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Article

Energy Based True Definition of Cosmic Red Shift and Quantum Halt of the Current Universe Having Light Speed Rotation

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Abstract: We appeal the science community to review the basic definition of wavelength dependent cosmic red shift. We would like to emphasize the point that, the true cosmic red shift must be defined as the ratio of loss in energy of photon to the energy of photon at galaxy. In terms of wavelength, photon red shift must be defined as the ratio of change in wavelength to the observed wavelength of photon. Considering the recent paper pertaining to cosmic halt authored by Cosmin Andrei, Anna Ijjas, and Paul J. Steinhardt and reviewed by Saul Perlmutter, in this paper we propose a very simple model of the universe having early stage light speed expansion and current stage quantum halt accompanied by light speed rotation. In this context, representing early cosmic expansion and rotation as an outward spiral, it seems possible to consider Hubble's law as a representation of current cosmic rotation having no further expansion. To understand the current cosmic halt, we are proposing very simple and very strange atomic and nuclear relations that constitute Hubble parameter and gravitational constant. It needs further study, observations and analysis.

Keywords: true definition of cosmic red shift; Hubble-Hawking universe; light speed expansion; light speed rotation; cosmic halt with quantum physics

1. Introduction

One of the key pillars of Lambda model of cosmology is 'cosmic red shift'. Since from the beginning, physicists and cosmologists strongly believe that, cosmic red shift is a measure of galactic distances and receding speeds [1]. It may be noted that, by the time of defining galactic red shift, maximum red shift was around 0.003. In terms of energy of photon, we would like to emphasize the point that, traditional definition of cosmic red shift is absolutely wrong. True cosmic red shift must be defined as the ratio of loss in energy of photon to the energy of photon at galaxy. As a consequence, in terms of wavelength, photon red shift must be defined as the ratio of change in wavelength to the observed wavelength of photon. Following this energy dependent true definition of cosmic red shift, we appeal the science community to review the basics and advanced concepts of Lambda model of accelerating cosmology [2].

Recent observations pertaining to 740 supernovae clearly suggest that current universe is expanding at constant rate of expansion [3,4]. Very recent paper on Lambda cosmology is turning towards a big crunch based on dark energy dependent cosmic deceleration and halt [5]. Very surprising point to be noted is that, this new paper has been authored by Cosmin Andrei, Anna Ijjas and Paul J. Steinhardt and reviewed by Saul Perlmutter. Based on reference [5] and considering our new definition of cosmic red shift, in this paper, we propose a very simple model of rotating model of universe having no further expansion. Considering atomic and nuclear constants, in section-6 we are making a bold attempt to understand the quantum mechanical halting mechanism of the current universe.

2. On the Role of True Definition of Cosmic Red Shift in Fitting Galactic Distances

In a mathematical form, true definition of cosmic red shift can be expressed as [6,7],

$$z_{new} \cong \frac{E_{Galaxy} - E_{Observed}}{E_{Galaxy}} \cong \frac{\lambda_{Observed} - \lambda_{Galaxy}}{\lambda_{Observed}} \cong 1 - \frac{\lambda_{Galaxy}}{\lambda_{Observed}} \tag{1}$$

If it is believed that, known physical laws of atomic and nuclear physics are applicable to other galaxies, then one can assume that, energy of photon at any galaxy is same as energy of photon coming from a laboratory resting in Milky Way. Then,

$$z_{new} \cong \frac{E_{Lab} - E_{Observed}}{E_{Lab}} \cong \frac{\lambda_{Observed} - \lambda_{Lab}}{\lambda_{Observed}} \cong 1 - \frac{\lambda_{Lab}}{\lambda_{Observed}} \cong \frac{z}{1+z}$$

where, $z \cong \frac{\lambda_{Observed} - \lambda_{Lab}}{\lambda_{Lab}} \cong \frac{\lambda_{Observed}}{\lambda_{Lab}} - 1 \cong \frac{E_{Lab} - E_{Observed}}{E_{Observed}} \cong \frac{E_{Lab}}{E_{Observed}} - 1....(illogical)$

(2)

This definition seems to be completely different from the currently believed definition of cosmic red shift and needs a review at fundamental level. With reference to current definition, $0 > z < \text{Infinity}$. Based on our definition, $0 > z_{new} < 1$. Following relation (2), observed farthest galactic distances can be estimated very easily with $d_G \cong (z_{new})(c/H_0)$. See Table 1.

