Light speed expanding Hubble-Hawking universe

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Abstract: Based on four major cosmological and astrophysical coincidences, it seems possible to develop a new model of Hubble-Hawking Universe having light speed expansion. First Coincidence is - distance travelled by light in 14 billion years seems to equal to the currently believed cosmic Hubble radius. Second Coincidence is - Product of currently believed cosmic critical density and cosmic Hubble volume seems to be equal to the black hole mass of the current Hubble universe. Third Coincidence is - Currently believed cosmic temperature seems to be equal to the geometric mean of Hawking temperature of Planck mass and Hawking temperature of current Hubble mass. Fourth coincidence is - single big bang having evolution that resembles a light speed growing Planck mass. Considering the analysis of 740 super novae data, it is possible to consider a constant rate of cosmic expansion. As there is no physical reasoning for the observed speed of light and all the cosmological observations are completely based on speed of light-by considering 'light speed expansion' concept as a characteristic nature of the universe, big bang, inflation, dark energy, quintessence and lambda term like ideal and unidentified concepts can be reviewed and relinquished at fundamental level and a practical model of expanding universe can be developed with ease and clarity. In this context, we encourage the reader to see Figure 1 pertaining to light travel distances prepared with $(z/1+z)(c/H_0) \cong z_{new}(c/H_0)$. For a comparison, readers are encouraged to visit https://cosmocalc.icrar.org/ and http://www.atlasoftheuniverse.com/cosmodis.c. It may be noted that, considering 200 million solar masses as a cut off for ordinary gravity, dark matter can be considered as an effect of power law based super gravity of galactic baryonic mass. It is well believed that, Hawking's findings about black holes are the most important contributions to physics in recent decades. Hence, we appeal the science community to recommend our Hubble-Hawking model for further research and study.

Keywords: Hubble-Hawking model, Light speed expansion, Black hole universe, Power law super gravity of baryonic mass, 200 million solar masses.

1. Introduction

Subject of standard model of cosmology is currently falling in serious disparagements due to dark matter and dark energy issues. It is very surprising to note that, after 20 years of a strong footing, very shocking news is that, based on 'quintessence' driven universe, within coming 100 million years, universe is coming to a halt and slowly getting contraction to form a big crunch [1]. This technical paper has been reviewed by one of the co-founders of the accelerating universe, Saul Perlmutter and got published in Proceedings of the National Academy of Sciences of USA in April 2022. In August 2019, based on the opacity of the universe, a technical paper got published in Monthly Notices of Royal Society on the dimming nature of distance supernovae, cosmic acceleration and dark energy [2]. On the whole, dark energy and quintessence both seem to play a crucial role in understanding the exact nature of cosmic expansion rate. Proceeding further, by considering 740 supernovae data, it has been argued that, observed acceleration is a local effect and no way connected with dark energy. This technical paper

has been published in Astronomy & Astrophysics in 2019 November. In this very critical situation, in 2019, it has been suggested that, universe undergoes a series of cyclic process with different phases [4]. This technical paper has been published in Physics Letters B in August 2019. In this context, we emphasize the point that, scientists are not showing interest in understanding the reasons for photon's light speed. We assure the reader that, it will certainly help in understanding cosmic acceleration, dark energy, quintessence and cosmic evolution.

After 90 years of strong observational support, considering the increasing number of dark matter deficient galaxies, another technical paper got published in Nature Astronomy in November 2019 [5]. Most recent and most advanced experiments are showing their inability in detecting dark matter particles in lower mass range [6] and experimentalists are trying to tune the experimental set up for detecting dark matter particles in various mass ranges.

2. Four major cosmological and astrophysical coincidences

2.1 Cosmic age and cosmic radius

Currently believed cosmic age is 13.8 billion years. Distance travelled by a photon in 13.8 billion years is $1.3\text{x}10^{26}$ m and is almost all equal to the currently believed Hubble radius $R_0 \cong (c/H_0)$. It clearly indicates something new about the cosmic expansion speed in terms of speed of photon. We interpret this relation as, from the beginning of Planck scale, universe expands with speed of light. In a mathematical form, $R_t - R_{pl} \cong ct$ where (R_{pl}, R_t) represent Planck scale cosmic radius and radius at any time R_t. This can be considered as Assumption-1. Lambda model of cosmic age up to $(1+\text{z}) = 1100$ can be fitted accurately with, $t \cong \left[1/(1+z)\right]^{\frac{3}{2}} (1/H_0) \cong \sqrt{1+z}/H_t$ where H_t is related with Hubble-Hawking model. It needs a review at fundamental level.

