finally lead the appearance of Singularity in the process of solving EGTR.

《5》; Suppose a great ball of constant matter-particles M in process of the adiabatic state:

1*; When M in the adiabatic process from state 1 can change into state 2, the relationship between amount of heat Q, entropy S and temperature T should be as below:

$\int TdS = C + Q_2 - Q_1$。

At the condition of $Q_2 - Q_1 = 0$, according to the second thermo-dynamical law, entropy S are always on the increase, so, the temperature T must be on the decrease. It is the clear expression that in the free and adiabatic condition to change their states, the constant M can only expand its volume and lower its temperature, and be impossible to contract its volume at all with the action of gravities of M themselves. **(only after something do work on M, then, M may contract under the pressure.)**

2*; **In a non-adiabatic system, anything expands with heat and contracts with cold, that is the law in accordance with the thermodynamics in nature.**

Suppose there are a constant amount of energy-matters $M = M_1 + M_2$, and M_1 is not in a adiabatic process. According to the thermo-dynamical law, although M in the adiabatic process, but part M_1 is not. If part M_1 could increase in its temperature and

exclude the surplus heat, then, M_1 would contract its volume and entropy. However, another part M_2 would increase in more heat and entropy. That is to say, only some heat in M_1 can be first excluded out into M_2, so, M_1 will contract its volume. If M_1 want to continue its contraction, it must continue to exclude its heat inside to M_2. **Once M_1 stop to exclude its heat, it will contract no more.**

Everybody knows, in a process of manufacturing liquid oxygen or liquid ammonia, they must be continuously added the external pressures and be excluded the internal heat, just those two necessary conditions can let oxygen and ammonia increase in their density and contract their volume. That is the real contraction process for a constant mass **in accordance with the thermo-dynamical law. In nature, there will not be a real process** for a constant energy-matters to contract its volume without excluding its internal heat. It can be seen, to a constant energy-matters, the contraction process without excluding heat as an assumption of EGTR must violate the thermo-dynamical law, and lead the appearance of Singularity.

3*; Since any BH can't exclude its internal heat or energy-matters in BH, it has no way to contract its size, but it is more impossible to contract its size into Singularity.

According to the new BH-theory proposed by author in [References 1], once M_1 could continuously contract its size into $\mathbf{M_b = C^2R_b/2G}$ due to exclude the energy-matters in BH, M_1 would become a BH M_b. Then, all energy-matters in BH must be always cooped in the Horizon radius R_b. If there were energy-matters outside near R_b, they would be engulfed into BH. If no energy-matters outside, BH would non-stop emit Hawking radiations m_{ss} to outside, and decrease in M_b and R_b, until M_b finally contract to become the virtual BH M_{bm} = Planck particle m_p, i,e., $m_p = M_{bm} = m_{ss} = (hC/8\pi G)^{1/2} = 10^{-5}$g, m_p as particle of the highest energy could only be disintegrated and disappeared in Planck Era. [1] Just the wrong assumption of no energy (heat) excluded to outside proposed by Penrose and Hawking in solving EGTR, could lead energy-matters in BH contract their size and finally lead Singularity appear in BH $\mathbf{M_b}$. It can be seen, that assumption must be to violate the thermo-dynamical laws.

《6》; In the real world, suppose a particle m_s in or out of the rubber ball **M full of constant amount of energy-matters, how could the running orbit (geodesic) of m_s be effected by the change of temperature and state of M?** Let R be the radius of ball M, T be the temperature of M, and let the elasticity of rubber ball be neglected.

1*; If m_s is on the outside of R of a ball M, m_s has distance R_s to the center of ball. Then, m_s is acted by gravities of M and has a defined running orbit, so, the curvature of R_s is K_s. If M has a expansion to reach temperature T_1, R will enlarge to R_1, so, $R_1 > R$, it lets the gravities of M to m_s become bigger , and the distance R_1 between M and m_s will become shorter to keep the balance between gravitational force of M and centrifugal force of m_s. Then, K_s changes into K_{s1}, and $K_{s1} > K_s$。

2*。 If m_s is on the outside of R of the ball M, m_s has first distance R_s to the center of ball. Then, m_s is acted by gravities of M and will have a defined geodesic, so, the curvature of R_s is K_s. If M has a contraction to higher temperature T_2, R will shrink to R_2, so, $R_2 < R$, it lets the gravities of M to m_s become smaller , the distance R_1 between M and m_s become longer. So, K_s changes into K_{s2}, and $K_{s2} < K_s$。

3*。 If m_s is in the ball M, m_s has first distance R_s to the center of ball. Then, m_s is acted by gravities of a certain part of M (according to G•B Birkhoff principle) and will have a defined geodesic. No matter whether the volume of M is expand or contract due to the temperature change of M, the geodesic and R_s of m_s must be changed, That is to say, the assumption of universal model of constant pressure by EGTR would violate thermo-dynamical laws of the physical world. **The temperature change of any constant M must cause the expansion or contraction of M and change the geodesic of a particle m_s,** it cannot be neglected at all times.

