Universe - the primordial black hole

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Abstract

The concept of 'dark energy' is still facing and raising a number of fundamental unresolved problems. 'Cosmic acceleration','dark energy' and 'inflation', are the results of Edwin Hubble's incomplete conclusions. If there is a misinterpretation in Hubble's law - flat model of cosmology can not be considered as a correct model of cosmology. **If the *primordial universe* is a natural setting for the creation of black holes and other nonperturbative gravitational entities, it is also possible to assume that throughout its journey, the whole universe is a *primordial cosmic black hole.*** Planck particle can be considered as the baby universe. Key assumption is that, "at any time, cosmic black hole rotates with light speed". Cosmic temperature is inversely proportional to the geometric mean of cosmic mass and planck mass. For this growing cosmic sphere as a whole, while in light speed rotation, 'rate of decrease' in temperature is a "primary" measure of cosmic 'rate of expansion'. It can be suggested that, 'rate of increase in galaxy red shift' from and about the cosmic center is a "secondary" measure of cosmic 'rate of expansion'. Present 'cosmic mass density' and 'cosmic time' are fitted with the natural logarithm of ratio of cosmic volume and planck particle's volume. If present CMBR temperature is isotropic at 2.725 ^{0}Kelvin, present angular velocity is 2.17 x 10^{-18} rad/sec = 67 Km/sec/Mpc.

Keywords: Black hole, planck particle, baby universe, primordial cosmic black hole, **Unruh effect**, light speed rotation, rate of decrease in CMBR temperature and rate of increase in cosmic redshift.

1 Modified Hubble's law

Ever since the late 1920's, when Edwin Hubble discovered a simple proportionality between the redshifts in the light coming from nearby galaxies and their distances, we have been told that the Universe is expanding. Hubble found the recession speed v of a nearby galaxy was related to its radial distance r, $v = H_0 r$, where H_0 is the constant of proportionality [1]. This relationship-dubbed the Hubble law- has since been strengthened and extended to very great distances in the cosmos.This was the incomplete interpretation that changed the destiny of the modern cosmology. Based on this interpretation modern cosmologists arrived at the conclusion that - at present, universe is flat and is accelerating. Nowadays it is considered to be well established in the expanding big bang universe. Hubble initially interpreted his redshifts as a Doppler effect, due to the motion of the galaxies as they receded for our location in the Universe. He called it a 'Doppler effect' as though the galaxies were moving 'through space'; that is how some astronomers initially perceived it. This is different to what has now become accepted but observations alone could not distinguish between the two concepts. **Later in his life Hubble varied from his initial interpretation [2] and said that the Hubble law was due to a hitherto undiscovered mechanism, but not due to expansion of space - now called cosmological expansion**. **In this connection, author humbly says - there was something wrong and missing in Hubble's interpretation. For the same observations it can also be possible to state that, in a closed and expanding universe, from and about the cosmic center, rate of increase in galaxy redshift is a measure of cosmic rate of expansion. This statement includes 3 points**.

1. Light from the galaxy travels opposite to the direction of cosmic expansion and shows redshift and thus redshift is a measure of galaxy distance from the cosmic center.

2. In the expanding universe, increase in redshift is instantaneous due to instantaneous increase in galaxy distance (which is due to instantaneous increase in cosmic volume).

3. Rate of increase in redshift indicates the cosmic rate of expansion.

2 Disclosure

Part of information included in this article has been previously published [3] in the paper "Physics of Rotating and Expanding Black Hole Universe", Progress in Physics, vol. 2, April, 2010, p. 7-14. In that paper author suggests that- through out its journey, universe is an expanding and (light speed) rotating black hole. This article is a compilation of similar ideas on black hole cosmology. Compilation is the base of unification. Author requests the world science community to kindly look into this article. Finally in this article it is suggested that universe can be considered as the primordial cosmic black hole.