2.2 Cosmic critical density, volume and mass

Currently believed cosmic critical density is, $\rho_0 \cong \left(3H_0^2/8\pi G\right)$. Considering the product of currently believed cosmic critical density and Hubble volume, $V_0 \cong \left(\frac{4\pi}{3}\right)(c/H_0)^3$, it is possible to show that, $M_0 \cong \left(c^3/2GH_0\right)$. On re-arranging this mass expression, $2GM_0/c^2 \cong c/H_0 \cong R_0$. It clearly indicates something new about the current universe in terms of current cosmic black hole mass, radius and expansion speed. We interpret this relation as, from the beginning of Planck scale, $R_t \cong (c/H_t) \cong 2GM_t/c^2$. This can be considered as Assumption-2.

2.3 Cosmic temperature

Currently believed cosmic temperature T_0 seems to be equal to the geometric mean of Hawking temperature of Planck mass, $T_{M_{pl}} \cong \frac{\hbar c^3}{8\pi k_B G M_{pl}}$ and Hawking temperature of current cosmic Hubble mass,

$T_{M_0} \cong \frac{\hbar c^3}{8\pi k_B G M_0}$. In a simplified form, it can be expressed as, $T_0 \cong \frac{\hbar c^3}{8\pi k_B G\sqrt{M_{pl} M_0}}$. It clearly indicates something new about the current cosmic temperature in terms of Hawking's Black hole physics. We interpret this relation as, from the beginning of Planck scale, $T_t \cong \frac{\hbar c^3}{8\pi k_B G\sqrt{M_{pl} M_t}} \cong \frac{\hbar\sqrt{H_t H_{pl}}}{4\pi k_B}$ where $M_t \cong \frac{c^3}{2GH_t}$, $M_{pl} \cong \sqrt{\frac{\hbar c}{G}}$ and $H_{pl} \cong \frac{1}{2}\sqrt{\frac{c^5}{G\hbar}}$. This can be considered as Assumption-3.

For an observed value of $T_0 \cong 2.72548$ K, estimated $H_0 \cong 2.167867\times10^{-18}$ sec^{-1} $\cong$ 66.89 km/sec/Mpc. We would like to emphasize the point that, based on Hawking's black hole temperature formula, geometric mean of Planck mass and the so called Hubble mass, seems to play a crucial role in estimating the observed cosmic microwave back ground temperature, (CMBR) [7]. This kind of relation is missing in Lambda cosmology and to a great extent, currently observed discrepancy or tension in estimating the Hubble parameter can be eliminated.

Considering Planck mass and the Universe, both, as 'point particles', this relation can be derived with three hypothetical conditions, $\frac{GM_t M_{pl}}{r_t^2} \cong \left(\frac{c^4}{8\pi G}\right)$; $r_t \cong \left(\frac{2.898\times10^{-3}}{2\pi T_t}\right)$ and $M_t \cong \left(\frac{c^3}{2GH_t}\right)$. Derived relation is, $T_t \cong \frac{\hbar c^3}{24.891 k_B G\sqrt{M_{pl} M_t}}$ and the denominator coefficient 24.891 is almost all equal to $8\pi \cong 25.13274$.

2.4 Light speed growing Plank ball having Big bang like evolution

Modern cosmologists strongly believe that there exists only big bang and that is responsible for the whole cosmic evolution. We would like to emphasize that - in reality, if big bang is the seed of cosmic evolution, if big bang is a representation of space expansion rather than an explosion, if there exists only one big bang and if one wishes to implement Planck scale in current and past universe, then, Planck mass can be considered as a possible seed of cosmic evolution having light speed expansion.

3. Cosmological disagreements and quantum cosmology

Technical publications that are having very high impact on science community are raising many new ideas and doubts on dark energy and dark matter. Now it is very clear hat, there is a disagreement in between main stream cosmologists and other researchers. Cosmological observations are not straight forward. For the same data, different interpretations are coming into picture with a great diversity. Right now it is not at all possible to prove the exact nature of cosmic expansion whether it is accelerating or decelerating. In this very ambiguous situation, it seems interesting to take the help of 'light speed' as a tool. There is a possibility for considering light speed radial expansion as well as light speed rotation. We would like to emphasize that,

1) So far no single experiment or no single observation confirmed super luminal physical results.
2) All cosmological observations and physical studies & research are being accomplished with 'light speed' only.

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3) It is well confirmed that, gravitons are moving with speed of light.
4) In one sentence, 'without light', there is no cosmology and there is no physics.

