



# Situation of Big Bang Theory in Today's Astronomy

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**Abstract:** This research paper is devoted to the history of emergence of the big bang theory and to modernize it from the notion of the explosion of hypothetical elementary particle with the incomprehensible particle that occurred around 13.7 billion years ago which causes the origin of universe. We are going to showcase the weakness of this theory and want to focus our own two point of view. According to our 1<sup>st</sup> point of view, around 13.7 billion years ago, because of the interaction of atoms of the baryonic substances with the dark matter of the surrounding universe, the growth of their mass, size and rotation along the orbits occurs over time. As a result, the counteraction between them, the centrifugal force and the restraining force in those dark matter increases over time. Thus a moment comes when the amount of centrifugal force tear up apart the atom. This can occur throughout the universe which causes its origin. Our 2<sup>nd</sup> point of view suggests if there exist some unknown or supernatural power. Because we all know that our universe is infinite, it has as such no start or no proper end. At start, there was nothing, more of a nothing with potential. A nothingness in which packets of energy fled in and out of existence popping out oblivion as quickly as they appeared. One of these fluctuations had just enough energy to take off. It inflated wildly out of control-one moment, infinitesimally small moments later light years across. All of the universe and time was created at that instant. There remain aspects of the observed universe that are not adequately explained by the Big Bang Models. After its initial expansion, the universe cooled sufficiently to allow the formation of subatomic particles and later atoms. The unequal abundances of matter and antimatter that allowed this to occur is an unexplained effect known as baryon asymmetry. These primordial elements-mostly hydrogen, with some helium and lithium- later coalesced through gravity, forming early stars and galaxies. Astronomers observe the gravitational effects of an unknown dark matter surrounding galaxies. Most of the gravitational potential in the universe seems to be in this form, and the big bang models and various observations indicate that this excess gravitational potential is not created baryonic matter, such as normal atoms. Measurements of the redshifts of supernovae indicate that the expansion of the universe is accelerating, an observation attributed to an unexplained phenomenon known as dark energy.

**Keywords:** Spacetime, Red-shift, Time-travel, Singularity, warm hole, Relativity, Hubble's Telescope

## I. INTRODUCTION

Big Bang Theory is a thought or rather a hypothesis which explains the beginning of our vast universe upto some limited aspects. Our scientists assumes that everything in this universe has their beginning so why not the whole universe has its whole beginning Discoveries and many researches on this thought have done till date but the astronomers, physicists and many well known scientists doesn't conclude any certain conclusion that what was happened in the beginning of the universe.

According to standard theory, our universe comes into its existence from a "Singularity" existence of "Black Holes" which is considered as singularity. Black holes consists of intense gravitational pressure. This is considered so much intense that finite matter is squished into infinite density. These infinite density is known as the "singularity". Where does it come from? Why did it appear? We don't know. Scientists are still working on this thought [1].

Therefore, it can be considered as our universe is begun as an infinitesimally small, hot and dense something- a singularity. It expands throughout billion of years, cooled and achieves the temperature of today's universe. The planets where we live, circulating many galaxies and stars are sprang into existence for reasons unknown. This is the Big Bang Theory.

## II. WHAT IS BIG BANG?

Big Bang is basically based on two assumptions. First is Einstein's general theory of relativity. The theory explains gravity based on the way space can 'curve' or more accurately, it associates the force of gravity with the changing geometry of space-time. According to general relativity, the observed gravitational attraction between masses results from the warping of space and time of those masses. Therefore,

$$E = mc^2,$$

where, m=mass of those particles which exists in universe, c =speed of the light in universe

