Frontiers of Astronomy, Astrophysics and Cosmology, 2015, Vol. 1, No. 2, 90-97
Available online at http://pubs.sciepub.com/faac/1/2/2

DOI:10.12691/faac-1-2-2

Toy model of Evolving Spherical Cosmology with Flatness, Angular Velocity, Temperature and Redshift

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Received June 19, 2015; Revised June 23, 2015; Accepted July 07, 2015

Abstract In a heuristic approach, with reference to 'conservation of energy', 'light speed expansion', 'light speed rotation', 'Kerr-Schwarzschild radius', 'constancy of centripetal force', 'Planck scale' and 'quantum gravity', we introduce a heuristic 'toy model of cosmology'. The authors would like to stress the fact that, 'with light speed expansion and light speed rotation' qualitatively 'Hubble parameter' and 'angular velocity' both can be shown to be secondary physical constants and their individual roles can be shown to be similar. With four unified, simplified and workable assumptions, a number of useful cosmological formulae can be generated and the current Hubble parameter and current microwave back ground temperature can be fitted accurately. With the proposed assumptions: 1) The intended purpose of 'lambda' term can be understood and in future it can be relinquished. 2) Cosmic acceleration and dark energy concepts can be relinquished at fundamental level. 3) Cosmic flatness can be well understood. 4) Comic 'horizon problem' can be eliminated at fundamental level. In future, either from 'academic interest' point of view or from 'serious research' point of view, this toy model can be recommended for in depth analysis at fundamental level.

Keywords: *planck scale. Cosmology. light speed expansion, light speed rotation. cosmic temperature. quantum gravity*

Cite This Article: U.V.S. Seshavatharam, and S. Lakshminarayana, "Toy model of Evolving Spherical Cosmology with Flatness, Angular Velocity, Temperature and Redshift." *Frontiers of Astronomy, Astrophysics and Cosmology*, vol. 1, no. 2 (2015): 90-97. doi: 10.12691/faac-1-2-2.

1. Introduction

Very recently, by vigorously analyzing the super novae type Ia data, Nielsen. J.T et al, in a paper posted in arXiv on 3rd June 2015 suggest that [1], at present universe seems to be expanding at constant rate [2,3] and evidence for cosmic acceleration is only marginal. In 2013, Abhas Mithra suggested that, the currently believed "Cosmic acceleration" could be an artifact of in homogeneity [4,5]. In 2011, Paul J. Steinhardt, one of the creators of the inflation theory, suggested against to "Inflation" [6]. These published papers seriously cast doubt on the basics and advanced concepts of modern cosmology. From unification point of view S.W. Hawking expected quantum cosmology [7]. By following the Schwarzschild formula [8] and other basic and reasonable assumptions, our recently published paper [9] titled with "The basics of flat space cosmology" discounts the need for dark energy [10], the theory of cosmic inflation [11,12] and Horizon problem entirely.

It is not a surprise to say that, 'nature loves symmetry'. All the celestial objects are found to be rotating. If universe is 'really an expanding sphere', then it is very natural to have some angular momentum [13]. In that case, it is absolutely wrong to say that, "subject of cosmology can be developed and understood without cosmic rotation". If universe is 'really not rotating', it is also absolutely wrong to say that, "Subject of cosmology can be developed and understood with cosmic rotation". Since 1920 cosmologists are trying to understand the observable universe, in all the possible versions. The very important point to be noted is that, subject of cosmology is mostly subjected to very long range cosmological observations and are beyond the scope of confirmation. As universe is vast, time to time observations are indicating different set of results and are again subjected to future observations. By going through the history of observational cosmology one can understand this. It is very surprising to say that, recent observations indicate that our galaxy size is 50% larger than we believe [14]. In this paper, The authors would like to stress the fact that, 'with light speed expansion and light speed rotation' qualitatively 'Hubble parameter' and 'angular velocity' both can be shown to be secondary physical constants and their individual roles can be shown to be similar.

In a heuristic approach, with reference to 'conservation of energy', ''light speed expansion', 'light speed rotation', 'Kerr-Schwarzschild radius', 'constancy of centripetal force', Planck scale' and 'quantum gravity' in this paper the authors made an attempt to develop a unified "Toy" model of spherical cosmology with flatness, angular velocity, temperature and redshift.

2. About Cosmic Rotation and Quantum Gravity/Quantum Cosmology

2.1 Cosmic Rotation

In our recently published paper [9] the authors proposed that, right from the beginning of Planck scale, universe is translating with light speed with a radius of c/H. If so, it is reasonable and natural to guess that, at every stage of cosmic expansion, for the expanding cosmic sphere, there exists certain angular velocity. By considering conservation of force, it is also reasonable to guess that, cosmic angular velocity is inversely proportional to cosmic size. With reference to Planck mass, at the beginning of comic evolution, angular velocity was very high and was equal to the Hubble parameter associated with Planck mass. Similarly for the current observable universe, angular velocity is equal to the current Hubble parameter. The main consequence of this proposal is that, right from the beginning of cosmic evolution, universe translates and rotates with light speed. Note that according to Michael Longo [15] the universe has a net angular momentum and was born in a spin.

