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Research Article

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Resolving The Hubble Tension by Newton's Mechanics

Dr. John Daniel

Researcher for a D.Sc. Degree, Mumbai University, Mumbai, India.

Email: johndaniel.india@gmail.com

ABSTRACT: ***The persistent discrepancy between the locally measured Hubble constant and the value inferred from cosmic microwave background observations—commonly referred to as the "Hubble Tension"—poses a significant challenge to the standard cosmological model. Most proposed solutions involve modifications to early-universe physics or the introduction of new theoretical components such as dark energy dynamics or extra relativistic particles. In this article, Hubble tension problem is solved based on the observations made from the light reaching the earth from the early universe like the CMBR and from the later universe. Modified big bang model cosmology is used to solve the Hubble tension problem. So, the modified big bang model cosmology is proved once again.***

KEYWORDS: ***Hubble Tension, Newtonian Mechanics, Modified Big Bang Theory, Cosmic Microwave Background Radiation (CMBR), Dark Matter and Dark Energy, Cyclical Universe.***

INTRODUCTION

By late 1990s advances in ideas and technology allowed higher precision measurements have converged on a value of approximately 73 Kms/s/Mpc for Hubble constant. All these measurements were made on the late universe [1]. Since 2000, early universe techniques based on CMBR gave a value of approximately 67.7 Kms/s/Mpc [2]. This discrepancy between the two values is called Hubble tension [3]. This problem was solved in the previous article [4]. In the previous article, Hubble tension problem was solved theoretically by applying Newton's gravitational and force laws and the laws of electromagnetic wave propagation. Theoretical predictions were verified by the experimental and observational data. This proof implies that dark energy and dark matter exists at the center of the universe. The proof also proves the existence of center of the universe. General theory of relativity is proved to be incorrect. Inflationary theory was proved. The universe is proved to be cyclical. Life time of the universe was calculated and the estimated value was at least in range of 100 – 1000 billion years.

First, this problem was solved by interpreting the unit of the Hubble constant. The cosmological model used in the article was modified big bang cosmological model [5].In this model, the universe is assumed to be a spherical volume with a center. Dark energy and dark matter are assumed to be at the center of the universe. Field and the space were assumed to be different. Earlier, the author has validated such a model with observational and experimental evidences [5]. Then the theory was explained with mathematical tools. The same theory was developed by interpreting the definition of Hubble constant and applying mathematics. Then, Hubble constant was derived based on electromagnetic radiation and pressure. Then, the same theory

was developed by applying Newton's gravitational and force laws. Then, the universe was proved to be inflationary. Finally, the universe was proved to be cyclical and the life time of the present universe was estimated. As per the particle physics, the universe originated from the energy. This energy must have originated from the absolute space or vacuum at a point which is the center of the universe. These are the basic principles of modified big bang theory of cosmology [5].

In the modified Big bang theory of cosmology, space and field were assumed to be independent. This theory satisfies cosmological principle, Hubble's law and CMBR and was verified by the observational evidences. The cosmic microwave radiation comes to the earth through the spherical gravitational field lines from the early universe as explained in the previous article [4]. Through the same spherical gravitational field lines light from the early universe also can reach the earth. So, in this article, Hubble tension problem is solved based on the observations made from the light reaching the earth from the early universe like the CMBR and from the later universe.

MODIFIED BIG BANG THEORY

The modified big bang theory was verified by the observational evidence (5). Recently, researchers found dark matter dominating in early universe galaxies (11-12). Similarly, researchers found the rotation of galaxies in a direction (13-14). These two findings confirms the validity of the modified big bang theory.

HUBBLE TENSION PROBLEM IS SOLVED

The proof of the previous article [4] also informs us that the remnant of the cosmic microwave radiation comes from when the universe was one billion years old. But cosmic microwaves were radiated when the universe was .38 million years old. So, the cosmic microwave radiated at about .38 million years ago were trapped and radiation from the remnant of cosmic microwave originated when the universe was one billion years old and transparent to the microwaves and light.[6]. The newly formed (by recombination) hydrogen atoms radiated cosmic microwaves and light. But the neutral hydrogen atomic cloud blocked the radiation till the time of one billion years.

So, in this article, Hubble tension problem is solved based on the observations made from the light reaching the earth from the early universe like the CMBR and from the later universe. Theory of this article is based on Newton's gravitational force and the Newton's laws of the force. As explained in the previous article, the speed of expansion of the universe v is due to radiation pressure acting in the direction of expansion (k) and the gravitational force of the central dark matter and dark energy (dr/dt) where r is the radius of the spherical universe and t is the time or age of the universe. So,

$$v = k - dr/dt \qquad \ldots (1)$$

As per the Newton's gravitational force and general force laws,

$$d^2r/dt^2 \approx - G.M/r^2 \qquad \ldots (2)$$

where G is gravitational constant and M is the mass of the universe.

By integrating the equation (2) we get,

$$dr/dt = -3GMt/r^3 + k \qquad \ldots (3)$$

where k is constant of integration and equal to constant velocity due to radiation pressure if equations (1) and (2) are compared.

If we integrate the equation (2) with the limits r = 0 to r and t = 0 to t, we get,

$$dr/dt = 3MGt/r^3 \quad \ldots (4)$$

If the equation (4) is integrated with the limits r = 0 to r and t = 0 to t … (5)

$$r^4 = 6MGt^2 \quad \ldots (6)$$

From the equation (6), we get,

$$r^3 = (6MG)^{3/4}.t^{3/2} \quad \ldots (7)$$

From the above equation we get,

$$r = (6MG)^{1/4}t^{1/2} \quad \ldots (8)$$

If the three dimensional spherical volume is represented on a two dimensional polar coordinate system, arc length of the circle is L = r.θ where θ is the angle of the radial line with reference to the line connecting the center of the earth and the center of the universe … (9)

If the equation (8) is substituted into the equation (9), we get,

$$L = A.\theta.\sqrt{t} \text{ where } A = (6MG)^{1/4} \quad \ldots (10)$$

Age of the universe is estimated to be 13.8 billion years. One billion years after the big bang, light from the newly born galaxies reaches the earth through the spherical gravitational field lines. To the observer on the earth, the light rays from the galaxies of one billion years old after the big bang will appear to be coming from a straight line distance of 12.8 billion light years. But actually they travel over the circular path of distance L = 24 billion light years [7]. So, the Hubble constant value at one billion years after the big bang is (24/12.8). dr/dt/r = 1.875.dr/dt/r = $1.875 \times 6.5 \times 10^3/12.8 = 952.15$ kms/s/Mpc [8]. Let H_1 be the Hubble constant when the universe was one billion years old after the big bang. The Hubble constant value of the present universe estimated based on the observational data is 76.5 kms/s/Mpc [9]. Let this value be H_2. So, the relative change of Hubble constant is 8% with reference to H_1. This relative change of Hubble constant with reference to H_1 estimated based on CMBR is 7.8% [4]. So, the estimated growth rate in this article approximately matches with the estimated growth rate based on CMBR as in the previous article.

CONCLUSION

The modified big bang model of the cosmology was verified by the observations on 7 earliest galaxies [5]. The Hubble tension problem was solved by three methods based on the modified big bang model cosmology in the previous article [4]. But the big bang cosmology which has got no center of the universe could not solve the Hubble tension problem [10]. So, the modified big bang theory of cosmology was proved to be correct. In this article, Hubble tension problem is solved based on the red shift of galaxies of early universe and that of galaxies close to the earth. The same modified big bang model cosmology is used in this article. So, the modified big bang model cosmology is proved once again.

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