

Physics of Rotating and Expanding Black Hole Universe

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Throughout its journey universe follows strong gravity. By unifying general theory of relativity and quantum mechanics a simple derivation is given for rotating black hole's temperature. It is shown that when the rotation speed approaches light speed temperature approaches Hawking's black hole temperature. Applying this idea to the cosmic black hole it is noticed that there is "no cosmic temperature" if there is "no cosmic rotation". Starting from the Planck scale it is assumed that universe is a rotating and expanding black hole. Another key assumption is that at any time cosmic black hole rotates with light speed. For this cosmic sphere as a whole while in light speed rotation "rate of decrease" in temperature or "rate of increase" in cosmic red shift is a measure of "rate of cosmic expansion". Since 1992, measured CMBR data indicates that, present CMB is same in all directions equal to 2.726 °K, smooth to 1 part in 100,000 and there is no continuous decrease! This directly indicates that, at present rate of decrease in temperature is practically zero and rate of expansion is practically zero. Universe is isotropic and hence static and is rotating as a rigid sphere with light speed. At present galaxies are revolving with speeds proportional to their distances from the cosmic axis of rotation. If present CMBR temperature is 2.726 °K, present value of obtained angular velocity is $2.17 \times 10^{-18} \frac{\text{rad}}{\text{sec}} \cong 67 \frac{\text{Km}}{\text{sec} \times \text{Mpc}}$. Present cosmic mass density and cosmic time are fitted with a \ln (volume ratio) parameter. Finally it can be suggested that dark matter and dark energy are ad-hoc and misleading concepts.

1 Introduction

Now as recently reported at the American Astronomical Society a study using the Very Large Array radio telescope in New Mexico and the French Plateau de Bure Interferometer has enabled astronomers to peer within a billion years of the Big Bang and found evidence that black holes were the first that leads galaxy growth [1]. The implication is that the black holes started growing first. Initially astrophysicists attempted to explain the presence of these black holes by describing the evolution of galaxies as gathering mass until black holes form at their center but further observation demanded that the galactic central black hole co-evolved with the galactic bulge plasma dynamics and the galactic arms. This is a fundamental confirmation of N. Hameiri's theory [2] described in his papers as a universe composed of "different scale black holes from universal size to atomic size".

This clearly suggests that: (1) Galaxy constitutes a central black hole; (2) The central black hole grows first; (3) Star and galaxy growth goes parallel or later to the central black holes growth. The fundamental questions are: (1) If "black hole" is the result of a collapsing star, how and why a stable galaxy contains a black hole at its center? (2) Where does the central black hole comes from? (3) How the galaxy center will grow like a black hole? (4) How its event horizon exists with growing? If these are the observed and believed facts — not only for the author — this is a big problem for the whole science community to be understood. Any how, the important point to be noted here is that "due to some unknown reasons

galactic central black holes are growing"! This is the key point for the beginning of the proposed expanding or growing cosmic black hole! See this latest published reference [3] for the "black hole universe".

In our daily life generally it is observed that any animal or fruit or human beings (from birth to death) grows with closed boundaries (irregular shapes also can have a closed boundary). An apple grows like an apple. An elephant grows like an elephant. A plant grows like a plant. A human grows like a human. Through out their life time they won't change their respective identities. These are observed facts. From these observed facts it can be suggested that "growth" or "expansion" can be possible with a closed boundary. By any reason if the closed boundary is opened it leads to "destruction" rather than "growth or expansion". Thinking that nature loves symmetry, in a heuristic approach in this paper author assumes that "through out its life time universe is a black hole". Even though it is growing, at any time it is having an event horizon with a closed boundary and thus it retains her identity as a black hole for ever. Note that universe is an independent body. It may have its own set of laws. At any time if universe maintains a closed boundary to have its size minimum at that time it must follow "strong gravity" at that time. If universe is having no black hole structure any massive body (which is bound to the universe) may not show a black hole structure. That is black hole structure may be a subset of cosmic structure. This idea may be given a chance.

Rotation is a universal phenomenon [4, 5, 6]. We know that black holes are having rotation and are not stationary. Re-

cent observations indicates that black holes are spinning close to speed of light [7]. In this paper author made an attempt to give an outline of “expanding and light speed rotating black hole universe” that follows strong gravity from its birth to end of expansion.