2.2. Quantum Gravity

In general, a unified branch of physics that connects general theory of relativity and quantum mechanics can be called as "quantum gravity". Clearly speaking, quantum gravity must show deep inner meaning at fundamental level for all possible energy scales. In this context, L.A. Glinka says - "Quantum gravity is one of the fundamental problems of modern theoretical physics. In spite of the significant efforts and various approaches, we are still very far of understanding the role of quantized gravitational fields in physical phenomena at high energies". To understand the advanced concepts of quantum gravity readers may refer L.A. Glinka's interesting paper [16]. Note that Glinka's words clearly indicate the current uncertain status of quantum gravity. 'Quantum cosmology' is another hot topic in current theoretical physics connected with the Planck scale and the expanding universe. Note that quantum cosmology attempts to explain those predictions related to the first phases of the early universe and also attempts to explain the current low energy scale observations of classical cosmology [9]. For a full description of this new subject readers may refer the lecture notes by Martin Bojowald [17].

3. Four Unified, Workable and Simplified Assumptions

From the Planck scale to the scale of our observable universe, four workable and simple assumptions can be expressed as follows:

Assumption-1: Right from the beginning of Planck scale, universe is expanding and rotating with light speed from and about the cosmic center. (But not from/about the Earth).

Comment-1: This assumption is new and paves a way to understand cosmic 'flatness' and 'horizon' problems. Not only that, with this assumption, the intended purpose of the famous Lambda term can be relinquished. The authors proposed this assumption very recently [9]. It may be noted that, without 'speed of light' there is no independent existence to Planck scale and without Planck scale there is no independent existence to physics and cosmology.

Assumption-2: At any stage of cosmic evolution, ratio of Hubble parameter and angular velocity can be expressed as,

$$\frac{H_t}{\omega_t} \cong \left\{1+\ln\left(\frac{\omega_{pl}}{\omega_t}\right)\right\} \cong \Upsilon_t \tag{1}$$

where H_t is the Hubble parameter and ω_{pl} is the Planck scale angular velocity.

Comment-2: This assumption is new, ad-hoc and proposed with reference to the currently recommended magnitudes of Hubble parameter and CMBR temperature. Note that, in the earlier published paper [9], the authors assumed that, at any stage of cosmic expansion, Hubble parameter and cosmic angular velocity are equal in magnitude. It may be true that, ratio of angular velocity and Hubble parameter is model dependent. Interested readers may assume a different ratio of Hubble parameter and angular velocity and may try for fitting the current Hubble parameter and cosmic microwave back ground temperature. That's why the authors call this model as "toy model of cosmology".

Assumption-3: Right from the beginning of Planck scale, cosmic size follows the relation,

$$R_t \cong \frac{GM_t}{c^2} \cong \frac{c}{\omega_t} \tag{2}$$

where R_t, M_t and ω_t represent the radius, mass and angular velocity of the universe at time t respectively.

Comment-3: This assumption is not new and can be seen in physics literature related with cosmology. With assumptions 1, 2 and 3 cosmic flatness and horizon problems can be understood. Now it is very simple to show that, at any stage of cosmic expansion, magnitude of centripetal force is the order of $M_t\left(c^2/R_t\right) \cong M_t c\omega_t \cong \left(c^4/G\right)$. Clearly speaking, at different stages of cosmic expansion, $M_1\left(c^2/R_1\right) \cong M_2\left(c^2/R_2\right) \cong M_3\left(c^2/R_3\right) \cong \left(c^4/G\right)$. Thinking in this way, at any stage of cosmic expansion, angular momentum can be shown to be $L_t \approx M_t c R_t \approx \left(GM_t^2/c\right) \approx \left(M_t/M_{pl}\right)^2 \hbar \approx \left(R_t/R_{pl}\right)^2 \hbar$.

Thus in this paper, the authors made an attempt to give priority to "conservation of centripetal force" rather than "conservation of angular momentum".

Assumption-4: Right from the beginning of Planck scale, at any stage of cosmic expansion, cosmic gravitational potential energy and total thermal energy are equal in magnitude and can be expressed as follows.

$$\frac{3}{5}\frac{GM_t^2}{R_t} \cong aT_t^4\left[\frac{4\pi}{3}\left(R_t^3\right)\right]. \tag{3}$$

Comment-4: This assumption is new and can be given some consideration for in depth analysis with respect to energy conservation in the expanding universe.

4. To Connect the Cosmic Physical Parameters

Following these assumptions, Planck scale Hubble parameter and angular velocity both can be assumed to be equal in magnitude and can be expressed as follows.

$$H_{pl} \cong \omega_{pl} \cong \frac{c^3}{GM_{pl}} \cong \frac{c}{R_{pl}} \cong 1.85492\times10^{43}\ \text{rad.sec}^{-1} \tag{4}$$

where $R_{pl} \cong GM_{pl}/c^2 \cong \sqrt{G\hbar/c^3} \cong 1.6162\times10^{-35}$ m is the assumed radius connected with Planck mass.