Existence of dark matter, dark energy, inflation and the accelerating universe - these four concepts are having only indirect support and can be considered as 'enigmatic concepts'. Their root was originated in 1929 from Edwin Hubble's incomplete interpretations. For the same observations it is also possible to reinterpret as: 'rate of increase in redshift' is a measure of cosmic rate of expansion. With this idea, automatically a closed expanding and rotating model of universe comes into picture. With the above four enigmatic concepts (directly and indirectly) GTR is loosing its original identity from the rest of the physics world. But this is the time to think about the unification of GTR and quantum mechanics. In this critical situation, one very interesting theoretical idea is - now a days to understand the origin of dark matter and galaxy growth, physicists are focussing their concentration on primordial cosmic black holes. One interesting observation is : central galactic black holes are spinning close to speed of light. Even though these two are also enigmatic concepts, GTR and quantum mechanics can be studied in a unified manner.

2.1 Light speed rotation - an unified enigmatic concept

All these enigmatic concepts can be unified into one enigmatic concept. That is - light speed rotation. Its important and immediate applications are

1. Classical limits of force and power can be generated.

2. GTR and quantum mechanics can be studied in a unified manner.

3. Origin of the planck scale can be understood.

4. A closed rotating and expanding model of the universe can be developed.

5. The two experimental numbers CMBR temperature and cosmic expansion rate can be interrelated in a unified way.

6. Finally a unified black hole model of cosmology can be developed.

3 The primordial black holes

A primordial black hole [4 - 6] is a hypothetical type of black hole that is formed not by the gravitational collapse of a large star but by the extreme density of matter present during the universe's early expansion. One way to detect primordial black holes is by their Hawking radiation. Other problems for which primordial black holes have been suggested as a solution include the dark matter problem, the cosmological domain wall problem and the cosmological monopole problem. Primordial black holes in the mass range 10^{14} kg to 10^{23} kg may also have contributed to the later formation of galaxies. This is due to the possibility that at this low mass they would behave as expected of other particle candidates for dark matter. As of today there is no solid evidence for the existence of PBHs, but their presence would be very difficult to detect even if they constitute the bulk of the dark matter. Based on the present theoretical works, expected mass of the nonevaporating PBHs ranges from $M \geq \left(0.1 \text{ to } 10^5\right) \times M_\odot$. **If the *primordial universe* is a natural setting for the creation of black holes and other non-perturbative gravitational entities, the whole universe can also be considered as the *primordial cosmic black hole.***

3.1 Force and power limits in black hole cosmology

Published papers [7-10] clearly indicates that, current cosmological observations can be understood with the black hole concepts and the possibility of a model of black hole cosmology is not far away from reality. Interesting research work on black hole cosmology can be seen in physics literature [10-14]. In a unified approach it is noticed that $\frac{c^4}{G}$ is the classical limit of force and $\frac{c^5}{G}$ is the classical limit of power. With these two limits, mathematical complexity involved in GTR can be simplified. Planck mass can be derived very easily. Light speed rotating black hole's formation can be understood. GTR and quantum mechanics can be coupled in a unified manner. Rotating black hole temperature formula can be derived very easily. Interesting thing is: force $\frac{c^4}{G}$ keeps the light speed rotating black hole stable. Very interesting observation is that, any elementary particle can escape from the light speed rotating black hole's equator. This idea may be given a chance.

3.2 Need of the existence of primordial cosmic black hole

From above discussion, to understand the cosmological observations and black hole physics in a unified manner, it can be assumed that, right from the beginning to the present state, universe can be considered as the primordial black hole. To proceed further, it is a must to show that,

1. There is a fundamental flaw in the basics of modern flat cosmology. It goes back to 1929 Hubble's interpretation of galactic redshift data [2, 3]. It's correct interpretation is: 'rate of increase' in red shift is a measure of cosmic rate of expansion.

2. Rate of decrease in CMBR temperature is a measure of cosmic rate of expansion. 'Cosmic isotropy' and 'cosmic acceleration' both are inversely proportional to each other.

3. Dimensions of Hubble's constant are 'radian/sec' but not '1/sec'. This is very simple and brings cosmic rotation into picture [15-18].

4. Universe follows a closed expanding boundary. Best example is :'Apple grows like an apple' with closed expanding/growing boundary. Rotation will make the closed expanding universe stable.

5. At any time, strong gravity plays an interesting role in minimizing the (expanding) cosmic size.

6. Large cosmic time and smooth cosmic expansion play an interesting role in the evolution of fundamental particles.

3.3 Proposed five assumptions

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, the universe is always rotating with speed of light.

3. Without 'cosmic rotation' there is no 'cosmic temperature'. Cosmic temperature follows Hawking black hole temperature formula where mass is equal to the geometric mean of planck mass and cosmic mass.