In this scenario, after publishing our paper in Progress in Physics [8], we have been inspired by Eugene Terry Tatum's cosmic 'light speed expansion' concept and 'Flat Space Cosmology' [9]. It may be noted that, Melia and his team is sincerely working on $R_h = ct$ models of cosmology [10-13]. Independently, Terry Tatum [14] is seriously working on 'Light speed expanding Flat Space Cosmology'. Rainer Burghardt is working on Subluminal expansion model and he argues that, Melia's model represents a closed model against 'flat model' [15]. Our approach is based on Black hole radius and temperature formulae [16] and is free from dark energy and dark matter concepts. Based on quantum mechanics and black holes, our model helps in understanding cosmic rotation. It may be noted that, assumptions 2 and 3 are applicable only for a closed universe having a positive curvature. We sincerely appeal the readers who are not interested in cosmic rotation may skip the following sections and see section 8 for a logical reasoning.

We propose that, observations attributed to dark matter can be understood as a representation of power law 'super gravity' associated with increasing galactic baryonic mass greater than $4x10^{38}$ kg. With further study – 1) Inflation, acceleration, dark energy and quintessence issues can be relinquished with light speed expansion; 2) Dark matter issue can be relinquished with super gravity of large baryonic mass content. 3) Red shift can be understood with the ratio of change in wavelength to observed wavelength.

Current model of standard cosmology is completely based on General theory of relativity and observations associated with galactic red shifts, distances, flat rotation speeds, gravitational lensing effects and cosmic back ground radiation temperature [17]. Final unification point of view, it seems essential to work on developing a model of quantum cosmology (QC) that combines general theory of relativity (GTR) and quantum mechanics (QM). In this context, by considering 'light speed expansion' and 'Planck scale' as the unified features of GTR and QM, in our recent publications, we have developed a very simple model of QC associated with growing cosmic black hole [18]. To proceed further, in the following sections (4), (5), (6), (7) and (8) we have highlighted the basic issues of Lambda Cosmology (LC) and suggested the best possible alternative physical concepts.

If it is really important to understand the radical nature of cosmic acceleration, based on light speed expansion, it can be understood as follows. As time is passing, to sustain continuous light speed expansion, galaxies maintain higher acceleration near to cosmic center and lower acceleration near to cosmic boundary. Clearly speaking, being higher in magnitude near to cosmic center, galactic acceleration, gradually disappears at cosmic boundary. In a mathematical form, for the current case, it can be expressed as, $(a_r)_0 = \left[c - (v_r)_0\right] H_0$ where r, (v_r) and (a_r) represent galactic distance, receding speed and acceleration from the cosmic center respectively.

4. Inadequacy of Lambda cosmology

Most intriguing concept of LC is 'cosmic evolution'. Clearly speaking, universe is having a beginning and its size and time are increasing. Earlier mater was in the form of radiation and observed matter is being created in the form of growing stars and galaxies with increasing number of elementary

atoms and their next level atoms. Another interesting feature is that, universe is expanding with increasing speed (accelerating). These observations were developed on the concept of galactic red shift associated with the observed and laboratory wavelengths of photon, being defined as $z \cong \frac{\lambda_{Observed} - \lambda_{Lab}}{\lambda_{Lab}} \cong \frac{\lambda_{Observed}}{\lambda_{Lab}} - 1$. Most complicated feature of LC is current cosmic acceleration [19]. By studying the galactic red shifts and galactic distances, cosmologists are trying to establish the notion of 'accelerating universe'. But in reality, it is practically impossible to investigate and measure the real expansion speeds of galaxies. Another bitter truth is that, as the observed universe is very large, it is absolutely beyond the scope of human beings to measure the expansion speed of cosmic boundary. Even though, cosmologists are strongly believing in cosmic acceleration and seriously working on chasing its mystery with 'dark energy' and 'Lambda term' like strange physical entities.

Most controversial feature of LC is galactic dark matter. To understand the observed excess rotation speeds of galactic orbiting stars and to understand the observed galactic gravitational lensing effects, scientists are seriously believing in the existence of 'dark matter' as an exotic form of matter not found in the standard particle model. Unfortunately, dark energy and dark matter, both seem to be 'unphysical' in nature and raising doubts on the 'scope', 'applicability' and 'correctness' of the basic assumptions of LC and GTR. Unless dark matter and dark energy are identified, LC cannot be considered [20-26] as a complete model of cosmology.