Planck scale temperature can be expressed as

$$T_{pl} \cong \left(\frac{9\omega_{pl}^2 c^2}{20\pi Ga}\right)^{\frac{1}{4}} \cong \left(\frac{9H_{pl}^2 c^2}{20\pi Ga}\right)^{\frac{1}{4}} \cong 9.67791\times10^{31}\ \text{K} \tag{5}$$

At any stage of cosmic expansion, if cosmic temperature is known,

Step-1: Angular velocity can be estimated with the following relation.

$$aT_t^4 \cong \frac{9c^2\omega_t^2}{20\pi G} \text{ and } \omega_t \cong \sqrt{\frac{20\pi GaT_t^4}{9c^2}} \tag{6}$$

Step-2: Hubble parameter can be estimated with the following relation.

$$H_t \cong \omega_t\left\{1+\ln\left(\frac{\omega_{pl}}{\omega_t}\right)\right\} \tag{7}$$

It is having the following key applications in cosmology.

1. Current CMBR temperature can be fitted accurately.
2. A very simple relation for CMBR redshift can be developed. See section-8.
3. Standard cosmology's predicted redshift of 1100 connected with recombination temperature of 3000 K can be fitted very easily. See section-8.
4. At every stage of expansion, qualitatively
5. Hawking's 'black hole temperature formula' like relation can be obtained. See relation (8).
6. General relativity, Quantum mechanics, Planck scale high temperatures, current & future low temperatures can be studied in a unified manner and a unified model of scale independent quantum gravity/cosmology [16,17,18] can be developed at fundamental level.

With reference to Planck mass and by splitting the radiation constant, if cosmic angular velocity is known, cosmic temperature can be estimated with the following relation.

$$T_t \cong \left(\frac{9\omega_t^2 c^2}{20\pi Ga}\right)^{\frac{1}{4}} \cong \left(\frac{9}{20\pi}\right)^{\frac{1}{4}}\left(\frac{\hbar c^3}{k_B G\sqrt{M_t M_{pl}}}\right) \cong \left(\frac{9}{20\pi}\right)^{\frac{1}{4}}\left(\frac{M_t}{M_{pl}}\right)^{\frac{1}{2}}\left(\frac{\hbar c^3}{k_B GM_t}\right) \tag{8}$$

In this relation, the expression, $\left(\frac{\hbar c^3}{k_B GM_t}\right)$ qualitatively can be compared with the famous Black hole temperature formula [18]. Considering this relation, quantum mechanics, general theory of relativity and Planck scale can be studied in a unified manner and quantum cosmology can be put into main stream cosmological observations.

5. The Characteristic Equations of Current Universe in This Toy Model of Cosmology

As per the 2015 Planck data [19,20], the current value of the Hubble parameter is reported to be:

$$\left.\begin{array}{l} \text{Planck TT+low P: } (67.31\pm0.96)\ \text{km/sec/Mpc} \\ \text{Planck TE+low P: } (67.73\pm0.92)\text{km/sec/Mpc} \\ \text{Planck TT,TE,EE+low P: } (67.7\pm0.66)\text{km/sec/Mpc} \end{array}\right\}$$

As per the 2015 Planck data, the current value of CMBR temperature is:

$$\left.\begin{array}{l} \text{Planck TT + lowP + BAO: } (2.722\pm0.027)\ \text{K} \\ \text{Planck TT; TE; EE + low P + BAO: } (2.718\pm0.021)\text{K} \end{array}\right\}$$

Upper limit of current CMBR is $\left.\begin{array}{l}(2.722+0.027)\cong 2.749\ \text{K}\\(2.718+0.021)\cong 2.739\ \text{K}\end{array}\right\}$ and average upper limit of the CMBR temperature is 2.744 K. Hence

Step-1: Current angular velocity can be estimated as follows:

$$\omega_0 \cong \sqrt{\frac{20\pi GaT_0^4}{9c^2}} \cong 1.49068\times10^{-20}\ \text{rad/sec} \tag{9}$$

Step-2: Current Hubble parameter can be estimated as follows:

$$H_0 \cong \omega_0\left\{1+\ln\left(\frac{\omega_{pl}}{\omega_0}\right)\right\} \cong 2.1805868\times10^{-18}\ \text{sec}^{-1} \cong 67.2864\ \text{km/sec/Mpc} \tag{10}$$

Current cosmic mass and radius can be estimated as,

$$\left.\begin{array}{l} M_0 \cong \dfrac{R_0 c^2}{G} \cong \dfrac{c^3}{G\omega_0} \cong 2.70833\times10^{55}\ \text{kg} \\ R_0 \cong \dfrac{GM_0}{c^2} \cong \dfrac{c}{\omega_0} \cong 2.0111\times10^{28}\ \text{m} \end{array}\right\} \tag{11}$$