4. 'Rate of decrease' in CMBR temperature is a measure of cosmic 'rate of expansion'.

5. Space, time and matter are the immediate and parallel results of cosmic expansion.

4 The cosmic critical density and its dimensional analysis

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 potential energy as,

$$\frac{1}{2}mv_e^2 = \frac{GMm}{R} \tag{1}$$

$$R\omega_e = v_e = \sqrt{\frac{2GM}{R}} \text{ and } \omega_e = \frac{v_e}{R} = \sqrt{\frac{2GM}{R^3}} \tag{2}$$

i.e Linear velocity of planet's rotation is equal to free particle's escape velocity. Without any external power or energy, test particle gains escape velocity by virtue of planet's rotation. Using this idea, 'Black hole radiation' and 'origin of cosmic rays' can be understood. Note that if Earth completes one rotation in one hour then free particles lying on the equator will get escape velocity. Now writing, $M = \frac{4\pi}{3}R^3\rho_e$, $\omega_e = \frac{v_e}{R} = \sqrt{\frac{8\pi G\rho_e}{3}}$

$$\omega_e^2 = \frac{8\pi G\rho_e}{3} \tag{3}$$

$$\text{Density, } \rho_\mathrm{e} = \frac{3\omega_\mathrm{e}^2}{8\pi \mathrm{G}} \tag{4}$$

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. The most important point to be noted here, is that, as far as dimensions and units are considered, from equation (4), it is very clear that, proportionality constant being $\frac{3}{8\pi G}$,

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

Equation (4) is similar to "flat model concept" of cosmic "critical density"

$$\rho_c = \frac{3H_0^2}{8\pi G} \tag{6}$$

Comparing equations (4) and (6) dimensionally and conceptually, $\rho_e = \frac{3\omega_e^2}{8\pi G}$ with $\rho_\mathrm{c} = \frac{3\mathrm{H}_0^2}{8\pi \mathrm{G}}$

$$H_0^2 \to \omega_\mathrm{e}^2 \;\; and \;\; \mathrm{H}_0 \to \omega_\mathrm{e} \tag{7}$$

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/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. One should not deny this dimensional analysis.

5 Cosmic closed model and rotation

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. Throughout 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, throughout 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 forever. The subject of black hole cosmology is not new. 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'. i.e 'Black hole structure' may be a sub set of 'cosmic structure'. Rotation is an universal phenomenon. Recent observations indicates that, black holes are spinning close to speed of light [19].

Clearly and strictly speaking there was no big bang at all. Highly dense, hot and tiny planck particle (the baby universe) was rotating with light speed and high angular velocity. Why, how and when the planck particle was born? is a trillion dollar question to be answered. As time is passing, forever rotating at light speed [19] the baby universe starts growing with decreasing temperature, decreasing angular velocity, increasing size and increasing mass. At what rate the changes are occurring? is a fundamental question to be answered. By observations and suitable analysis it is possible. The utmost fundamental question to be answered is – is planck particle a black hole? If it is a really a black hole certainly it possess an intrinsic or a characteristic (high) temperature [20]. Keeping this idea in mind if one proceeds further concepts of isotropy, homogeneity can be answered very easily. Inflation hypothesis can be eliminated. A unified model of black hole cosmology can be developed. But the subject of black holes is still under development. So many doubts and conflicts are there about the formation and growth of galactic central black holes and galaxy as a whole [22].

6 The cosmological principle and the closed expanding universe

It may be a flat universe or closed universe, why universe is/was filled with thermal bath? is a million dollar question. If it is a black hole this question can be answered partially. The cosmological principle states that at any given cosmic time universe is homogeneous and isotropic. Compared to a flat model, isotropy is more natural in a closed expanding universe. Considering the closed expanding universe this can be very easily understood. In a closed expanding universe the utmost important and interesting point is that as the closed universe is expanding its thermal waves are stretched by the closed cosmic working or active boundary in opposite directions simultaneously. As long as the closed universe is expanding instantaneously thermal waves undergo continuous stretching and results in instantaneous isotropy or thermal equilibrium. This is just like stretching of a rubber band with both the hands in opposite directions.