In reality, above analyses express every particle in M has its heat action in Tensor item of EGTR , it may correspondingly be equal to add the energy density of $\rho_\Lambda = \Lambda/8\pi G$ or add the pressure intensity of $p_\Lambda = -\Lambda/8\pi G$ on particles in EMT. Although EGTR may become more correct but more complicated, and nobody can solve so much complicated EGTR. **Moreover, the problem is that ρ_Λ and p_Λ not only have the relationship with the pressure and temperature of M, but also with the structure of M.**

Therefore, **scientists have to add many simplified assumptions for solving EGTR.** After a BH of M_b was formed, no heat energy can be excluded to outside except the tiny Hawking radiations being emitted to outside one by one. So, **the heat caused by the contraction of M_b must resist the gravitational contraction of M_b. Then, it could be an absurd talk that energy-matters in BH would finally contract into Singularity.**

《7》; The steady existence of anything must be the results of internal balances between all gravitational forces and all exclusive forces under the conditions of some constant temperature. Therefore, EGTR of only gravitational forces but no exclusive forces must be to violate the principle of anything having its steady internal structure.

First; anything having mass < 10^{15}g is uncertain to have a solid center, its structure can resist the gravitational contraction. However, all objects of mass > 10^{15}g, such as planets, stars, white dwarfs, neutron stars, galaxies, star clusters, etc, must have the more solid core in center to resist the gravitational contraction. Earth and planets may have the fluid or solid iron center. Sun and stars can have a core of very high temperature and pressure caused by nuclear fusion. In the center of neutron stars or BHs of $3M_\theta$, there may be a very solid core of high density about 10^{15}g/cm^3 formed from some hyperons or solid neutrons. In the center of every galaxy, there may be a giant BH of bigger density.

Second; **In nature, the really key problems may be that the strongest pressure can only be caused from the explosion of supernovas, their so high pressure can only produce a core of high density about 10^{15}g/cm^3 in neutron stars or in BHs of about $3M_\theta$,** but cannot produce matters of density >10^{16}g/cm^3. So, in the real world, ultra-stable protons could reach the high density enough from 10^{16}g/cm^3 ~10^{53}g/cm^3, and quarks could reach the very high density enough from 10^{53}g/cm^3~10^{93}g/cm^3. [1[Thus, after a BH formed, its internal had no way to cause the supernova explosion duo to no hydrogen, but protons and quarks of very high density from 10^{16}g/cm^3 ~ 10^{93}g/cm^3 as a solid core could resist the gravitational contraction of BH of any high density. How could Singularity appear in BHs?

Third; In 1915, when Einstein established his EGTR, he just knew 2 fundamental forces----gravitational force and electromagnetic force, but did not know other 2 fundamental forces----weak force and strong force. Two former forces can only produce matters of density about 10^2g/cm^3. probably, people at that time would believe the gravitational contraction of matters to be able to straightly reach to Singularity without the resistance of matters of very high density. Now we know, under the actions of weak force and strong force, the density of quarks in protons can reach to 10^{93}g/cm^3. Can the strongest gravitational contraction of some small BHs weigh down so solid core of density from 10^{16}g/cm^3 ~10^{93}g/cm^3?

Conclusions: <u>The gravitational contractions of a great ball of energy-matters need not only to overcome the thermal resistance caused by gravitational contraction and nuclear fusion, but also need to destroy the strong structure of solid core of very high density. That is to say, Singularity proposed by Hawking and Penrose in EGTR is impossible to appear in nature at all.</u>

《8》; Only two items of the original EGTR like Newton second law was just a dynamical equation. Where would be the boundaries of validity of EGTR? Under what conditions could the more precise results be got by EGTR? Why could orbits of the precession of mercury around the sun at perihelion calculated by EGTR be more precisely than Newton mechanics did? Why would the deflection of lights near the sun become the more precise confirmation of EGTR? Could EGTR not added any supplemental condition be solved?

1; If a particle m_s is near the outside of a great object M or the Universe M_u, its geodesic motion calculated out from EGTR should be more accurately but more complex than from Newton mechanics. Because the total gravities in EGTR are recognized as all particles **scattered** in the whole space of object, but in Newton mechanics, all particles in object causing gravities are recognized as **a centralized force at its center.** That can be a real difference between EGTR and Newton mechanics.

If the running orbits of m_s is far away from M or M_u which may be regarded as **a centralized force**, it can be directly got from the simple Newton mechanics.