The two impossible things in cosmology are: 1) Measuring the cosmic size. 2) Measuring the cosmic mass. It may be noted that, with reference to current Hubble radius, ~68% dark energy and ~32% (observable matter and dark matter) total estimated mass of current universe is 2.48×10^{54} kg. This can be compared with the proposed estimate of 2.71×10^{55} kg. Estimation of observable cosmic mass mainly depends on 'counting the number of galaxies, 'weighing the central core mass of all the galaxies', 'counting the number of stars in all of the galaxies' and 'weighing the individual mass of stars' etc. This entire procedure is mainly based on 'observational approach' and needs so many correction factors. Two interesting points are: 1) Day by day, 'cosmic acceleration' and 'dark energy' both are losing their identity [1,2,3,4,5]. 2) Modified Newtonian dynamics (MOND) taking a leading role in understanding the galactic rotational curves [21,22,23] and day by day, dark matter also losing its identity. Hence in future it may be easy to estimate the cosmic mass. With future cosmological observations and other models of cosmology, these proposed magnitudes of cosmic mass and size can be considered as the characteristic limiting magnitudes.

6. Cosmic Age

In general, cosmic age is 'model dependent' and 'cosmic size dependent'. In this proposed model, cosmic age estimation is very simple and direct. As the cosmic model is always assumed to be expanding with light speed, from the beginning of Planck scale, cosmic age can be estimated as follows.

$$\left.\begin{array}{l} t \cong \dfrac{\left(R_t - R_{pl}\right)}{c} \text{ and } ct \cong \left(R_t - R_{pl}\right) \cong R_t \\ \text{where } R_t >> R_{pl} \end{array}\right\} \quad (12)$$

For the current case, since $\left(R_{pl}\right)$ is very small and $\left(R_0 - R_{pl}\right) \cong R_0$.

$$t_0 \cong \frac{R_0}{c} \cong \frac{1}{\omega_0} \cong 2.126\times10^{12} \text{ years} \cong 2125.75 \text{ G Years} \quad (13)$$

No that, in this toy model cosmic time is a function of cosmic angular velocity and speed of light and is subjected to current and future observational estimations of magnitude of angular velocity.

From relation (11) estimated current cosmic radius is 146 times higher than the current Hubble radius. Hence current cosmic age will be 146 times higher than the currently believed cosmic age of 13.8 billion years.

7. Practical Applications of Current Angular Velocity in This Toy Model

A. Galactic revolving speed:

For the current light speed rotating cosmic model, on the equatorial plane, galactic revolving speed can be expressed as,

$$\left(v_g\right)_{rev} \cong r_g\omega_0 \le c \quad (14)$$

Here, r_g and $\left(v_g\right)_{rev}$ represent the galactic distance from the cosmic center and galactic revolving speed corresponding to the cosmic angular velocity, respectively. The important point to be noted is that, even though $\dfrac{\left(v_g\right)_{rev}}{c}$ is always less than 1, the proposed velocity refers to galactic "revolution speed" about the cosmic center and the proposed distance refers to galaxy distance from the cosmic center. Importantly, actual galactic "revolving speeds" have never been confirmed by any direct cosmological observations. This is for further study.

B. Galactic receding speed:

In modeling the current expanding universe, on the equatorial plane, galactic receding speed can be expressed as follows.

$$\left(v_g\right)_{rec} \cong \left(\frac{r_g}{R_0}\right)c \cong r_g\left(\frac{c}{R_0}\right) \cong r_g\omega_0 \le c \quad (15)$$

From the above, it is clear that, at the present time, on the equatorial plane, the magnitude of galactic revolving speed equals the magnitude of galactic receding speed. In Hubble's law [24,25], velocity refers to galactic "receding speed" and distance refers to "distance between galaxy and observer." Thus *Hubble's law appears to be a natural physical consequence in this model.*

C. Galactic centripetal acceleration:

1) For any revolving galaxy, galactic centripetal acceleration can be expressed as:

$$a_g \cong \omega_0\left(v_g\right)_{rev} \cong r_g\omega_0^2 \quad (16)$$

2) For any satellite that is assumed to be revolving at a distance $r_{satellite}$ from the cosmic center, centripetal acceleration can be expressed as:

$$a_{satellite} \cong \omega_0\left(v_g\right)_{rev} \cong r_{satellite}\omega_0^2 \quad (17)$$

Based on the above applications, and by measuring actual galactic "revolving speeds" and galactic "recession speeds," the current cosmic centripetal acceleration can be estimated.