In a flat universe there exists no working or active cosmic boundary and hence stretching of the thermal waves in opposite directions may not be possible instantaneously. Hence isotropy or thermal equilibrium cannot be maintained instantaneously in a flat model. Even the possibility of a proper physical coupling or contact in between the thermal bath and the flat cosmic volume is doubtful. Inflation may be required in a flat model but not required for the closed expanding model. Even in particle physics also there is no clear and solid mechanism for the initiation of inflation. More over inflation or exponential expansion of cosmic space violates the constancy of speed of light. Please note that at present there is no fundamental theory for the inflationary universe. With this discussion any one can confidently say that - the notion of 'flat accelerating universe' is incorrect. Note that present 'accelerating model' and 'dark energy' both are the consequences of 'flat model' [23, 24]. Hence their survival seems to be ad-hoc and uncertain[25, 26].

The new SNe distance determinations do not state that the expansion of the universe is accelerating [25, 26] nor that there is some kind of "antigravity" effect, nor that there is some new substance. The data only forces the conclusion that there is a problem in the purely Hubble conception of the cosmos or at least in the Hubble-based method of determining the distance to distant objects. Present observational or experimental data indicates that cosmic microwave back ground radiation temperature is 2.725 ^{0}kelvin. It is very uniform up to several mega parsecs from Earth and so smooth to one part in 100000. Since past 5 billion years if universe is really accelerating one must find a continuous drop in CMBR temperature but not the temperature fluctuations.

7 GTR, Planck mass and CMBR temperature

Let us assume that present universe is a point particle having mass M_0. Assume that gravitational force of attraction between the point universe mass and the planck mass (the baby universe mass) is equal to $\left(c^4/8\pi G\right)$. Author humbly say- this simple assumption unifies GTR, quantum mechanics, planck scale, big bang cosmology and Hubble's observations.

$$\frac{GM_0M_P}{r_0^2} \cong \frac{c^4}{8\pi G} \tag{8}$$

From big bang model at any time expanding universe possess some temperature and its present CMBR temperature is $T_0 = 2.725^o$ Kelvin. Surprisingly it is noticed that, above assumption is satisfied at the following 2 conditions.

$$r_0 = \left(\frac{\lambda_m T}{2\pi T_0}\right) = \frac{2.898 \times 10^{-3}}{2\pi T_0} = \frac{hc}{2\pi \times 4.965 k_B T_0} \text{ meter} \tag{9}$$

$$M_0 = \frac{c^3}{2GH_0} \tag{10}$$

where H_0 is the present cosmic expansion rate index. Above expression can be expressed as

$$T_0 = \frac{1}{\sqrt{8\pi * 4.965^2}} \frac{\hbar c^3}{Gk_B\sqrt{M_0M_P}} \cong \frac{\hbar c^3}{8\pi Gk_B\sqrt{M_0M_P}} \tag{11}$$

Note that, $\sqrt{8\pi * 4.965^2} \cong 24.891 \cong 8\pi = 25.13274123$. Hence

$$T_0 \cong \frac{\hbar}{4\pi k_B}\sqrt{\frac{c^3}{2GM_P} \times \frac{c^3}{2GM_0}} \tag{12}$$

There is no working boundary in the flat model cosmology. It is an usual and widespread practice to say that $\left(c/H_0\right)$ is the characteristic length of the universe and is called as the Hubble radius. Not only that Hubble volume $\frac{4\pi}{3}\left(\frac{c}{H_0}\right)^3$ represents the characteristic and observable volume of the universe .

It is defined and accepted that H_0 value changes with time. Cosmic temperature also changes with time. By any chance if one is able to consider $\frac{c^3}{2GM_0}$ as the present angular velocity, $\frac{c^3}{2GM_P}$ as the planck mass angular velocity then above relation can be expressed as

$$4\pi k_B T_0 \cong \hbar\sqrt{\omega_P \omega_0} \tag{13}$$

This is definitely possible only if universe follows strong gravity and light speed rotation. During the cosmic evolution, at any time above equation can be re-expressed as

$$4\pi k_B T_t \cong \hbar\sqrt{\omega_P \omega_t} \tag{14}$$

The surprising and interesting idea is for the baby universe or for the planck mass $\omega_t = \omega_P$. Hence

$$4\pi k_B T_t \cong \hbar\omega_P \tag{15}$$

8 Derivation for light speed rotating black hole temperature

Stephen Hawking says [27] - "*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.*