5. Most misleading part of Lambda cosmology

It may be noted that, by the time of defining the definition of galactic red shift, maximum red shift value was around 0.003. We would like to emphasize the point that, definition of galactic red shift is ambiguous [27,28]. It can also be defined as, $z_{new} \cong \frac{\lambda_{Observed} - \lambda_{Lab}}{\lambda_{Observed}} \cong 1 - \frac{\lambda_{Lab}}{\lambda_{Observed}} \cong \frac{z}{z+1}$. See our references [17,28]. With reference to current definition, z value lies between 0 and infinity. By following our new definition, z value lies between 0 and 1. It may be noted that, with our given definition, it is very easy to implement 'light speed expansion' in cosmic evolution scheme. By considering light speed expansion concept, dark energy and lambda term concepts can be relinquished. Thought of in this way, as there is no evidence for dark energy, the current definition of galactic red shift can be considered as the most misleading part of LC. Figure 1 compares galactic light travel distances according to our new definition, $(z_{new})(c/H_0)$ (Red curve) and the conventional formula connected with dark energy density and other density fractions (Green curve).

Based on this new definition of cosmic red shift, observed farthest galaxies distance can be estimated very easily. For example, see the following Table 1. We sincerely appeal that, on cosmological scales, 2.5% is not yet all a 'serious' error. We would like to emphasize the point that, conceptually, we are no way deviating from the basic idea of expanding universe and receding galaxies. Only thing is that, we are confining to 'light speed expansion' and 'light speed receding'. With further study, there is a scope for understanding the universe in a unified approach. Since most of the cosmological observations are being studied with photons that move at speed of light, rather than 'working on controversial cosmic 'acceleration' and 'flatness' phenomena it is better to work on understanding the root causes of 'speed of light'.

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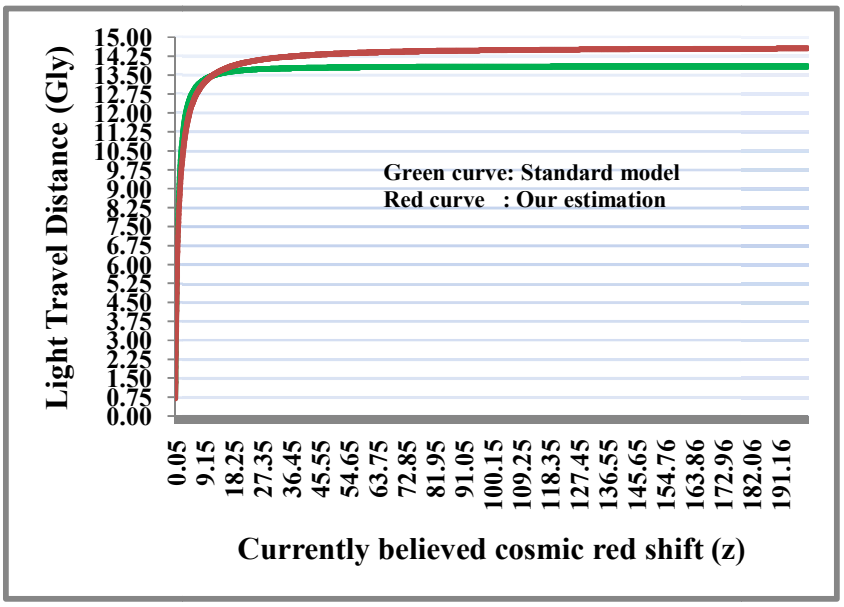
Figure1: Comparison of standard and estimated light travel distances



Richard Powell has written an online C program (http://www.atlasoftheuniverse.com/cosmodis.c) (version 1.1) for estimating the light travel distance. Using that program and considering a redshift of z = (0.1 to 200), we have prepared Figure-1. Green curve indicates the light travel distance in Lambda cosmology prepared with Omega matter = 0.32, Omega lambda = 0.68, Omega radiation = 0.0 and H_0 = 66.87 km/sec/Mpc. Red curve indicates our estimated light travel distance, $\left(\frac{z}{z+1}\right)\left(\frac{c}{H_0}\right) \cong (z_{new})\left(\frac{c}{H_0}\right)$

Table-1: To estimate and fit the distances of farthest galaxies

Galaxy	Redshift	Standard Light travel distance (Gly)	Estimated Light travel distance (Gly)	%Error
GN-z11	11.09	13.39	13.41	-0.15
MACS1149-JD1	9.11	13.26	13.17	0.65
EGSY8p7	8.68	13.23	13.11	0.91
A2744 YD4	8.38	13.2	13.06	1.05
EGS-zs8-1	7.73	13.13	12.95	1.41
z7 GSD 3811	7.66	13.11	12.93	1.36
z8_GND_5296	7.51	13.1	12.9	1.51
SXDF-NB1006-2	7.215	13.17	12.84	2.5
GN-108036	7.213	13.07	12.84	2.5
BDF-3299	7.109	13.05	12.84	2.5
A1703 zD6	7.014	13.04	12.84	2.5
BDF-521	7.008	13.04	12.84	2.5
G2-1408	6.972	13.03	12.84	2.5
IOK-1	6.964	13.03	12.84	2.5