D. Galactic rotational curves:

The current dominant paradigm is that galaxies are embedded in halos of cold dark matter (CDM), made of non-baryonic weakly-interacting massive particles. However, an alternative way to explain the observed rotation curves of galaxies is the postulate that, for gravitational accelerations below a certain value $a_0 \cong (1.2\pm0.3)\times10^{-10}$ $m.\sec^{-2}$,the true gravitational field strength g approaches $\sqrt{g_N g}$, where g_N is the usual Newtonian gravitational field strength (as calculated from the observed distribution of visible matter). This paradigm is known as modified Newtonian dynamics (MOND). Here, $a_0 \cong (1.2\pm0.3)\times10^{-10}$ $m.\sec^{-2}$. In the light speed rotating cosmic model, by considering the galactic revolving speed $\left(v_g\right)_{rev}$ about the cosmic center, the magnitude of galactic centripetal acceleration can be assumed to vary as:

$$a_g \cong \omega_0 \left(v_g\right)_{rev} \cong r_g \omega_0^2 \tag{18}$$

where r_g is the distance between galaxy and the cosmic center. Now rotational speed of a star in any galaxy can be represented as follows:

$$\begin{aligned}\left(v_{star}\right)_{rev} &\propto \sqrt[4]{GM_g \omega_0 \left(v_g\right)_{rev}} \\ &\propto \sqrt[4]{GM_g r_g \omega_0^2}\end{aligned} \tag{19}$$

M_g is the mass of the galaxy. With an assumed universal proportionality ratio of 1, and by knowing the galactic mass and actual revolving speeds of galactic stars, galactic revolving speed and galactic distance from the cosmic center can be approximated in the following way:

$$\left.\begin{aligned}\left(v_g\right)_{rev} &\cong \frac{\left(v_{star}\right)_{rev}^4}{GM_g \omega_0} \text{ and} \\ r_g &\cong \frac{\left(v_g\right)_{rev}}{\omega_0} \cong \frac{\left(v_{star}\right)_{rev}^4}{GM_g \omega_0^2}\end{aligned}\right\} \tag{20}$$

By knowing our mother galactic mass and rotational curves, our galactic distance from the cosmic center can be approximated. By considering the different model-dependent proportionality ratios, and correlating all of the data, finally the correct magnitude of the proportionality ratio can be fitted. This is for further study.

8. Model Equation of Cosmic Non-linear Redshift and to Estimate the Cosmic Angular Velocity

In this section, in a semi-empirical approach, the authors propose a very simple model equation for observed and predicted cosmic redshifts, including galactic and CMBR redshifts. These are for further research and analysis. With reference to the proposed assumptions,

$$\left\{1+\ln\left(\frac{\omega_{pl}}{\omega_0}\right)\right\} \cong \left\{1+\ln\left(\frac{R_t}{R_{pl}}\right)\right\} \tag{21}$$

Thus at any stage of cosmic expansion in the past,

$$\left\{1+\ln\left(\frac{\omega_{pl}}{\omega_t}\right)\right\} \cong \left\{1+\ln\left(\frac{R_t}{R_{pl}}\right)\right\} \tag{22}$$

Based on this relation, one particularly simple model equation under current study is:

$$Z \cong \sqrt{\frac{\omega_t}{\omega_0}-1} \cong \sqrt{\frac{R_0}{R_t}-1} \cong \sqrt{\frac{GM_0}{c^2 R_t}-1} \tag{23}$$

where $\omega_t > \omega_0, R_t < R_0$, and $M_0 \cong c^3/G\omega_0$.

Where ω_0 and ω_t represent current and past cosmic angular velocity respectively. Similarly R_0 and R_t represent current and past decreasing cosmic radii, respectively. Thus in this model, by knowing or guessing the galactic redshift, cosmic angular velocity can be estimated.

With reference to cosmic center and by following relation (23) and Minkowski's relativistic Doppler shift formula, galactic redshift (connected with simultaneous cosmic light speed expansion and light speed rotation) may be considered for further study and analysis [9].

With reference to the proposed assumptions, relation (23) can be obtained in the following semi-empirical approach. Let,

$$\left[1+\ln\left(\frac{R_0}{R_{pl}}\right)\right] \cong \Upsilon_0 \text{ and } \left[1+\ln\left(\frac{R_t}{R_{pl}}\right)\right] \cong \Upsilon_t \tag{24}$$

$$\left.\begin{aligned}Z &\cong \sqrt{\exp\left(\Upsilon_0-\Upsilon_t\right)-1} \\ &\cong \sqrt{\exp\left\{\left[1+\ln\left(\frac{R_0}{R_{pl}}\right)\right]-\left[1+\ln\left(\frac{R_t}{R_{pl}}\right)\right]\right\}-1} \\ &\cong \sqrt{\exp\left\{\left(\ln\left(\frac{R_0}{R_{pl}}\right)-\ln\left(\frac{R_t}{R_{pl}}\right)\right)\right\}-1} \\ &\cong \sqrt{\exp\left\{\ln\left(\frac{R_0}{R_t}\right)\right\}-1} \cong \sqrt{\frac{R_0}{R_t}-1}\end{aligned}\right\} \tag{25}$$

With respect to the proposed assumptions it is clear that at any stage of cosmic expansion, cosmic radius is inversely proportional to the squared cosmic temperature. The above relation (21) can be expressed as follows.

$$Z \cong \sqrt{\frac{R_0}{R_t}-1} \simeq \sqrt{\frac{T_t^2}{T_0^2}-1} \tag{26}$$

where T_t is the past cosmic temperature and T_0 is the current cosmic temperature and $T_t > T_0$.