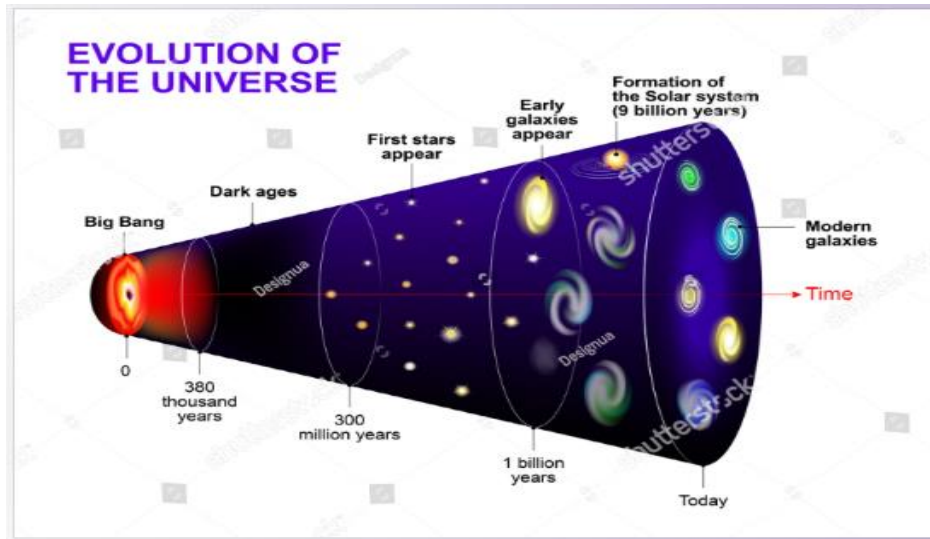


Fig. 1: Evolution of universe from the Big Bang [2]

The second assumption called the cosmological principle. In modern physical cosmology, the cosmological principle is the notion that the spatial distribution of matter in the universe is homogeneous and isotropic when viewed on a large enough scale, since the forces are expected to act uniformly throughout the universe, and should therefore produce no observable irregularities in the large-scale structuring over the course of evolution of matter field that was initially laid down by the Big Bang. Based on this two assumptions, scientists concludes that our today’s universe sprang into its existence by a singularity though they even don’t know from where the singularity come from. It expands over the space time which actually exceeds the speed of light. After that, it cooled down and achieves today’s temperature of universe.

After the big bang happens, it became a sea of neutrons, protons, electrons, anti-electrons(positrons),photons and neutrons. As time passes out gradually, the universe cools down. By the time of cooling down, the neutrons either decaying into protons and electrons or combining with protons and electrons or combining with protons to make deuterium(an isotrope of hydrogen). Continuing the cooling down process, it will gradually reach that temperature level where electrons combined with nuclei to form neutral atoms. And from this recombination, the stars and galaxies are come into existence and our living planets are being eligible for living [3].

### III. EVIDENCE FOR THE BIG BANG THEORY

There are many major evidences which supports the Big Bang Theory. We are pretty much certain by studying the journals and many scientist’s research papers that in the beginning there was a starting of universe. Some experimental law directly supports this big bang theory. These are described in the below-

- Firstly, we are going to discuss the Hubble’s law which is also known as the Hubble-Lemaitre law. It is the observation in physical cosmology that galaxies are moving away from each other at speeds proportional to their distance.

$$\frac{\Delta\lambda}{\lambda} = e^{t\frac{\alpha}{k}} - 1 = e^{H \cdot L} - 1$$

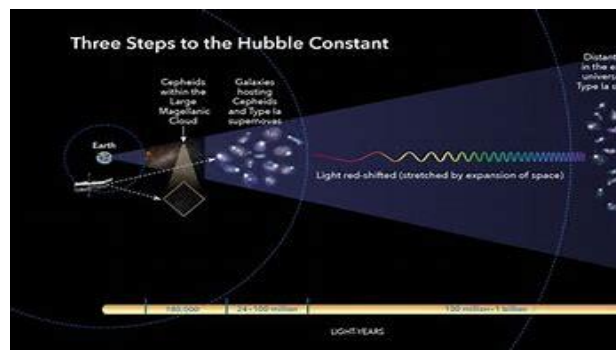


Fig. 2 Interpretation of Hubble’s law [4]



In other words, the farther they are, the faster they are moving away from Earth. The velocity of the galaxies has been determined by their redshift, a shift of the light they emit toward the red end of the visible spectrum [5]. The new version of Hubble’s law more correctly reflects the realities of the world around us than the well-known original version of this law. Returning further to the actual Hubble’s law, we note that, in contrast to the Hubble law, the wavelength increases nonlinearly with time. Therefore the Hubble’s law can be written as-

$$\frac{\Delta\lambda}{\lambda} = H \cdot L = H \cdot t$$

where H is the Hubble constant and t is the time required in space region[6].