Stephen Hawking in his famous book *A Brief History of Time* [8], in Chapter 3 which is entitled *The Expanding Universe*, says: “Friedmann made two very simple assumptions about the universe: that the universe looks identical in which ever direction we look, and that this would also be true if we were observing the universe from anywhere else. From these two ideas alone, Friedmann showed that we should not expect the universe to be static. In fact, in 1922, several years before Edwin Hubble’s discovery, Friedmann predicted exactly what Hubble found... We have no scientific evidence for, or against, the Friedmann’s second assumption. We believe it only on grounds of modesty: it would be most remarkable if the universe looked the same in every direction around us, but not around other points in the universe”. From this statement it is very clear and can be suggested that, the possibility for a “closed universe” and a “flat universe” is 50–50 per cent and one can not completely avoid the concept of a “closed universe”. Clearly speaking, from Hubble’s observations and interpretations in 1929, the possibility of “galaxy receding” and “galaxy revolution” is 50–50 per cent and one can not completely avoid the concept of “rotating universe”.

1.1 Need for cosmic constant speed rotation

1. Assume that a planet of mass M and size R rotates with angular velocity ω_e and linear velocity v_e in such a way that free or loosely bound particle of mass m “lying on its equator” gains a kinetic energy equal to its potential energy and linear velocity of planet’s rotation is equal to free particle’s escape velocity. That is without any external power or energy, test particle gains escape velocity by virtue of planet’s rotation

$$\frac{mv_e^2}{2} = \frac{GMm}{R}, \quad (1)$$

$$\omega_e = \frac{v_e}{R} = \sqrt{\frac{2GM}{R^3}}. \quad (2)$$

Using this idea, “black hole radiation” and “origin of cosmic rays” can be understood. Now writing $M = \frac{4\pi}{3}R^3\rho_e$ and $\omega_e = \frac{v_e}{R} = \sqrt{\frac{8\pi G\rho_e}{3}}$ it can be written as

$$\omega_e^2 = \frac{8\pi G\rho_e}{3}, \quad (3)$$

where density ρ_e is

$$\text{density} = \rho_e = \frac{3\omega_e^2}{8\pi G}. \quad (4)$$

In real time this obtained density may or may not be equal to the actual density. But the ratio $\frac{8\pi G\rho_{real}}{3\omega_{real}^2}$ may have some

physical meaning. From equation (4) it is clear that proportionality constant being $\frac{3}{8\pi G}$

$$\text{density} \propto \text{angular velocity}^2. \quad (5)$$

Equation (4) is similar to the “flat model concept” of cosmic “critical density”

$$\rho_0 = \frac{3H_0^2}{8\pi G}. \quad (6)$$

Comparing equations (4) and (6) dimensionally and conceptually $\rho_e = \frac{3\omega_e^2}{8\pi G}$ and $\rho_0 = \frac{3H_0^2}{8\pi G}$ one can say that

$$H_0^2 \rightarrow \omega_e^2 \Rightarrow H_0 \rightarrow \omega_e. \quad (7)$$

In any physical system under study, for any one “simple physical parameter” there will not be two different units and there will not be two different physical meanings. This is a simple clue and brings “cosmic rotation” into picture. This is possible in a closed universe only. It is very clear that dimensions of Hubble’s constant must be “radian per second”. Cosmic models that depends on this “critical density” must accept “angular velocity of the universe” in the place of Hubble’s constant. In the sense “cosmic rotation” must be included in the existing models of cosmology. If this idea is rejected without any proper reason, alternatively the subject of cosmology can be studied in a rotating picture where the ratio of existing Hubble’s constant and estimated present cosmic angular velocity will give some valuable information.

2. After the Big Bang, since 5 billion years if universe is “accelerating” and at present dark energy is driving it- right from the point of Big Bang to the visible cosmic boundary in all directions, thermal photon wavelength must be stretched instantaneously and continuously from time to time and cosmic temperature must decrease instantaneously and continuously for every second. This is just like “rate of stretching of a rubber band of infinite length”. Note that photon light speed concept is not involved here. Against to this idea since 1992 from COBE satellite’s CMBR data reveals that cosmic temperature is practically constant at 2.726 °K. This observational clash clearly indicates that something is going wrong with accelerating model. Moreover the standard model predicts that the cosmic background radiation should be cooling by something like one part in 10^{10} per year. This is at least 6 orders of magnitude below observable limits. Such a small decrease in cosmic temperature might be the result of cosmic “slowing down” rather than cosmic acceleration. See this latest published reference for cosmic slowing down [9].