For past higher cosmic temperatures, where $T_t >> T_0$

$$Z \cong \sqrt{\frac{T_t^2}{T_0^2}-1} \cong \frac{T_t}{T_0} \tag{27}$$

This can be compared with the famous relation that is currently well believed by modern cosmologists.

$$Z+1 \cong \frac{T_t}{T_0} \tag{28}$$

Thus, it appears likely that at least a portion of the progressively higher redshift we observe with increasing look-back distance is a manifestation of gravitational time dilation. In addition, because of this inverse square relationship over very long distances, plots of proximal galactic redshifts per unit of distance observed would be expected to look relatively linear (as seen by the weaker telescopes of the 1920's and 1930's) and deep space galactic redshifts per unit of distance observed would be expected to clearly fall away from linearity, along with decreasing luminosity, as redshifts extend into the infrared range (as reported in 1998 Type Ia supernovae observations) [26]. Such an effect may possibly create an illusion of dark energy whose current evidence is only marginal [1].

The following graph (Figure 1), according to the above relation (23), shows expected observed cosmic redshift as a function of decreasing past cosmic radius R_t pertaining to a particular astronomical observation. In this manner, increasingly greater redshifts would be expected to correspond with more distant galactic observations. The authors propose that something like this mathematical relationship could be useful in modeling the results of progressively deeper space observations. For data, see Table 1. In the last row of Table 1 the past cosmic radius R_t and redshift of 1090 corresponding to the recombination temperature of 2990 K are correlated. Relations (23) and (27) closely approximate the recombination temperature of 3000 K and CMBR redshift 1100 believed to be related to formation of the first hydrogen atoms. Figure 1 may possibly provide an explanation for the nonlinearity of deep space Type Ia supernovae observations currently being attributed to "dark energy" [27]. Here it may be noted that, with reference to the suggestions proposed in reference [1] of this paper, current universe seems to be expanding at constant rate and evidence for dark energy is only marginal.

Table 1. Cosmic Physical Parameters Obtained with Relation (23)

Assumed angular velocity (rad/sec)	Estimated cosmic radius (m)	Estimated galactic redshift	Estimated cosmic temperature (K)	Estimated cosmic age (Years)
1.49069E-20	2.01110E+28	0.0	2.74	2.12573E+12
2.45666E-20	1.22033E+28	0.8	3.52	1.28989E+12
4.04857E-20	7.40490E+27	1.3	4.52	7.82699E+11
6.67204E-20	4.49327E+27	1.9	5.80	4.74938E+11
1.09955E-19	2.72650E+27	2.5	7.45	2.88191E+11
1.81206E-19	1.65443E+27	3.3	9.57	1.74873E+11
2.98628E-19	1.00390E+27	4.4	12.28	1.06112E+11
4.92139E-19	6.09163E+26	5.7	15.76	6.43885E+10
8.11045E-19	3.69637E+26	7.3	20.24	3.90707E+10
1.33660E-18	2.24295E+26	9.4	25.98	2.37080E+10
2.20272E-18	1.36101E+26	12.1	33.35	1.43859E+10
3.63008E-18	8.25856E+25	15.6	42.81	8.72931E+09
5.98237E-18	5.01126E+25	20.0	54.96	5.29691E+09
9.85895E-18	3.04081E+25	25.7	70.56	3.21414E+09
1.62476E-17	1.84515E+25	33.0	90.58	1.95033E+09
2.67760E-17	1.11963E+25	42.4	116.28	1.18345E+09
4.41268E-17	6.79389E+24	54.4	149.27	7.18114E+08
7.27210E-17	4.12250E+24	69.8	191.62	4.35749E+08
1.19844E-16	2.50152E+24	89.7	246.00	2.64411E+08
1.97503E-16	1.51791E+24	115.1	315.80	1.60443E+08
3.25485E-16	9.21063E+23	147.8	405.40	9.73565E+07
5.36400E-16	5.58898E+23	189.7	520.43	5.90755E+07
8.83986E-16	3.39137E+23	243.5	668.10	3.58468E+07
1.45681E-15	2.05787E+23	312.6	857.67	2.17517E+07
2.40082E-15	1.24871E+23	401.3	1101.03	1.31988E+07
3.95656E-15	7.57711E+22	515.2	1413.44	8.00901E+06
6.52040E-15	4.59776E+22	661.4	1814.50	4.85984E+06
1.07456E-14	2.78990E+22	849.0	2329.35	2.94893E+06
1.77088E-14	**1.69290E+22**	**1089.9**	**2990.30**	**1.78940E+06**