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

For further analysis and verification, readers are encouraged to visit the URLs, <https://cosmocalc.icrar.org/>. and <http://www.atlasoftheuniverse.com/cosmodis.c>. Most important point to be noted is that, based on the data presented in Table 1, cosmic acceleration and dark energy concepts can be relinquished logically.

3. Hubble’s Law and Its Possible Applicability to Cosmic Rotation

Many cosmologists strongly believe that, there exists a link between cosmic structure and cosmic rotation [8–18]. In this context, in our recent publication [19] titled “A Rotating Model of a Light Speed Expanding Hubble-Hawking Universe” published in Physical Science Forum, we have made many logical and supporting arguments in favor of cosmic rotation and positive curvature. Readers are encouraged to go through. We would like to emphasize that, in a quantum mechanical and quantum gravitational [20] picture,

- 1. Without Spin there is no existence to quantum mechanics.

2. Without rotation there is no independent existence to cosmic structure as a whole.
3. Hubble's law can be studied with expansion and rotation in the form an outward spiral.
4. Big bang can be replaced with a growing and rotating Planck ball.

Cosmic isotropy and flatness (no curvature) are the rival factors that make cosmologists to ignore the idea of cosmic rotation. Isotropy point of view, many cosmologists [21,22] are analyzing the true nature of the assumed cosmic isotropy in all possible ways. Future observations may definitely shed light on the validity of Perfect Cosmological Principle i.e. At any location and in any direction, universe is homogeneous and isotropic. Most recent observations on cosmic microwave background radiation pertaining temperature and polarization anisotropy strongly suggest the possibility of considering a positively curved universe [23–25].

We would like to emphasize the point that, conceptually, we are neither against to big bang nor against to cosmic expansion. Starting from the Planck scale, by representing early cosmic expansion and rotation as an outward spiral, it seems possible to consider Hubble's law as a representation of current cosmic light speed rotation having no further expansion. It needs strong theoretical and observational support. Here it is important to note that – whether current/future universe is expanding or not can be understood with,

1. Rate of decrease in cosmic temperature.
2. Rate of decrease in Hubble parameter.
3. Analyzing distant galactic surface brightness [26–29].

Hence, Hubble's law for cosmic rotation applicable to whole Hubble volume can be expressed as,

$$d_G H_0 \cong \left(\frac{z}{z+1} \right) c \cong (z_{new}) c \quad (3)$$

By this time, if universe is not really expanding,

1. It seems illogical to consider H_0 as a representation of current cosmic expansion rate.
2. It seems meaningful to consider H_0 as a representation of current cosmic angular velocity.

New and recent observations are indicating strange things in cosmology - They are cosmic filaments (very long tube like structures) that constitute galaxies and assumed dark matter. Here point of interest is that the large cosmic filaments are found to have spin. Cosmologists are working on understanding the mystery of filament spin [30]. We hope that, with future observations and cosmic rotation, it seems possible to understand the mysterious spin of cosmic filaments.