2*。For example, when solving the precession of Mercury at perihelion of the sun, EGTR can be able to get more accurately calculated values than values got from Newtonian mechanics, because the total gravities of mass M_θ as a concentrated force in Newton mechanics may have greater error than that all particles of M_θ as the scattered forces in the whole space of the solar radius R_θ in EGTR. Moreover, every particle in M_θ is treated as a rotating object around the center in whole M_θ space. They are correct amendments of EGTR to Newtonian mechanics, and are reasons why EGTR is more accurate than Newtonian mechanics.

3*。When the gravitational deflection of a light runs in vicinity of the sun, according to the defined viewpoint of EGTR, **the photons are all no gravitational mass**, and the solar sphere is as a constant diameter and temperature, so deflection of light can only be such interpreted as its geodesic motion in accordance with the view of FGTR. This is the problem not solved by Newtonian mechanics .

Conclusion: The reasons why more accurate results in above problems can be solved by EGTR is that the gravitational field produced by energy-matters can be recognized as in the stable states of keeping equal size and temperature, and is to neglect thermo-dynamical effects in the gravitational field.

Some additional explanations:

A; When m_s, Mercury and lights are **near the outside of a stable field of M_u or M_θ keeping** the constant temperature and size**,** the geodesics of m_s, Mercury and lights can be calculated by EGTR or by Newton mechanics. However, the more accurate geodesic motion calculated by EGTR than by Newton

mechanics, but the calculations with EGTR are much more complex than with Newton mechanics.

B; Rotation of particles in the sun should be more accurately calculated by EGTR.

C; If lights run on the equatorial plane of the sun, the extremely small red shift or blue shift of light should occur, but it may be too small to be measured.

D; However, **if you do not follow the view of special relativity, and assume that photons may be considered to have its equivalently gravitational mass, then,** using Newtonian mechanics to solve the running orbits of light deflection near the sun is extremely likely.

《9》； If a particle m_s runs near the outside of the horizon radius of our Universe, though its geodesic motion could be calculated by EGTR, but it would not be measured or observed. It has exceeded the horizon and has meaningless to us.

《10》；1*； If using EGTR without cosmological constant Λ to study the internal motion of particle m_s in some objects, such as in the universe, in some great areas or great objects (galaxies or stars), due to the assumptions of only pure substance gravity, and no internal thermal resistance of particles (included heat repulsive force generated by the gravitational contraction and nuclear fusion, structural resistance of the object of very high density, the resistance caused by Pauli exclusion principle between material particles, etc.) to antagonize gravities, EGTR is only an unstable and shrinking equation, Singularity will appear certainly. This is the inevitable conclusion got by R•Penrose and Hawking in 1970s. 2*; However, if the cosmological constant Λ of EGTR is added to the outside of Energy-momentum Tensor (EMT) item as the real resistance to study the geodesic motion of a particles m_s in an object, such EGTR may not be solved due to that m_s are effected by two gravitational fields of object and Λ. 3*; If Λ is added in the object, EGTR may be very hardly solved, even have no way to be solved. 4*; If some prerequisites are given for simplifying the solutions of EGTR as scientists did before, it must be to violate the thermo-dynamical laws. **They are just the paradoxes of EGTR**.

Although in 1917, under the conditions of ignoring temperature (actually a constant temperature) affect, Einstein got a solution of a steady state of the Universe with EGTR, however, in 1927, Lemaitre pointed and proved that Einstein's solution was really unstable.

《11》； Therefore, if EGTR can be used to solve the real geodesic of some particles m_s in the universe, or in some objects, it must add some repulsions on every particle m_s, such as heat in EMT item of EGTR, simultaneously, **it must be known that a solid core of certain size exists at the center of object as a supplemental condition.** Only in this way, the appearance of Singularity can be avoided; but the real geodesic of any particle m_s in object may hardly or impossibly be got from solving EGTR. However, **if the heat distributions and the size of more solid core in object can be well known, the running orbits of any particle m_s in object will more easily solved out with Newton mechanics, who wants to use the very complex EGTR ?**

This is the root causes that EGTR until now, except using as a universe outlook, but did not get out some importantly scientific successes in BH (black hole) theory and cosmology. Since many premises to violate thermodynamics must be proposed for simplifying solution of EGTR, it will certainly lead to appear many fallacies, such as "singularity."