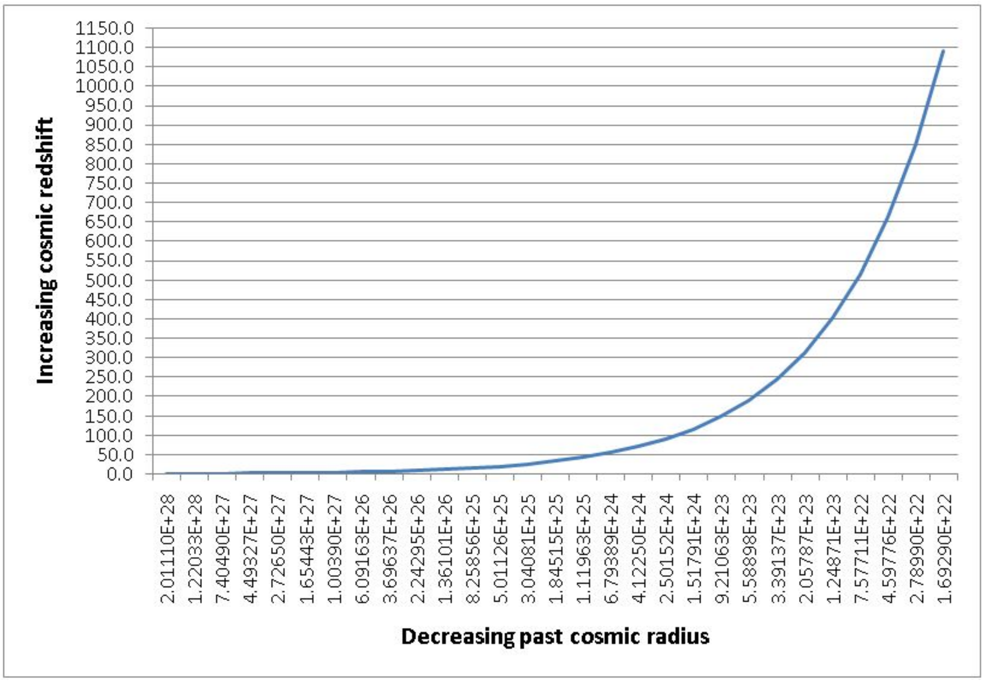

Figure 1. Increasing cosmic redshift vs Decreasing past cosmic radius

9. Flatness and Horizon Problems and Lambda Term in This Toy Model of Cosmology

A. Back ground history of Flatness problem: Ever since physicist Robert Dicke first made the observation [27] in 1969, cosmologists have been deeply puzzled as to how our universe appears to be expanding in a very precise way so as to perfectly balance out the attractive "force" of gravity. This is also what is meant by a "flat universe". In fact, as it was pointed out at the time, for such an apparent balance to be within observable error in the present, the presumably opposing forces in the very early universe (within the first second after the Big Bang) must have been of equal magnitude to within one part in 10^{14}. This has since been referred to as the "cosmological flatness problem." There is an excellent discussion of this problem in Alan Guth's book [11] "The Inflationary Universe." As one of the pioneers and early proponents of the theory of cosmic inflation, Dr. Guth makes it very clear in his book that the flatness problem was a primary reason for which the theory of cosmic inflation was developed.

B. Modern view of 'flatness' and its current status: According to modern cosmology, criteria for 'flatness' is: sum of observable matter density, density of dark matter and density of dark energy should be equal to the critical density, $(\rho_{cri})_0 \cong (3H_0^2/8\pi G)$. Current cosmological observations clearly suggest that, evidence to cosmic acceleration is only marginal and at present universe is expanding at a constant rate [1,2,3] and reference there in. If so currently believed 'dark energy that assumed to be constituting ~68% of critical density' may be losing its identity in all respects. With reference to MOND, 'dark matter that assumed to be constituting ~27% of critical density' seems to be losing its physical identity. Compared to 'dark energy', 'dark matter' seems to have some underlying particle physics back ground. But so far, no one could notice or find a 'characteristic particle' that can be called as the particle related with 'dark matter'. These points seriously cast doubt on the modern definition of 'flat universe' and seems to be reviewed at fundamental level.

C. Modern view of horizon problem: It had been a puzzle to cosmologists as to how a universe much larger than our own Hubble radius could have had any kind of causal connection to generate homogeneity. This has been called the "horizon problem." The theory of cosmic inflation, assumes an extremely brief period of superluminal hyper-rapid exponential expansion that believed to solve the flatness problem and the horizon problem simultaneously.