where H_0 = 66.87 km/sec/Mpc. As traditional redshift is increasing from 0, error in estimated light travel distance is increasing to +8.59% at $z \cong 1.20$ and from there onwards, error is reaching to 0% at $z \cong 11.5$ to 11.55. Proceeding further, error is reaching to -5.14% at $z \cong 200.0$. Here, 'positive error' means, traditional light travel distance is higher than our estimate and 'negative error' means, traditional light

travel distance is lower than our estimate. This can be also be confirmed with other online cosmic redshift-distance calculators written by written by Aaron Robotham and Joseph Dunne (https://cosmocalc.icrar.org/).

Cosmic scale factor seems to be associated with time and temperature rather than red shift. Scale factor can be expressed as, $1+z \cong \sqrt{\exp(\gamma_0 - \gamma_t)}$ where $\gamma_0 \cong 1+\ln\left(\frac{H_{pl}}{H_0}\right)$ and $\gamma_t \cong 1+\ln\left(\frac{H_{pl}}{H_t}\right)$. Currently believed cosmic time scale up to $1+z=1100$ can be expressed as, $tH_t \cong \sqrt{1+z}$. We are working in this direction. If so, $t \cong \left(\frac{1}{1+z}\right)^{\frac{3}{2}}\left(\frac{1}{H_0}\right) \cong \frac{\sqrt{1+z}}{H_t} \cong \frac{\left[\exp(\gamma_0-\gamma_t)\right]^{\frac{1}{4}}}{H_t}$ where $H_t \cong \left(\frac{1}{H_{pl}}\right)\left(\frac{4\pi k_B T_t}{\hbar}\right)^2 \cong 2\sqrt{\frac{G\hbar}{c^5}}\left(\frac{4\pi k_B T_t}{\hbar}\right)^2$. Interesting observation to be noted is that, $\frac{H_t}{H_0} \cong \exp(\gamma_0-\gamma_t) \cong (1+z)^2$.

6. Super gravity of baryonic matter

Considering the case of supposition of dark matter through gravitational interaction, inferring the negative results of dark matter experiments and following the ongoing debate concerning the existence of exotic form of dark matter, we are proposing the existence of a power law based super gravitational behavior of baryonic matter as a possible explanation for the observed galactic rotation curve anomalies. We would like to emphasize the point that, in reality there exists no dark matter and equivalent mass of galactic dark matter can be defined as [30], $(M_{dark})_G \cong \left(M_{baryon}\right)_G^{3/2} \Big/ \left(4\times10^{38}\right)^{1/2}$ kg where 4×10^{38} kg (200 million solar masses) can be considered as the 'current reference mass unit'.

Based on this idea, galactic masses less than 4×10^{38} kg will have a decreasing trend of super gravity and galactic masses greater than 4×10^{38} kg will have an increasing trend of super gravity and it is proportional to $\left(M_{baryon}\right)_G^{3/2}$. Total mass of galaxy can be expressed as, $M_G \cong \left(M_{baryon}\right)_G + (M_{dark})_G$. Following this relation, galactic flat rotation speeds can be understood with a relation of the form, $\frac{V_G}{c} \cong \frac{1}{4}\left[\frac{M_G}{M_0}\right]^{1/4} \cong \frac{1}{4}\left[\frac{\left[\left(M_{baryon}\right)_G + (M_{dark})_G\right]}{M_0}\right]^{1/4}$ where $M_0 \cong \frac{c^3}{2GH_0} \cong$ Current Hubble mass. This can be considered as assumption-4. Flat rotation speeds from 10 km/sec to 500km/sec can be understood in this way. Our proposal is in line with newly discovered dark matter deficient galaxies [31] and large massive galaxies having high flat rotation speeds [32].

Another interesting feature is that, Sun's estimated equivalent dark mass is around $1.5\text{x}10^{26}$ kg and its effect seems to be negligible. It needs observational and experimental confirmation. To some extent, considering the estimated Virial mass of Sun and based on the theory of light bending, our proposal can be confirmed. Nucleons estimated equivalent dark mass is around 10^{-60} kg and it needs experimental verification.

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See the following figures 2 and 3 [29] where reference mass is $(M_{\text{Ref}})_0 \cong 3.89\times10^{38}$ kg = 195.6 million solar masses. Figure 2 shows an increase in dark mass with corresponding increase in baryonic mass. Figure 3 shows a comparative increase in galactic flat rotation speeds against MOND [24]. It may be noted that, rotation speed of UGC 12591 is (488.4 ± 12.5) km/sec and our estimated baryonic mass is $(2.0 \text{ to } 2.25)\times10^{42}$ kg comparable with recent estimation of 1.37×10^{42} kg [33].