3. If universe is accelerating, just like “rate of stretching of a rubber band of infinite length” CMBR photon wavelength stretches and CMBR temperature decreases. Technically from time to time if we are able to measure the changes in cosmic temperature then rate of decrease in cosmic temperature will give the rate of increase in cosmic expansion

accurately. Even though acceleration began 5 billion years before since all galaxies will move simultaneously from our galaxy “rate of increase” in super novae red shift can not be measured absolutely and accurately. Hence it is reasonable to rely upon “rate of decrease” in cosmic temperature rather than “rate of increase” in galaxy red shift.

4. Based on this analysis if “cosmic constant temperature” is a representation of “isotropy” it can be suggested that at present there is no acceleration and there is no space expansion and thus universe is static. From observations it is also clear that universe is homogeneous in which galaxies are arranged in a regular order and there is no mutual attraction in between any two galaxies. Not only that Hubble’s observations clearly indicates that there exists a linear relation in between galaxy distance and galaxy speed which might be a direct consequence of “cosmic rotation” with “constant speed”. This will be true if it is assumed that “rate of increase in red shift” is a measure of cosmic “rate of expansion”. Instead of this in 1929 Hubble interpreted that “red shift” is a measure of cosmic “expansion”. This is the key point where Einstein’s static universe was discarded with a simple 50–50 percent misinterpretation [10].

5. At present if universe is isotropic and static how can it be stable? The only one solution to this problem is “rotation with constant speed”. If this idea is correct universe seems to follow a closed model. If it is true that universe is started with a big bang, the “Big Bang” is possible only with “big crunch” which is possible only with a closed model.

6. At present if universe rotates as a rigid sphere with constant speed then galaxies will revolve with speeds proportional to their distances from the cosmic axis of rotation. This idea matches with the Hubble’s observations but not matches with the Hubble’s interpretation as “galaxy receding”. From points 2, 3 and 4 it is very clear that at present universe is isotropic and static. Hence the Hubble’s law must be re-interpreted as “at present as galaxy distance increases its revolving speed increases”. If so H_0 will turn out to be the present angular velocity. In this way cosmic stability and homogeneity can be understood.

7. This “constant speed cosmic rotation” can be extended to the Big Bang also. As time passes while in constant speed of rotation some how if the cosmic sphere expands then “galaxy receding” as well as “galaxy revolution” both will come into picture. In the past while in constant speed of rotation at high temperatures if expansion is rapid for any galaxy (if born) receding is rapid and photon from the galaxy travels towards the cosmic center in the opposite direction of space expansion and suffers a continuous fast rate of stretching and there will be a continuous fast rate of increase in red shift. At present at small temperatures if expansion is slow galaxy receding is small and photon suffers continuous but very slow rate of stretching and there will be a continuous but very slow rate of increase in red shift i.e. red shift practically remains constant. From this analysis it can be suggested that rate of

decrease in cosmic temperature or rate of increase in red shift will give the rate of cosmic expansion.

8. In the past we have galaxy receding and at present we can have galaxy revolution. By this time at low temperature and low angular velocity, galaxies are put into stable orbits.

1.2 Need for cosmic strong gravity

1. After Big Bang if universe follows “least path of expansion” then at any time “time of action” will be minimum and “size of expansion” will be minimum and its effects are stable and observable.

2. For any astrophysical body its size is minimum if it follows strong gravity. Being an astrophysical body at any time to have a minimum size of expansion universe will follow strong gravity. No other alternative is available.

3. Following a closed model and similar to the growth of an “apple shaped apple” if universe grows in mass and size it is natural to say that as time is passing cosmic black hole is “growing or expanding”.

1.3 Need for light speed cosmic rotation and red shift boundary from 0 to 1

1. From Hubble’s observations when the red shift $z \leq 0.003$, velocity-distance relation is given by $v = zc$ and ratio of galaxy distance and red shift is equal to $\frac{c}{H_0}$. If H_0 represents the present cosmic angular velocity $\frac{c}{H_0}$ must be the present size of the universe. Hence it can be guessed that cosmic speed of rotation is c . Since from Big Bang after a long time, i.e. at present if rotation speed is c , it means at the time of Big Bang also cosmic rotation speed might be c . Throughout the cosmic journey cosmic rotation speed [7] is constant at c . This is a heuristic idea. One who objects this idea must explain — being bound to the cosmic space, why photon travels at only that much of speed. This idea supports the recent observations of light speed rotation of black holes. Universe is an independent body. It is having its own mechanism for this to happen.