D. The authors opinion on flatness, homogeneity and horizon problems, primordial density fluctuations and the Lambda term

In this proposed model the authors assume that, right from the beginning of cosmic evolution, universe is expanding at light speed. This assumption seems to be strongly supported by the (very) recent cosmological observations that suggest 'constant rate of expansion' [1,2,3] against "cosmic acceleration". It may be noted that, 'expansion at constant rate' implies that no apparent net forces acting on the expanding universal system as a whole. In this context, the authors' proposed four assumptions can be given considerable importance.

a. In this proposed model, in the first second of cosmic expansion, the universe expands from $1.6162\times10^{-35}\,\text{m}$ to $3\times10^{8}\,\text{m}$ and the ratio of expansion is 1.85×10^{43}. Similarly, in one second from the Planck scale, temperature drops from 9.68×10^{31} K to 2.25×10^{10} K and the ratio of temperature drop in the first second is 4.3×10^{21}. Thus by considering 'continuous light speed expansion' the intended purpose of 'cosmic inflation effect' can be understood thoughly at fundamental level without requiring new physic.

b. In this proposed model, just crossing the Planck scale, at every stage of cosmic expansion, universe is confined to a size limited by $\left[R_t \cong c/\omega_t \cong GM_t/c^2\right] > \left[c/H_0\right]$. Clearly speaking, in this model current cosmic radius is ~146 times more than the current Hubble radius. Thus the solution to the "horizon problem" is built into this model, not because the authors designed it with that intention, but because a universe bounded by $R_0 \cong c/\omega_0 \cong GM_0/c^2$ will be causally connected.

c. Cosmologists also postulate that primordial density perturbations resulting from primordial quantum fluctuations are responsible for the structure of the universe we see today. This also seems reasonable in this proposed model. Why because this proposed model is inherently connected with Planck scale. Planck scale itself may be responsible for the assumed primordial density fluctuations. Any how, in this context more study and additional mathematical modeling seesm to be required.

d. If it is assumed that, 'continuos light speed expansion' plays a cruicial role in cosmology, then the currently believed famous "lambda term" can be relinquished for ever. Any how, in a semi empirical approach, Lambda term can be expressed with the following relation.

$$\left.\begin{array}{l}\Lambda_t\left(\dfrac{c^4}{G}\right)\cong\left(\dfrac{9c^2\omega_t^2}{20\pi G}\right)\cong aT_t^4 \quad \text{and} \\ \Lambda_t\cong\left(\dfrac{9c^2\omega_t^2}{20\pi G}\right)\left(\dfrac{c^4}{G}\right)^{-1}\cong\left(\dfrac{9\omega_t^2}{20\pi c^2}\right) \\ \cong aT_t^4\left(\dfrac{c^4}{G}\right)^{-1}\cong\dfrac{GaT_t^4}{c^4}\end{array}\right\} \tag{29}$$

Here (c^4/G) can be considered as the characteristic constant centripetal force of the light speed expanding and light speed rotating universe. Current magnitude of Λ can be expressed as:

$$\left.\begin{array}{l}\Lambda_0\cong\left(\dfrac{9c^2\omega_0^2}{20\pi G}\right)\left(\dfrac{c^4}{G}\right)^{-1}\cong\left(\dfrac{9\omega_0^2}{20\pi c^2}\right) \\ \cong\dfrac{GaT_0^4}{c^4}\cong 3.5415\times10^{-58}\ \text{m}^{-2}\end{array}\right\} \tag{30}$$

10. Conclusion

The authors stress the fact that, subject of cosmology is subjected to time to time cosmological observations [1-3], critical reviews [4,5] on old concepts and new models of cosmology [28,29,30]. With reference to current available data, qualitatively and quantitatively this proposed toy model can be analyzed theoretically in many possible ways. It may be true that, ratio of angular velocity and Hubble parameter is model dependent. Theoretically, compared to cosmic size and cosmic mass estimations, estimation of cosmic angular velocity seems to be easy and may yield workable models of cosmology. Now it seems essential to think and focus on developing 'observational methods' of cosmic angular velocity. By considering the Planck scale, in this paper, the authors assumed that $H_t \cong \omega_t \left\{1+\ln\left(\omega_{pl}/\omega_t\right)\right\}$ and is for further critical study. As the assumed angular velocity is interlinked with Planck scale, its significance cannot be ignored. In future, either from 'academic interest' point of view or from 'serious research' point of view,

1. By considering 'light speed expansion' and 'light speed rotation' subject of cosmology can be simplified.
2. By guessing the 'Black hole radius' concept, subject of cosmology can be strengthened.
3. By guessing different ratios of angular velocity and Hubble parameter - different models of cosmology can be developed and a unified model of flat space (spherical) cosmology can be developed with respect to observational confirmation of the magnitude of angular velocity.
4. Quantum gravity point of view or Quantum cosmology point of view, relation (8) can be recommended for in depth study and analysis.

Acknowledgements

Authors are very much thankful to Dr. E. Terry Tatum for his kind and valuable discussion on 'cosmic rotation'. One of the authors, Seshavatharam U.V.S, is indebted to professors K.V. Krishna Murthy, Chairman, Institute of Scientific Research in Vedas (I-SERVE), Hyderabad, India and Shri K.V.R.S. Murthy, former scientist IICT (CSIR), Govt. of India, Director, Research and Development, I-SERVE, for their valuable guidance and great support in developing this subject.

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