Figure 2: Galactic baryonic mass Vs Dark mass

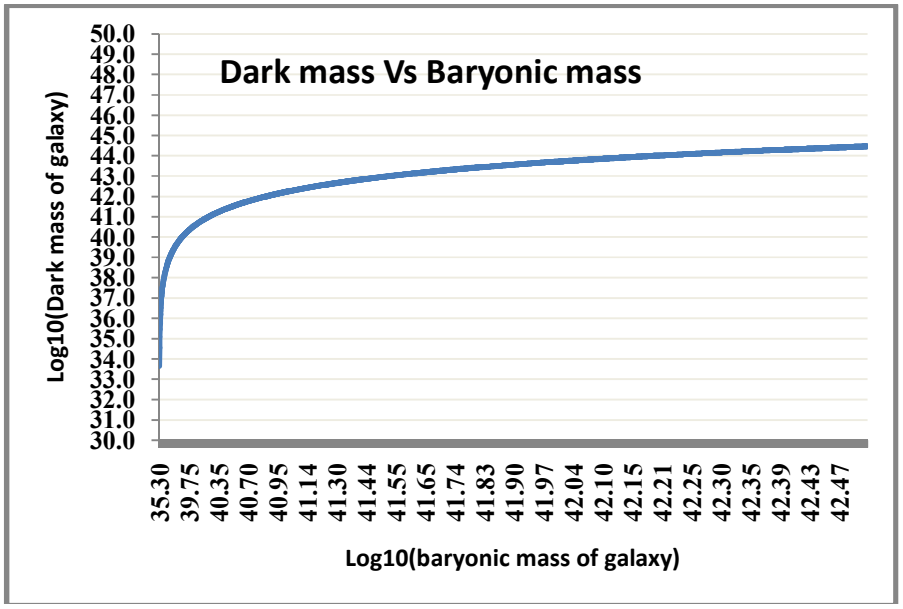
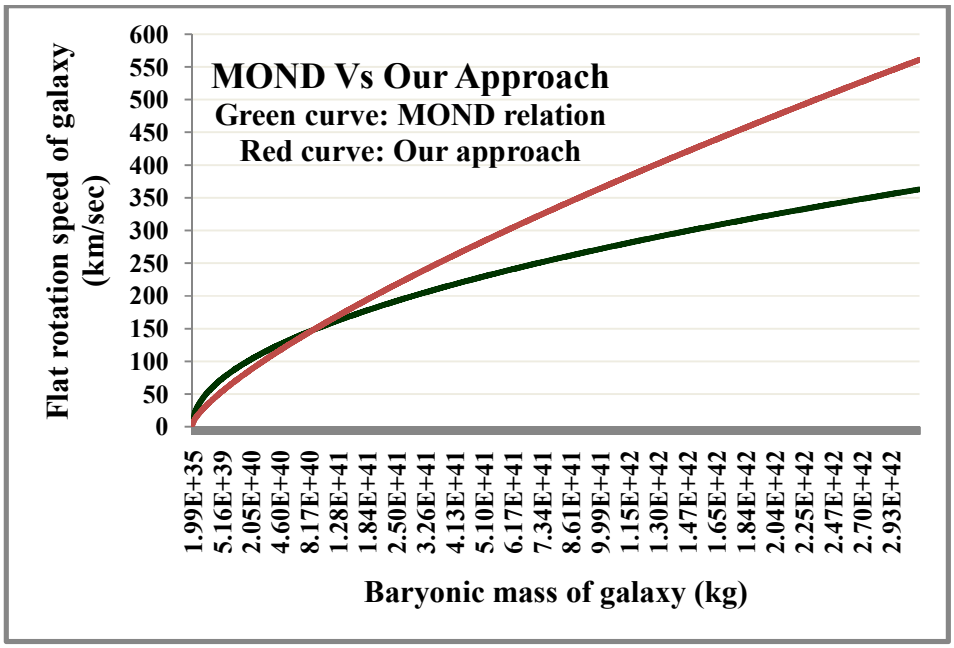


Figure 3: Galactic flat rotation speeds



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Considering 200 million solar masses as a characteristic representation of current cosmic weak interaction mass unit, there is a scope to implement weak boson masses and Higg's field [34] in understanding the hypothecated mass of galactic dark matter. Clearly speaking, without considering dark matter, weak interaction can be considered as a boosting drive for the observed super gravity of galactic baryonic mass. Based on this idea, we have developed the following relation for estimating the proposed 200 million solar masses [30].