2. Galaxies lying on the equator will revolve with light speed and galaxies lying on the cosmic axis will have zero speed. Hence it is reasonable to put the red shift boundary as 0 to 1. Then their distances will be proportional to their red shifts from the cosmic axis of rotation.

1.4 Origin of cosmic black hole temperature

1. Following the Hawking’s black hole temperature formula (see subsection 2.1) it is noticed that black hole temperature is directly proportional to its rotational speed. For a stationary or non-rotating black hole its temperature is zero. As the rotational speed increases black hole’s temperature increases and reaches to maximum if its rotational speed approaches to light speed. At any time if we treat universe as black hole when it is stationary its temperature will be zero. Without cosmic black hole rotation there is no cosmic temperature.

2. When the growing cosmic black hole rotates at light speed it attains a maximum temperature corresponding to its mass or angular velocity at that time. As time passes if the cosmic black hole continues to rotate at light speed and expands then rate of decrease in temperature seems to be minimum if rate of increase in size is minimum and thus it always maintains least size of expansion to have minimum drop in temperature.

2 The four assumptions

To implement the Planck scale successfully in cosmology, to develop a unified model of cosmology and to obtain the value of present Hubble's constant (without considering the cosmic red shifts), starting from the Planck scale it is assumed that at any time t : (1) *The universe can be treated as a rotating and growing black hole*; (2) *With increasing mass and decreasing angular velocity universe always rotates with speed of light*; (3A) *Without cosmic rotation there is no "cosmic temperature"*; (3B) *Cosmic temperature follows Hawking black hole temperature formula where mass is equal to the geometric mean of Planck mass M_P and cosmic mass M_i* ; (4) *Rate of decrease in CMBR temperature is a measure of cosmic rate of expansion*.

2.1 Derivation for black hole temperature and base for assumptions 1, 2 and 3

A black hole of mass M having size R rotates with an angular velocity ω and rotational speed $v = R\omega$. Assume that its temperature T is inversely proportional to its rotational time period t . Keeping "Law of uncertainty" in view assume that

$$(k_B T) \times t = \frac{\hbar}{2} = \frac{h}{4\pi}. \quad (8)$$

$$T \times t = \frac{\hbar}{2k_B}. \quad (9)$$

where, t = rotational time period, T = temperature, k_B = Boltzmann's radiation constant, h = Planck's constant and $\frac{k_B T}{2} + \frac{k_B T}{2} = k_B T$ is the sum of kinetic and potential energies of a particle in any one direction.

Stephen Hawking in Chapter 11 *The Unification of Physics* of his book [8], says: "The main difficulty in finding a theory that unifies gravity with the other forces is that general relativity is a "classical" theory; that is, it does not incorporate the uncertainty principle of quantum mechanics. On the other hand, the other partial theories depend on quantum mechanics in an essential way. A necessary first step, therefore, is to combine general relativity with the uncertainty principle. As we have seen, this can produce some remarkable consequences, such as black holes not being black, and the universe not having any singularities but being completely self-contained and without a boundary". We know that

$$t = \frac{2\pi}{\omega} = \frac{2\pi R}{v} = \frac{4\pi GM}{c^2 v}, \quad (10)$$

$$T = \frac{\hbar c^2 v}{8\pi k_B GM} = \frac{\hbar \omega}{4\pi k_B}, \quad (11)$$

thus if black hole rotational speed v reaches light speed then its temperature reaches to maximum

$$v \rightarrow v_{max} = c \Rightarrow T \rightarrow T_{max} = \frac{\hbar c^3}{8\pi k_B GM} = \frac{\hbar \omega_{max}}{4\pi k_B}. \quad (12)$$

Note that this idea couples GTR and quantum mechanics successfully. Hawking's black hole temperature formula can be obtained easily. And its meaning is simple and there is no need to consider the pair particle creation for understanding "Hawking radiation". This is the main advantage of this simple derivation. From this idea it is very clear that origin of Hawking radiation is possible in another way also. But it has to be understood more clearly. Information can be extracted from a black hole, if it rotates with light speed. *If a black hole rotates at light speed photons or elementary particles can escape from its "equator only" with light speed and in the direction of black hole rotation and this seems to be a signal of black hole radiation around the black hole equator. With this idea origin of cosmic rays can also be understood.* Note that not only at the black hole equator Hawking radiation can take place at the event horizon of the black hole having a surface area.