A black hole of mass (M) having size, $R = \frac{2GM}{c^2}$ 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,

$$(k_B T) * t = \frac{h}{4\pi} = \frac{\hbar}{2} \tag{16}$$

$$\text{(Or)} \quad T * t = \frac{h}{4\pi k_B} = \frac{\hbar}{2k_B} \tag{17}$$

Here, t = rotational time period and T = Temperature, k_B = Boltzmann's radiation constant, h = Planck's constant and $\left[\left(\frac{k_B T}{2}\right) + \left(\frac{k_B T}{2}\right)\right] = k_B T$ is the sum of kinetic and potential energies of a particle in any one direction. We know that,

$$t = \frac{2\pi}{\omega} = \frac{2\pi R}{v} = \frac{4\pi GM}{c^2 v} \tag{18}$$

Hence,

$$T = \frac{\hbar c^2 v}{8\pi GM k_B} \tag{19}$$

It is very surprising to say that - a small physical constant is influencing a big massive body. If the black hole rotational speed v approaches light speed c, then temperature reaches to maximum. Here author's humble appeal is : force limit $\left(c^4/G\right)$ keeps the black hole 'stable or rigid' even at light speed rotation.

$$v \to v_{\max} \to c, \quad T = \frac{\hbar c^3}{8\pi GM k_B} \cong T_{\max} \tag{20}$$

Please note that, this idea or assumption 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'. Conceptually this can be compared with the famous **Unruh effect** [28]. It is the prediction that an accelerating observer will observe black-body radiation where an inertial observer would observe none. The Unruh temperature, derived by William Unruh in 1976, is the effective temperature experienced by a uniformly accelerating detector in a vacuum field. Its mathematical expression is

$$T = \frac{\hbar a}{2\pi c k_B} \tag{21}$$

where a is the local acceleration. If one is willing to replace the 'local acceleration' with the 'angular acceleration' of the rotating black hole, then 'black hole temperature' comes into picture.

8.1 Hawking's Black hole temperature formula demands light speed rotation

From the above discussion 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.* Please 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 (20) is identical to the famous expression derived by Hawking. Since the black hole temperature formula is accepted by the whole science community, author humbly requests the modern scientists to kindly look into this major conceptual clash at utmost fundamental level.

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 of the cosmic black hole 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.

9 Results in black hole cosmology

1. Based on the increasing cosmic time, 'cosmic isotropy' and 'cosmic acceleration' both are inversely proportional to each other. It can be suggested that, from cosmology point of view 'dark matter' and 'dark energy' are 'ad-hoc & misleading' concepts.

2. (H_0) is the present angular velocity (ω_t) of the slowly expanding light speed rotating black hole universe. Presently believed critical density, $\rho_0 \cong \frac{H_0^2}{8\pi G}$ is a space-time geometric density and is a variable parameter and in any way it is not connected with the cosmic expansion.

3. At any time, $4\pi * k_B T_t \cong \hbar * \sqrt{\omega_t \omega_P} \cong \hbar * \left(\frac{c^3}{2G\sqrt{M_t M_P}}\right)$ where M_t is the cosmic mass, T_t is the cosmic temperature, ω_t is the cosmic angular velocity and M_P is the planck mass, T_P is the planck temperature, ω_P is the planck angular velocity respectively. If present CMBR temperature is 2.725 ^{0}Kelvin, present angular velocity is 2.17 x 10^{-18} rad/sec = 67 Km/sec/Mpc.

4. Mass density = $\rho_m \cong 3\ln\left(\frac{R_t}{R_P}\right) * \frac{aT_t^4}{c^2} \cong 6\ln\left(\frac{T_P}{T_t}\right) * \frac{aT_t^4}{c^2}$ where R_P, T_P are size and temperature of plank particle and R_t, T_t are size and temperature of the light speed rotating black hole universe at time 't' [29]. Its present value is 1.95×10^{-31} gram/cm^3.

5. If $m_n c^2$ is the rest energy of nucleon, baryon-photon number density ratio can be expressed as $\left(\frac{N_B}{N_\gamma}\right) \cong 3\ln\left(\frac{R_t}{R_P}\right) * \left(\frac{2.7 k_B T_t}{m_n c^2}\right)$.