$$\left(M_{\text{Ref}}\right)_0 \cong \ln\left(\frac{T_{pl}^4}{T_0^4}\right)\times\left(\frac{M_0}{M_{pl}}\right)\times\left(80.4+91.2\right)\text{GeV}/c^2 \cong 183.5 \text{ Million solar masses}$$

$$\cong \ln\left(\frac{H_{pl}^2}{H_0^2}\right)\times\left(\frac{M_0}{M_{pl}}\right)\times\left(80.4+91.2\right)\text{GeV}/c^2 \cong \ln\left(\frac{M_0}{M_{pl}}\right)\times\left(\frac{M_0}{M_{pl}}\right)\times\left[\left(2*80.4\right)+\left(2*91.2\right)\right]\text{GeV}/c^2$$

$$\text{where, } \begin{cases} M_{pl} \cong \sqrt{\dfrac{\hbar c}{G}} \cong \dfrac{c^3}{2GH_{pl}} \cong 2.176\times10^{-8} \text{ kg}\,, \; T_{pl} \cong \dfrac{\hbar c^3}{8\pi k_B G M_{pl}} \cong \dfrac{\hbar H_{pl}}{4\pi k_B} \\ M_0 \cong \dfrac{c^3}{2GH_0} \cong 9.3\times10^{52}\,\text{kg}\,, \; T_0 \cong \dfrac{\hbar c^3}{8\pi k_B G\sqrt{M_0 M_{pl}}} \cong \dfrac{\hbar\sqrt{H_0 H_{pl}}}{4\pi k_B} \end{cases}$$

This formula needs a physical interpretation and we are working on it. It seems that, continuous decay or annihilation of large number of charged and weak bosons generate so many force carriers in such a way that, any baryonic galaxy experiences a kind of 'dark matter' like super attracting force or super gravity.

7. Standard ruler associated with baryon acoustic oscillations

As per the cosmic baryon acoustic oscillations (BAO), current acoustic bubble radius is around 150 Gpc [35,36]. This characteristic length can be fitted with a simple relation of the form, $\sqrt{\dfrac{T_0}{T_{\text{Recomb}}}}\left(\dfrac{c}{H_0}\right) \cong \dfrac{c}{H_{\text{Recomb}}^{1/4} H_0^{3/4}} \cong 150 \text{ Mpc}$ where T_{Recomb} and H_{Recomb} represent recombination epoch temperature and Hubble parameter respectively. Hawking's black hole temperature formula pertaining to recombination epoch can be expressed as, $T_{\text{Recomb}} \cong \dfrac{\hbar c^3}{8\pi k_B G\sqrt{M_{\text{Recomb}} M_{pl}}} \cong \dfrac{\hbar\sqrt{H_{\text{Recomb}} H_{pl}}}{4\pi k_B G}$. Clearly speaking, 'light speed' being a characteristic feature of cosmic expansion and $H_{\text{Recomb}}^{1/4}$ being a characteristic feature of cosmic recombination, baryon acoustic bubble radius seems to be inversely proportional to $H_0^{3/4}$. It needs further study.

8. On cosmic rotation and cosmic center

Considering the evolving universe as a growing black hole or simply a white hole [18], it seems natural to expect cosmic rotation [37]. We would like to emphasize the point that, Spin is a basic property of QM and one who is interested in developing quantum models of cosmology, must think about cosmic rotation. It may be noted that, without a radial in-flow of matter in all directions towards one specific point, one cannot expect a big crunch and without a big crunch, one cannot expect a big bang. Really if there was a "big bang" in the past, with reference to formation of big bang as predicted

by GTR and with reference to the cosmic rate of expansion that might have taken place simultaneously in all directions at a "naturally selected rate" about the point of big bang: "point" of big bang can be considered as the characteristic reference point of cosmic expansion in all directions. Thinking in this way, to some extent, point of big bang can be considered as a possible centre of cosmic evolution. If so, thinking about the universe without a center of rotation is illogical. Based on this logic, we appeal the science community to see the possibility of thinking about angular velocity, cosmic rotation and rotational axis [38-43].

Based on references [1,4], it is going to be happened that, within coming 100 million years, cosmic expansion is reaching a halt and moving towards a big crunch. In this context, we emphasize the point that, without a radial in-flow of matter in all directions towards any one specific point, it may not be possible to have a big crunch and discussing on center less universe having a big bang or big bounce seems to be meaningless.