- Secondly, the major evidence which supports this big bang theory, is the Doppler Effect. In physics, Doppler effect is defined as the increase(or decrease) in the frequency of sound, light, or other waves as the source and observer move towards or away from each other.

$$f' = \frac{(V \pm V_o)}{(V \pm V_s)} f$$

where,

$f'$  = observed frequency,  $f$  = actual frequency,  $v$  = velocity of sound waves,  $v_o$  = velocity of observer,  $v_s$  = velocity of the source

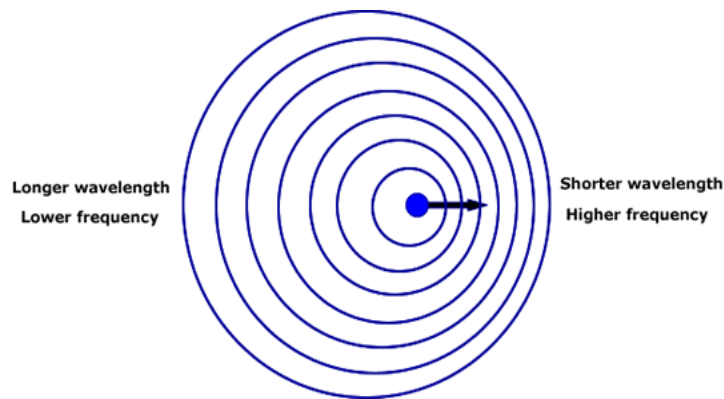


Fig. 3: Interpretation of Doppler’s law [7]

On the basis of the Doppler law, physicists linked the cosmological redshift in the spectra of distant galaxies with their active removal from each other, including from the observer of earth. By this the big bang theory is confirmed by the detected cosmological radiation and gravitational waves that is the reason to create today's universe after the explosion.

- Thirdly, if we consider that at the beginning of the universe the particles which existed in the universe is very very hot then there should be some remnant which supports the Big Bang Theory. In 1965, Radio astronomers Arno Penzias and Robert Wilson discovered a 2.725 degree Kelvin(-454.765 degree Fahrenheit, -270.425 degree Celsius) Cosmic Microwave Background radiation(CMB) which pervades the observable universe. This is thought to be remnant which scientists were looking for. Penzias and Wilson shared in 1978 Nobel Prize for physics for their discovery.
- Finally, scientists and astronomers observed the abundance of light elements in the observable universe. We know from the big bang theory that after cooling of the universe, there present a sea of protons, neutrons, electrons and many more particles which recombines with each other to produce the further elements like hydrogen, helium and many more light particles. Therefore the abundance of this particles supports the Big Bang theory majorly [8].

**IV. IS BIG BANG REALLY HAPPENED?**

After studying all the journals and research papers till date, our team is really confused in many aspects. The concepts which is described in those journals and papers is exceeding our concepts somewhere. Therefore, some questions are arising in our mind.



Fig. 4: Starting of Universe (assumed by Hubble's Telescope) [9]

1. Is Big Bang theory is the ultimate answer of the starting universe?
2. After observing the galaxies by the most advanced telescope(Hubble's telescope, NASA), there is some traces that showing big bang theory is not sufficient for proving the starting point of universe.
3. We know about just three dimensions present in universe. But according to superstring theory, our universe exists in 10 different dimensions. If Big Bang theory is stabilized upon just 3 dimensions and it is possible to understand another dimensions, then what will happen for the other dimension?
4. On today's date, NASA had invented the latest version of telescope which is named as Hubble's Telescope. It arises a question in today's world that Big Bang theory is not sufficient to answer all the question according to the starting of the universe. It is not able to answer all the possibilities about modern Astro science. Can we will find another theory which say about starting point of universe?