《12》；The original EGTR has no Λ as repulsion, so, it is impossible to explain the expansion of the Universe. Λ as a repulsive cosmological constant was later added to the outside of EMT of object M in EGTR. Therefore, **Λ as a repulsion can only act on whole object M and let the movement of M as a whole.** If Λ added in EMT can let every material particles m_s having its different orbits in M, so, the different geodesics of different particles m_s will have no way to be solved by complex EGTR **with no many simplified assumptions. That is the paradox of Λ.**

《13》；It is completely correct to replace EGTR with 5 formulas of new BH-theory proposed by author.[1]

The authors has proved in [Reference 1], many problems of BHs and cosmology can be successfully solved with 5 formulas of new BH-theory. Those 5 formulas are: (1a)--$M_bT_b=(C^3/4G)\times(h/2\pi\kappa)\approx 10^{27}$gk；(1b)—$E = m_{ss}C^2=\kappa T_b=Ch/2\pi\lambda=\nu h/2\pi$; (1c)--$GM_b/R_b=C^2/2$：(1d)--$m_{ss}M_b= hC/8\pi G=1.187\times10^{-10}g^2$：(1e)--$m_{ss}=M_{bm}=(hC/8\pi G)^{1/2}=m_p=1.09\times10^{-5}$g。**(1d) and (1e) are newly proposed by author.** In above 5 formulas, the changes of state parameters (M_b, R_b, T_b, m_{ss}) on the horizon radius R_b can decide the fate of the growth and the decline and other important problems of BH and the Universe. Their changes are only related to the value of M_b, and are unrelated to the thorny problems of internal state and structure、matter distribution and particle motion, etc, in BHs. Moreover, 5 formulas can determine the gravitational collapse of all BHs only to Planck particles, but not to Singularity at all.

Thus, there is no need use the extremely complex EGTR for solving the problems of internal BHs and

the Universe. Studying the changes of state parameters with 5 simple formulas on R_b of BHs are **very simple and effective to replace studying the changes of internal BHs with EGTR. That is reasons why new 5 formulas of BH-theory is more incomparably superior than EGTR.**

All objects included BHs and the Universe itself in nature are formed from protons, electrons and radiation energy, etc. The internal changes of state or structure of objects are inevitably associated with thermal effects and obey the thermo-dynamical laws. However, in reality, the successful processes to solve EGTR have to be one of EGTR better decomposed into equations of Newton mechanics. Thus, **when the thermal effects of an object keep constant state and constant size in process, the solution of EGTR will be easily changed to Newton equations,** such as TOV equation, the solution of precession of mercury. If the solutions of EGTR are applied with metric mode and coordinate transformation without thermal effects, it is nothing but a math game not in accordance with the really physical world, such as all wrong conclusions of various metrics, and may lead to get many ridiculous results.

The other fatal defect of EGTR is to ignore the existence of mass energy swap, i. e., formula $E = MC^2$. Everybody knows formula $E = MC^2$ proposed by Einstein was one of the highest achievement in science. Formula $E = MC^2$ has been widely used in modern physics and its correctness has been proven. $E = MC^2$ and the law of general gravity will have been epoch-making significance forever. At the time of EGTR proposed by Einstein, probably he recognized that formula $E = MC^2$ was just effective in the area of closing the light speed C, but in reality, that formula can be effectively used to radiations of any temperature and not be neglected , so, another formula of $m_{ss}C^2 = \kappa T$ is generally effective to BH-theory and cosmology, m_{ss} --equivalent mass of any radiations.

That is to say, no thermal effect and no mass energy swap in EGTR must decide that any solutions of EGTR will be impossibly correct.

Since it was proved in 1970 by Penrose and Hawking that the appearance of Singularity became the necessary condition of BH existence, then, **Singularity has puzzled scientists over 50 years.** It can be seen from above-mentioned, **Singularity was nothing but the product of some wrong assumptions for solving EGTR.** With new BH-theory, in Reference[1[, author had proved all BHs could only contract into Planck particles $m_p = 10^{-5}$g, but impossible go to Singularity. **That is enough to prove it may be completely correct to replace EGTR with 5 formulas of new BH-theory.**

《14》： By extension, any ultimate theories now studied by enthusiastic physicists, such as TOE (Theory Of Everything), string theory, membrane theory, etc., if they are not linked to the thermodynamic effects, it will be impossible to successfully solve problems in the really physical world, and impossible to have universal significance.

It must be pointed out too, since the particles in EGTR are dot structure, the mass of particle can not be become to zero, so, when size of objects can unlimitedly shrink, it will lead to the appearance of "singularity" of infinite density. This shows a continuous mathematical equations in the limit case (criticality) can not descript the physical world of a discontinuous state.

Now, such as primitives of string theory, membrane theory are non-point structure, though it can naturally avoid 'singularity' from mathematical equation at the infinitely small condition, but is it a real description to the physical world ? Mankind may never observe the real states of Planck Era, because that world is governed by the restrictions of 'uncertainty principle'. Therefore, those string theory, membrane theory may become the math game of no verification in modern times.

Conclusions: Owing to be not only correct and inevitable, but also to be simple and coincide with the real physical world, EGTR of no thermal effects and no mass energy swap will be only replaced by 5 formulas of new BH-theory based on quantum mechanics and thermodynamics.

===The End ====

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