As per the recent 2020 publication, according to Vladimir A. Korotky, Eduard Masar and Yuri N. Obukhov [44]: "In observational cosmology, the main difficulty for detecting a global rotation is its smallness-less than 10^{-13} rad/year according to the generally accepted assessment. It is impossible in the Universe to distinguish the direction corresponding to the axis of rotation, with respect to which one could notice deviations (in the standard tests) from the Friedman standard cosmology. In theoretical cosmology, the main difficulties are related, on the one hand, to the lack of simple models of an expanding and rotating Universe in general relativity (GR) similar to Friedman–Robertson–Walker models. On the other hand, there are no convincing predictive effects of cosmic rotation that are consistent with the capabilities of the equipment of modern astronomical observatories".

9. Discussion

We would like to emphasize the fact that, the basic principles of cosmology were developed when the subject of cosmology was in its budding stage. Friedmann made two simple assumptions about the universe [45]. They can be stated in the following way.

1) When viewed at large enough scales, universe appears the same in every direction.
2) When viewed at large enough scales, universe appears the same from every location.

In this context, Hawking expressed that [46]: "There is no scientific evidence for the Friedmann's second assumption. We believe it only on the grounds of modesty: it would be the most remarkable if the universe looked the same in every direction around us, but not around other points in the universe". Proceeding further, current galactic observations and advanced technology raise many doubts on the validity of Friedmann's first assumption. It may be noted that [47],

1) There is no clear cut mechanism for understanding big bang.
2) Whether big bang followed known physical laws or not - is unclear and unknown.
3) Mass and size of universe pertaining to pre and post big bang are unclear.
4) Applying Planck scale physics to big bang notion seems to be ambiguous.
5) As there exist no clear reasons for understanding the occurrence of exponential expansion, cosmologists are having different opinions on cosmic inflation.

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6) So far, it has not yet been possible to establish solid connection between Planck scale and current physical parameters of the observable universe.
7) Cosmologists are having different opinions on dark energy and dark matter.
8) So far, no observation and no experiment confirmed the existence of dark energy or dark matter.
9) Quantum cosmology is in its budding stage and cosmologists are seriously working on quantum models of cosmology [48,49].
10) Our proposed model of quantum cosmology is practical and very simple to follow [50,51].

As per the papers published in Astronomical Journal 2012 [13] and Nature-Scientific Reports 2016 [21], data pertaining to 580 to 740 super novae clearly reveal that, universe is expanding at an uniform rate. In 2018-2019, the same result has been obtained by a student Lisa Goh Wan Khee of National University of Singapore supervised by Cindy Ng [52]. This information can be considered as a base for light speed cosmic expansion.

Here it seems reasonable to consider the views of Moshe Carmeli and team [53] on red shift dependent cosmic time. It can be expressed as, $t = \frac{2H_0^{-1}}{1+(1+z)^2}$. This relation and our proposal, both, seem to cast doubt on the currently believed cosmic red shift-time relation. In addition to that, based on our proposal, above expression can also be expressed as, $t = \frac{2H_0^{-1}}{1+(1+z)^2} = \left(\frac{H_0 + H_t}{2}\right)^{-1}$ where $(1+z)^2 H_0 \cong H_t$.

Now, the fundamental question to be answered is: Maintaining their black hole nature as-it-is, how massive black holes will grow in the expanding universe? In this context, recently, K.S. Crocker and team proposed that [54], during cosmic expansion and increasing cosmic age,

1) All material particles will grow in their mass content while universe is expanding.
2) Massive objects like black holes [55] will have a significant increase in their mass content.
3) This mechanism can be called as 'Cosmological coupling'.
4) Magnitude of cosmological coupling increases with increasing mass of the object.
5) In case of observed massive black holes this seems to be true and this mechanism can be recommended for testing in near future.

Based on our proposal, if universe is really a black hole and is really expanding with speed of light [50], then, forever, maintaining its black hole structure 'as-it-is', universe can be expected to have an increase in mass during its light speed expansion.

10. Conclusion

Considering the four major cosmological coincidences proposed in section (2) and following sections (3) to (9), there is a scope for reviewing the standard model of cosmology. In reality, it is absolutely impossible to reach the core of a black hole. Following our approach, it seems practically possible to swim in the light speed expanding or growing black hole universe. Physicists agree that Hawking's findings about black holes are the most important contributions to physics in recent decades.

In this context, we appeal the science community to review our simple and logical proposals for a better understanding of cosmic physics in terms of light speed expanding black hole universe.

Acknowledgements

Author Seshavatharam is indebted to professors Dr. E.T. Tatum, Dr. L. Shamir, Shri M. Nagaphani Sarma, Chairman, Shri K.V. Krishna Murthy, founder 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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