6. Basically cosmic redshift is a measure of galactic distances. At any time 't', Cosmic red shift, $z_t = \left(\frac{\lambda_{measured} - \lambda_{emitted}}{\lambda_{measured}}\right)$ but not $z_t = \left(\frac{\lambda_{measured} - \lambda_{emitted}}{\lambda_{emitted}}\right)$.

7. At any time, galaxies are rotating about the cosmic center about an axis at some distance and proportionately show some redshift. Since the total cosmic sphere is rotating and expanding, galaxies will have some receding. This receding is directly proportional to the rate of expansion of the rotating cosmic sphere as a whole. In this scenario, for any galaxy, from and about the cosmic center,

   (a) If rate of increase in red shift is increasing - it means universe is expanding with acceleration.

   (b) If rate of increase in red shift is decreasing - it means universe is expanding with deceleration.

   (c) If rate of increase in red shift is same- it means universe is expanding with uniform velocity.

   (d) If rate of increase in red shift is zero- it means universe is not expanding.

   When the universe was young i.e in the past, Hubbles law was true, in the sense,"increasing red shift was a measure of galaxy receding (if born)" and now also Hubbles 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 shit boundary as '0 to 1'. Then their distances will be proportional to their red shifts from the cosmic axis of rotation.

8. Now and then universe is rotating with 'light speed', big bang concepts of 'nucleosynthesis' can be combined with the proposed ideas.

9. $(1/H_0) \cong (1/\omega_t)$ indicates the time required to complete one radian and $(2\pi/H_0) \cong (2\pi/\omega_t)$ indicates the time required to complete one rotation.

10. Time required to expand from planck volume to existing volume can be called as the present cosmic time. Its proposed expression is $t \cong 3\ln\left(\frac{R_t}{R_P}\right) * \left(\frac{8\pi}{\omega_t}\right) \cong 24\pi\ln\left(\frac{R_t}{R_P}\right) * \left(\frac{1}{\omega_t}\right)$. At present, $t \cong 4.85 \times 10^{21}$ seconds. With this large time 'smooth cosmic expansion' can be possible.

11. Inflation, magnetic monopoles problem and supernovae dimming etc can be understood by a 'larger cosmic time and smooth cosmic expansion'. 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 was 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' was born? has to be investigated by the present and future cosmologists.

12. If $T_t \cong 2.73 \times 10^{11}$ ^{0}kelvin, $\mathrm{t} \cong 0.31$ sec, $\mathrm{R_t} \cong 13833.6$ m, $\omega_\mathrm{t} \cong 21671$ rad/sec, $\mathrm{M_t} \cong 9.31 \times 10^{30}$ Kg. If $T_t \cong 2.73 \times 10^{10}$ ^{0}kelvin, $\mathrm{t} \cong 32.55$ sec, $\mathrm{R_t} \cong 1.38 \times 10^6$ m, $\omega_\mathrm{t} \cong 216.71$ rad/sec, $\mathrm{M_t} \cong 9.31 \times 10^{32}$ Kg. One second after the birth of planck particle, $R_t \cong 4.23 \times 10^4$ m. This is less than one light second, 3×10^8 m . From this data it can be suggested that, the cosmic expansion is smooth.

13. To a great surprise, this obtained time is matching with 96.84% of the present age of lord Brahma of Hindu or Indian vedic cosmology = 158.7 trillion years = 5×10^{21} seconds [30]. Really this is a miracle. This may be a coincidence also. The interesting question is – why and how the ancient Indians obtained that number? If so the interesting thing is that 1.7 days of lord Brahma is roughly matching with the current estimations of cosmic age!

10 Conclusion

Even though the detection of primordial cosmic black holes is very difficult, their direct effects are best seen in the form of old and new galaxies and their fast spinning galactic centers. Recent observations reveals that galactic central black holes are spinning close to speed of light. Compared to dark matter and dark energy, primordial cosmic black holes connects GTR, quantum mechanics and comology in a unified manner. Hence from its birth to its present state, universe can be considered as a growing and rotating primordial black hole. Constant speed of rotation maintains its stability and rate of decrease in temperature indicates its growth rate. Rate of increase in galaxy red shift from and about the cosmic center is an alternative measure of its growth rate.

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