This equation (12) is identical to the expression derived by Hawking [11]. From the assumptions and from the obtained expressions it is clear that black hole temperature is directly proportional to the rotational speed of the black hole. Temperature of a stationary black hole is always zero and increases with increasing rotational speed and reaches to maximum at light speed rotation. In this way also GTR and quantum mechanics can be coupled. *But this concept is not the output from Hawking's black hole temperature formula. In any physical system for any physical expression there exists only one true physical meaning. Either Hawking's concept is true or the proposed concept is true. Since the black hole temperature formula is accepted by the whole science community author humbly request the science community to kindly look into this major conceptual clash at utmost fundamental level. Recent observations shows that black holes are spinning close to light speed.* Temperature of any black hole is very small and may not be found experimentally. But this idea can successfully be applied to the universe! By any reason if it is assumed that universe is a black hole then it seems to be surprising that temperature of a stationary cosmic black hole is zero. Its temperature increases with increase in its rotational speed and reaches to maximum if the rotational speed approaches light speed. This is the essence of cosmic black hole rotation. CMBR temperature demands the existence of "cosmic rotation". This is the most important point to be noted here.

Hawking radiation is maintained at event horizon as a (particle and anti particle) pair particle creation. One particle falls into the black hole and the other leaves the black

hole. Since the black hole is situated in a free space and lot of free space is available around the black hole's event horizon this might be possible. But applying this idea to the universe this type of thinking may not be possible. There will be no space for the particle to go out side the cosmic boundary or the cosmic event horizon and there is no scope for the creation of antiparticle also. If so the concept of cosmic black hole radiation and normally believed black hole radiation has to be studied in a different point of view. If there is no particle creation at the cosmic event horizon then there will be no evaporation of the cosmic black hole and hence there is no chance for decay of the cosmic black hole. Due to its internal mechanism it will grow like a black hole.

2.2 Black hole minimum size, maximum rotation speed and stability

Here, the fundamental question to be answered is — by birth, is black hole a rigid stationary sphere or a rigid light speed rotating sphere? See the web reference [7]. *Super massive black holes, according to new research, are approaching the speed of light. Nine galaxies were examined by NASA using the Chandra X-ray Observatory, and found each to contain black holes pumping out jets of gas in to the surrounding space. "Extremely fast spin might be very common for large black holes", said co-investigator Richard Bower of Durham University. This might help us explain the source of these incredible jets that we see stretching for enormous distances across space.* This reference indicates that author's idea is correct. Not only that it suggests that there is something new in black hole's spin concepts. Author suggests that [12, 13, 14] force limit $\frac{c^4}{G}$ keeps the black hole stable or rigid even at light speed rotation. This force can be considered as the "classical limit" of force. It represents the "maximum gravitational force of attraction" and "maximum electromagnetic force". It plays an important role in unification scheme. It is the origin of Planck scale. It is the origin of quantum gravity. Similar to this classical force, classical limit of power can be given by $\frac{c^5}{G}$. It plays a crucial role in gravitational radiation. It represents the "maximum limit" of mechanical or electromagnetic or radiation power. The quantity $\frac{c^4}{G}$ can be derived based on "Newton's law of gravitation and "constancy of speed of light". In solar system force of attraction between sun and planet can be given as

$$F = \left(\frac{m}{M}\right)\left(\frac{v^4}{G}\right), \tag{13}$$

where M = mass of sun, m = mass of planet and v = planet orbital velocity. Since $\frac{m}{M}$ is a ratio $\frac{v^4}{G}$ must have the dimensions of force. Following the constancy of speed of light, a force of the form $\frac{c^4}{G}$ can be constructed. With 3 steps origin of rotating black hole formation can be understood with $\frac{c^5}{G}$ and Mc^2 , i.e.

$$\text{torque} = \tau \leq Mc^2, \tag{14}$$

$$\text{power} = \tau\omega \leq \left(\frac{c^5}{G}\right), \tag{15}$$

$$\omega \leq \frac{c^3}{GM} \Rightarrow \omega_{max} = \frac{c^3}{GM}. \tag{16}$$

To have maximum angular velocity size should be minimum

$$R_{min} = \frac{c}{\omega_{max}} = \frac{GM}{c^2}. \tag{17}$$

That is, if size is minimum, the black hole can rotate with light speed! Hence the space and matter surrounding its equator can turn at light speed! This is found to be true for many galaxy centers. Acceleration due to gravity at its surface can be given as $\frac{c^4}{GM}$. Rotational force can be given as $MR_{min}\omega_{max}^2 = \frac{c^4}{G}$. This is the ultimate magnitude of force that keeps the black hole stable even at light speed! This is a natural manifestation of space-time geometry.