4. Understanding the Cosmic Scale Factor

As per the basics of Lambda cosmology, cosmic scale factor is defined as,

$$\frac{a_{then}}{a_{now}} \cong \frac{a_t}{a_0} \cong \frac{1}{1+z} \cong a_t \quad (4)$$

where,

$$z \cong \frac{\lambda_{Observed} - \lambda_{Lab}}{\lambda_{Lab}}$$

$$\frac{a_{then}}{a_{now}} \cong a_{then} \cong a_t \quad \text{if } a_{now} \cong a_0 \cong 1$$

Based on our definition, $z_{new} \leq 1$ and $1 + (z_{new}) \leq 2$. Hence it seems quite complicated to follow the above relation (4). To resolve the problem, we appeal that,

$$\begin{aligned} \text{(Either)} \quad a_t &\cong \left(\frac{T_0}{T_t} \right) \dots\dots\dots (5A) \\ \text{(Or)} \quad a_t &\cong \frac{1}{1+(z_{new})} \dots\dots\dots (5B) \end{aligned} \quad (5)$$

For further study, we appeal the science community to choose either (5A) or (5B). Choosing relation (5A) and following our Hubble-Hawking model [6,7] related with Planck mass, $M_{pl} \cong \sqrt{\frac{\hbar c}{G}}$, currently believed cosmic time scale up to the formation of first hydrogen atom can be fitted with,

$$\begin{aligned} t &\cong \left(\frac{1}{1+z} \right)^{3/2} \left(\frac{1}{H_0} \right) \cong \sqrt{\frac{T_t}{T_0}} \left(\frac{1}{H_t} \right) \dots\dots\dots (6A) \\ &\cong \left(\frac{1}{T_0} \right)^{1/2} \left(\frac{1}{T_t} \right)^{3/2} 3.42646 \times 10^{18} \text{ sec} \quad (6) \\ tH_t &\cong \sqrt{\frac{1}{a_t}} \cong \sqrt{\frac{T_t}{T_0}} \dots\dots\dots (6B) \end{aligned}$$

where,

$$\begin{aligned} T_t &\cong \frac{\hbar c^3}{8\pi k_B G \sqrt{M_t M_{pl}}} \cong \frac{\hbar \sqrt{H_t H_{pl}}}{4\pi k_B} \\ \text{provided, } M_t &\cong \frac{c^3}{2GH_t} \text{ and } H_{pl} \cong \frac{c^3}{2GM_{pl}} \cong \frac{1}{2} \sqrt{\frac{c^5}{G\hbar}}. \\ H_t &\cong \left(\frac{1}{H_{pl}} \right) \left(\frac{4\pi k_B T_t}{\hbar} \right)^2 \cong 2.91846 \times 10^{-19} (T_t)^2 \end{aligned}$$

Note: For, $T_0 \cong 2.72548 \text{ K}$, obtained $H_0 \cong 66.89 \text{ km/sec/Mpc}$.

Relation (6A) is a very nice fit for the currently believed cosmic time scale and it is very essential to work on it for a clarity and better understanding based on Hubble-Hawking cosmology. If so, interesting observation to be noted is that,

$$\frac{H_t}{H_0} \cong \left(\frac{T_t}{T_0} \right)^2 \cong \frac{1}{a_t^2} \quad (7)$$

5. Relation between Various Cosmological Distances

Based on the new red shift definition as discussed in section (2), various distances associated with galactic light can be understood in the following way.

Light Travel Distance can be approximated with,

$$LTD \cong z_{new} \left(\frac{c}{H_0} \right) \quad (8)$$

Comoving Distance can be approximated with,

$$CD \cong \exp(z_{new}) * LTD \quad (9)$$

Luminosity Distance can be approximated with,

$$LD \cong \frac{CD}{1 - z_{new}} \quad (10)$$

For data comparison, readers are encouraged to refer Table 2 of our recent publication [31].

6. Discussion on Present Cosmic Halt

Based on ref. [5], it seems very clear to say that, dark energy is taking a new turn and making the universe to decelerate and within 100 million years, universe is coming to a halt. Here it is very important to note that, so far no single observation or no single experiment has shown a signal for the existence of dark energy. Cosmologists are somehow making attempts to understand the expanding nature of current universe in terms of dark energy for acceleration as well as deceleration. If it is really true that, in near future, universe is going to a halt, it can be understood in terms of unification of atomic and cosmic physical constants [32–37] with the following strange relations.