On the basis of all questions we are going to describe some concepts according to our understandings.

Today we have some modern telescopes (specially Hubble's Telescope). And, the concepts of astronomy is continuously changing because of new observations. Combinations of them are indirectly showing that big bang theory is not ultimate theory of starting of universe. Some advanced telescopes captures some lights which is coming from unknown or unobserved galaxies. That is completely normal because any telescope can capture any light. But the question is different. Those specific light is captured by advanced telescopes that is showing the age of those galaxies, which is more than the age of big bang. So here this is one of the against answer of big bang theory.

Now consider that our machine and advanced technology is wrong. But there is another question that is if we can't explore the whole universe today then how we take a theory for the ultimate answer of starting of universe. May be after exploring the entire universe there will be some different answers. From here, another question is arrived!

Today's modern science is assuming that there is high possibility to have more that 3 dimensions. According to superstring theory, we found more than 10 dimensions. There is some interesting relationship between time and dimensions. According to Einstein's General theory of relativity, the spacetime is a 4 dimensional object that has to obey an equation called the Einstein's Equation, which explains how the matter curves the spacetime-

$$R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu} + \Lambda g_{\mu\nu} = \frac{8\pi G}{c^4}T_{\mu\nu}$$

This equation dictates how freely falling matter moves through spacetime, form the core of the mathematical formulation of general relativity. [10]

Assume that we have to travel 2 lakh light years. And this is kind of impossible by using today's technology. Even if we achive the speed of light then we need 2 lakh years time to cover this mentioned distance. From here, we got another concept that is called wormhole theory(a hypothetical structure connecting disparate points in spacetime and based on special solution of Einstein field equations.

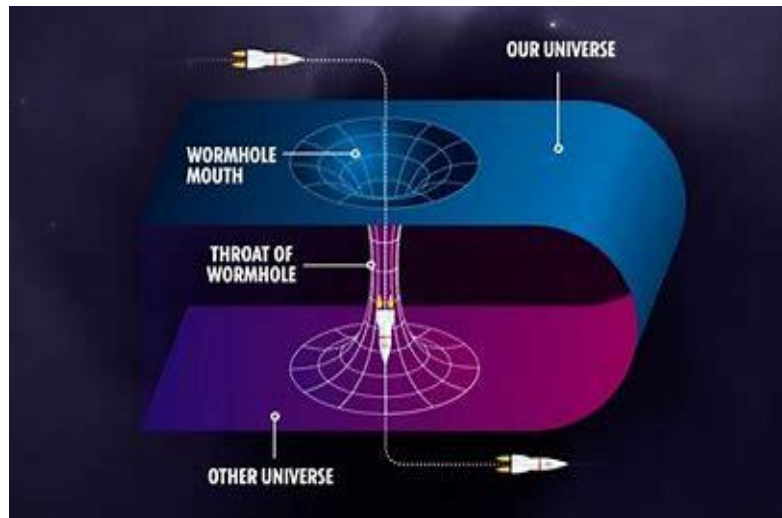


Fig. 5: Concept of Wormhole [11]

By our general concept three dimensional travel is not working for covering this huge distance. But if we can connect these two lines by using a trick which contains maximum distance of some millimeters then we can easily travel this huge distance in a single of moment. From here we got the concept of time travel. Because, if we can travel a huge distance in a short time that is called time travel. This sounds some funny! Right? But yes, if we can do time travel then we will get the ultimate answer of starting of the universe. Because when we will be explored the entire universe then we can come in a single decision otherwise there will be various questions about starting of universe. And there will be nothing to assume. There will be a theory about starting of universe which will totally based on 100% scientific evidences.

So according to our observations and study we can say that if we can do time travel then we will get our final theory of starting of universe. May be that will be big bang theory or not. And till that day it will not good for us to consider a theory as a ultimate theory. This theory is just starting. Many more theories will come because science is evolving. So big bang theory is beginning and end result is awaiting.

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