Note that here in equation (17) only the coefficient 2 is missing compared with Schwarzschild radius. If the concept of "Schwarzschild radius" is believed [15] to be true, for any rotating black hole of rest mass (M) the critical conditions are: (1) *Magnitude of kinetic energy never crosses rest energy*; (2) *Magnitude of torque never crosses potential energy*; (3) *Magnitude of mechanical power never crosses $\left(\frac{c^5}{G}\right)$.*

Based on virial theorem, potential energy is twice of kinetic energy and hence, $\tau \leq 2Mc^2$. In this way factor 2 can be obtained easily from equations (14), (15) and (16). Not only that special theory of relativity, classical mechanics and general theory of relativity can be studied in a unified way.

2.3 Planck scale and cosmic black hole temperature

At any time (t) from assumption (1) based on black hole concepts, if mass of the universe is M_t size of the cosmic event horizon can be given by

$$R_t = \frac{2GM_t}{c^2}. \tag{18}$$

From assumption (2) if cosmic event horizon rotates with light speed then cosmic angular velocity can be given by

$$\omega_t = \frac{c}{R_t} = \frac{c^3}{2GM_t}. \tag{19}$$

From assumptions (3A) and (3B),

$$T_t = \frac{\hbar c^3}{8\pi k_B G \sqrt{M_t M_p}}, \tag{20}$$

where $M_t \geq M_p$. From equations (19) and (20)

$$4\pi k_B T_t = \hbar \sqrt{\omega_t \omega_p}. \tag{21}$$

This is a very simple expression for the long lived large scale universe! At any time if temperature T_t is known

$$\omega_t = \left(\frac{4\pi k_B T_t}{\hbar}\right)^2 \left(\frac{1}{\omega_p}\right). \tag{22}$$

Ultimate gravitational force of attraction between any two Planck particles of mass M_P separated by a minimum distance r_{min} can be given as

$$\frac{GM_P M_P}{r_{min}^2} = \frac{c^4}{G}, \quad (23)$$

where $2\pi r_{min} = \lambda_P = \frac{h}{cM_P} =$ Planck wave length. In this way Planck scale mass and energy can be estimated

$$\text{Pl. mass} = M_P = 2.176 \times 10^{-8} \text{ Kg} = \sqrt{\frac{\hbar c}{G}}, \quad (24)$$

$$\text{Pl. size} = R_P = 3.2325 \times 10^{-35} \text{ meter} = \frac{2GM_P}{c^2}, \quad (25)$$

$$\text{Pl. angl. velocity} = \omega_P = 9.274 \times 10^{42} \frac{\text{rad}}{\text{sec}} = \frac{c^3}{2GM_P}, \quad (26)$$

$$\text{Pl. temperature} = T_P = 5.637 \times 10^{30} \text{ }^\circ\text{K} = \frac{\hbar\omega_P}{4\pi k_B}. \quad (27)$$

Substituting the present cosmic CMBR temperature [16] 2.726 °K in equation (22) we get present cosmic angular velocity as $\omega_t = 2.169 \times 10^{-18} \frac{\text{rad}}{\text{sec}} \approx 66.93 \frac{\text{Km}}{\text{sec} \times \text{Mpc}}$. Numerically this obtained value is very close to the measured value of Hubble's constant H_0 [17, 18]. Not only that this proposed unified method is qualitatively and quantitatively simple compared with the "cosmic red shift" and "galactic distance" observations. This procedure is error free and is reliable. *Author requests the science community to kindly look into this kind of rotating and growing universe models. If this procedure is really true and applicable to the expanding universe then accelerating model, dark matter and dark energy are becomes ad-hoc concepts.* At any time it can be shown that

$$M_t R_t \omega_t^2 = M_t c \omega_t = \frac{c^4}{2G}. \quad (28)$$

2.4 Cosmic mass density and baryon-photon number density ratio

With this model empirically it is noticed that, mass density

$$\rho_{mass} \approx 3 \ln \left(\frac{R_t}{R_P} \right) \left[\frac{aT_t^4}{c^2} \right] \approx 6 \ln \left(\frac{T_P}{T_t} \right) \left[\frac{aT_t^4}{c^2} \right]. \quad (29)$$

If $T_t = 2.726 \text{ }^\circ\text{K}$, $\omega_t = 2.169 \times 10^{-18} \frac{\text{rad}}{\text{sec}}$, $R_t = \frac{c}{\omega_t} = 1.383 \times 10^{26} \text{ meter}$ and $R_P = 3.232 \times 10^{-35} \text{ meter}$, present mass density can be obtained as

$$\rho_{mass} \approx 418.82 \times 4.648 \times 10^{-34} = 1.95 \times 10^{-31} \frac{\text{gram}}{\text{cm}^3}.$$