$$\begin{aligned} \frac{Gm_p m_e}{R_p H_0} &\cong \frac{\hbar}{2} \quad \text{Or} \quad \frac{Gm_p m_e}{R_p} \cong \frac{1}{2} \hbar H_0 \dots\dots\dots (11A) \\ \frac{2Gm_p m_e}{\hbar R_p} &\cong H_0 \cong (67.88 \text{ to } 70.69) \text{ km/sec/Mpc} \dots\dots\dots (11B) \\ \text{where } R_p &\cong (0.84184 \text{ to } 0.87680) \text{ fm} \end{aligned} \quad (11)$$

Here in this expression (11A), LHS is a representation of gravitational potential energy of proton and electron separated by a distance equal to the root mean square radius of proton. RHS seems to be a representation of ground state quantum of energy associated with current Hubble parameter and characteristic quantum constant. Following relation (11), quantum of orbiting electron's areal velocity can be expressed as,

$$\frac{dA}{dt} \cong \frac{1}{2} v r \cong \frac{Gm_p}{R_p \omega_0} \quad (12)$$

Based on our 4G model of unification [37–39], we noticed that [40],

$$R_p \cong \sqrt{\frac{\alpha_s}{\alpha}} \left(\frac{\hbar}{m_p c} \right) \cong \sqrt{\frac{0.115 \text{ to } 0.12}{0.0073}} \left(\frac{\hbar}{m_p c} \right) \cong (4 \mp 0.05) \left(\frac{\hbar}{m_p c} \right) \cong 4 \left(\frac{\hbar}{m_p c} \right) \quad (13)$$

where, α_s is the strong coupling constant and

α is the fine structure ratio.

Hence, it is also possible to write two more relations in the following way.

$$\begin{aligned} \sqrt{\frac{Gm_p^2 m_e c}{2H_0}} &\cong \hbar \dots\dots\dots (14A) \\ \frac{Gm_p^2 m_e c}{2\hbar^2} &\cong H_0 \cong 70.75 \text{ km/sec/Mpc} \dots\dots\dots (14B) \end{aligned} \quad (14)$$

Another very interesting relation is associated with fine structure ratio. For $H_0 \cong 76.266 \text{ km/sec/Mpc}$,

$$\frac{1}{\alpha} \cong \ln \sqrt{\frac{(E_T)_0/2}{(E_{em})_0}} \cong \ln \sqrt{\frac{4\pi\epsilon_0 c^6}{23040\pi GH_0^2 e^2}} \cong \ln \sqrt{\frac{\epsilon_0 c^6}{5760GH_0^2 e^2}} \cong 137.036 \quad (15)$$

where,

$$(E_T)_0 \cong aT_0^4 \left(\frac{4\pi}{3} \left(\frac{c}{H_0} \right)^3 \right)$$

\cong Current thermal energy within the current Hubble volume.

$$(E_T)_0 / 2 \cong \text{Half of } aT_0^4 \left(\frac{4\pi}{3} \left(\frac{c}{H_0} \right)^3 \right)$$

\cong Current thermal energy within the current hemi spherical or dipole Hubble volume.

$$(E_{em})_0 \cong \frac{e^2}{4\pi\epsilon_0 (c/H_0)} \cong \text{Electromagnetic potential associated with current Hubble radius.}$$

Readers are encouraged to refer the URL: “https://en.wikipedia.org/wiki/Hubble%27s_law” for various values of the current Hubble parameter estimated with various methods. From the data it is clear that, $H_0 \cong (67.6 \text{ to } 76.2) \text{ km/sec/Mpc}$. Relation (15) seems to give a nice picture of the current cosmic closed or positive curvature and it needs a very special study at fundamental level.

7. Conclusions

We would like to emphasize the point that current definition of cosmic red shift is absolutely wrong and considering our given energy based true definition of cosmic red shift, there is a scope for understanding the true nature of cosmic expansion. In this context, current universe can be supposed to be rotating at light speed with no further expansion by virtue of an unknown quantum mechanical halting mechanism. New research seems to be essential in this context.

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