This is very close to the observed mater density [19] of the universe $(1.75 \text{ to } 4.1) \times 10^{-31} \frac{\text{gram}}{\text{cm}^3}$. If this idea is true the proposed term

$$3 \ln \left(\frac{R_t}{R_P} \right) \approx 6 \ln \left(\frac{T_P}{T_t} \right), \quad (30)$$

can be given a chance in modern cosmology. Actually this is the term given as

$$\ln \left(\frac{\text{cosmic volume at time, } t}{\text{Planck volume}} \right) \approx 3 \ln \left(\frac{R_t}{R_P} \right). \quad (31)$$

The interesting idea is that, if $R_t \rightarrow R_P$, and $T_t \rightarrow T_P$, the term $3 \ln \left(\frac{R_t}{R_P} \right) \rightarrow 0$ and mass density at Planck time approaches zero. Conceptually this supports the Big Bang assumption that "at the time of Big Bang matter was in the form of radiation". Not only that as cosmic time increases mass density gradually increases and thermal density gradually decreases. Using this term and considering the present CMBR temperature baryon-photon number density ratio can be fitted as follows

$$\frac{N_B}{N_\gamma} \approx 3 \ln \left(\frac{R_t}{R_P} \right) \left[\frac{2.7k_B T_t}{m_n c^2} \right], \quad (32)$$

Here interesting point is that

$$\left[\frac{2.7k_B T_t}{m_n c^2} \right] \approx \frac{\text{average energy per photon}}{\text{rest energy of nucleon}}, \quad (33)$$

thus present value can be given as

$$\frac{N_B}{N_\gamma} \approx \frac{1}{3.535 \times 10^9}. \quad (34)$$

2.5 The 2 real densities

Since the cosmic black hole always follows closed model and rotates at light speed, at any time size of cosmic black hole is $\frac{c}{\omega_t}$. It's density = $\frac{\text{mass}}{\text{volume}} = \frac{3\omega_t^2}{8\pi G}$. It is no where connected with "critical density" concepts. From equations (18), (19) and (20) it is noticed that

$$\frac{3\omega_t^2}{8\pi G} = 5760\pi \left[\frac{aT_t^4}{c^2} \right]. \quad (35)$$

Finally we can have only 2 real densities, one is "thermal energy density" and the second one is "mass density".

3 Origin of the cosmic red shift, galaxy receding and galaxy revolution

As the cosmic sphere is expanding and rotating galaxies receding and revolving from and about the cosmic axis. As time passes photon from the galaxy travels opposite to the direction of expansion and reaches to the cosmic axis or center. Thus photon shows a red shift about the cosmic center. If this idea is true cosmic red shift is a measure of galactic distances from the cosmic axis of rotation or center. Galaxy receding is directly proportional to the rate of expansion of the rotating cosmic sphere as a whole. In this scenario for any galaxy continuous increase in red shift is a measure of rapid expansion and "practically constant red shift" is a measure of very

slow expansion. That is change in galaxy distance from cosmic axis is practically zero. At any time (t) it can be defined as, cosmic red shift

$$z_t = \frac{\Delta\lambda}{\lambda_{measured}} \leq 1. \quad (36)$$

when z_t is very small this definition is close to the existing red shift definition

$$z = \frac{\Delta\lambda}{\lambda_{emitted}}. \quad (37)$$

At present time relation between equations (36) and (37) can be given as

$$\frac{z}{z+1} \cong z_t. \quad (38)$$

Equation (38) is true only when z is very small. Note that at Hubble's time the maximum red shift observed was $z = 0.003$ which is small and value of H_0 was 530 Km/sec/Mpc. By Hubble's time equation (36) might have been defined in place of equation (37). But it not happened so! When rate of expansion is very slow, i.e. at present, based on $v = r\omega$ concepts

$$v_t \cong z_t c, \quad (39)$$

gives revolving galaxies tangential velocity where increase in red shift is very small and practically remains constant and galaxy's distance from cosmic axis of rotation can be given as

$$r_t \cong \frac{v_t}{\omega_t} \cong z_t \left(\frac{c}{\omega_t} \right). \quad (40)$$

Numerically this idea is similar to Hubble's law [20]. This indicates that there is something odd in Hubble's interpretation of present cosmic red shifts and galaxy moments. By this time even though red shift is high if any galaxy shows a continuous increase in red shift then it can be interpreted that the galaxy is receding fast in the sense this light speed rotating cosmic sphere is expanding at a faster rate. Measured galactic red shift data indicates that, for any galaxy at present there is no continuous increase in their red shifts and are practically constants! This is a direct evidence for the slow rate of expansion of the present light speed rotating universe. When the universe was young i.e. in the past, Hubble's law was true in the sense "red shift was a measure of galaxy receding (if born)" and now also Hubble's law is true in the sense "red shift is a measure of galaxy revolution".

As time is passing "galaxy receding" is gradually stopped and "galaxy revolution" is gradually accomplished. Galaxies lying on the equator will revolve with light speed and galaxies lying on the cosmic axis will have zero speed. Hence it is reasonable to put the red shift boundary as 0 to 1. Then their distances will be proportional to their red shifts from the cosmic axis of rotation.

4 The present cosmic time

(1) Time required to complete one radian is $\frac{1}{\omega_t}$ where ω_t is the angular velocity of the universe at time t . At any time this is not the cosmic age. If at present $\omega_t \rightarrow H_0$, it will not represent the present age of the universe. (2) Time required to complete one revolution is $\frac{2\pi}{\omega_t}$. (3) Time required to move from Planck volume to existing volume = present cosmic age.

How to estimate this time? Author suggests a heuristic procedure in the following way. With reference to Big Bang picture present cosmic time can be given as

$$t \cong \ln\left(\frac{T_P}{T_t}\right) \sqrt{\frac{3c^2}{8\pi G a T_t^4}} = 4.33 \times 10^{21} \text{ seconds.} \quad (41)$$

Here $T_t \leq T_P$, and interesting idea is that if $T_t \rightarrow T_P$, the term $\ln\left(\frac{T_P}{T_t}\right) \rightarrow 0$. It indicates that, unlike the Planck time, here in this model cosmic time starts from zero seconds. This idea is very similar to the birth of a living creature. How and why, the living creature has born? This is a fundamental question to be investigated by the present and future mankind. In the similar way, how and why, the "Planck particle" born? has to be investigated by the present and future cosmologists. Proposed time is 9400 times of $\frac{1}{H_0}$. With this large time "smooth cosmic expansion" can be possible. Inflation, magnetic monopoles problem and super novae dimming can be understood by a "larger cosmic time and smooth cosmic expansion". Proportionality constant being unity with the following 3 assumptions "cosmic time" can be estimated

$$t \propto 3 \ln\left(\frac{R_t}{R_P}\right), \quad (42)$$

$$t \propto \left[\frac{M_P c^2}{4\pi k_B T_t} \right], \quad (43)$$

$$t \propto \left[\frac{\hbar}{k_B T_t} \right]. \quad (44)$$

After simplification, obtained relation can be given as

$$t = \sqrt{\frac{36\pi}{90}} \times \ln\left(\frac{T_P}{T_t}\right) \sqrt{\frac{3c^2}{8\pi G a T_t^4}}, \quad (45)$$

$$t = 1.121 \times \ln\left(\frac{T_P}{T_t}\right) \sqrt{\frac{3c^2}{8\pi G a T_t^4}} = 4.85 \times 10^{21} \text{ sec.} \quad (46)$$

5 Conclusion

The force $\frac{c^4}{G}$ and power $\frac{c^5}{G}$ are really the utmost fundamental tools of black hole physics and black hole cosmology. In this paper author presented a biological model for viewing the universe in a black hole picture. In reality its validity has to be studied, understood and confirmed by the science community at utmost fundamental level. At present also regarding the cosmic acceleration some conflicts are there [9].

The concept of dark energy is still facing and raising a number of fundamental problems. If one is able to understand the need and importance of “universe being a black hole for ever”, “CMBR temperature being the Hawking temperature” and “angular velocity of cosmic black hole being the present Hubble’s constant”, a true unified model of “black hole universe” can be developed.

The main advantage of this model is that, it mainly depends on CMBR temperature rather than the complicated red shift observations. From the beginning and up to right now if universe rotates at light speed- “Big Bang nucleosynthesis concepts” can be coupled with the proposed “cosmic black hole concepts”. Clearly speaking, in the past there was no Big Bang. Rotating at light speed for ever high temperature and high RPM (revolution per minute) the “small sized Planck particle” gradually transforms into low temperature and low RPM “large sized massive universe”.

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