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Research Article

Big Bang Theory

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Abstract

In 1927 a Belgian cosmologist and a catholic priest George Lemaitre proposed the Big Bang Theory. It explains about what happen for Bang that occurred 13.8 billion years ago. The Big Bang is how astronomers explain the way the universe began. Researches say that universe is still expanding. What causes the acceleration? Big Bang theory explains it. The earliest times of the universe lasting from approximately 10^{-43} to 10^{-11}seconds after the Big Bang. According to Big Bang Theory all matter in the universe were concentrated as single extremely dense and hot free ball. Scientists like Stephen Hawking, George Elis and Roger Penrose have studied and researched on the Big Bang Theory. Big Bang hypothesis states that "All of the current and past matter in the universe came into existence at the same time".

Keywords: *Creation of universe, Hubble's law, cosmic microwave background.*

Introduction

The Big Bang is a theory concerning the origin of the universe not the formation of stars and planets. The universe originated between 10 billion and 20 billion years ago from expansion of matter. In 1927, this theory was developed. It is considered to be the most credible scientific explanation of how the universe was created. "Big Bang" was first coined by "Fred Hoyle".The universality of physical laws and the cosmological principle were the two major assumptions of this theory. Cosmologist believe that big bang flung energy in all direction at the speed of light 300,000,000 matter per second a million times faster than H-bomb .This theory explain where all the hydrogen and helium in the universe came from. The time line for Big Bang is 0 to 10 seconds (2). The phrase that came to be applied to Lemaitre theory referring as Big Bang idea was coined by Hoyle. The universe started to expand from one spot space and times were created in Big Bang. It is an astrophysical model of the universe that can be observed by human senses. This theory states that after the initial phase of expansion the universe began to cool down sufficiently in order to allow the formation of particles that would later become atoms. The process of expansion and explosion of hydrogen gas was created which led to the formation of stars and their death (Super Nova) The Amount of very light elements such as Hydrogen, Helium and Lithium seems to agree with this theory.

Evidence of Big Bang Theory

According to the Big Bang theory universe was born as a very hot, dense, single point in space. In 2001 NASA launched the Wilkinson Microwave Anisotropy Probe (WMAP) mission to study the conditions as they existed in the early universe by measuring radiation from the cosmic microwave background. Among other discoveries WMAP was able to determine the age of the universe about 13.7 billion years ago. When the universe was very young it grew exponentially and double in size at least 90 times during the burst of expansion which is known as "Inflation" (3). After inflation the universe continued to grow but a slower rate. As space expanded the universe cooled and matter formed. Within the first three minutes of the Universe formation the light chemical elements were created. As the universe expanded, temperatures cooled the Protons and neutrons collide to make deuterium. This deuterium combined to make helium. After the Big bang the Intense heat from the universe creation made it essentially too hot to shine. Opaque plasma of protons that scattered light like fog. Roughly 400 million years after the Big Bang the universe began to came out of its dark ages. This period in the universe evolution is called the age of ionization. The process of deionization plus the clearing of foggy Hydrogen gas caused the universe to become transparent.Astronomers comb the universe looking for the most far-flung and oldest galaxies to help them understand the properties of early universe. The cosmic back ground Explorer (COBE) and missions still in operation like Hubble space telescope in 1990 all help scientists to solve most enduring mysteries and answered the Questions in cosmology (4). Our solar system is estimated to have been a little after 9 billion years after the big bang making it about 4.6 billion years old. According to current estimates the sun is one of more than 100 billion stars in Milky Way. As gravity caused the nebulae to collapse it spun faster and flattened into a disk.

The mysterious and invisible mass became known as dark matter. Dark matter is made up of 23 percent of the universe. In comparison only 4 percent of the universe is composed of regular matters which are stars, planets and people (5). In 1920 astronomer Edwin Hubble made a revolutionary discovery about the universe. Using newly constructed telescope at the Mount Wilson observatory in Los Angles. Hubble observed that the universe is not static but rather is expanding. Decades later in 1998 the prolific space telescope named after first astronomer found that the universe was expanding slowly than it is today. The existence of this energy is make up 73 percent of the

universe is one of the most hotly debated topics in cosmology while much has been discovered about the creation and evolution of the universe. There are enduring questions that remain unanswered dark matter and dark energy remains two of the biggest mysteries but cosmologist continue to probe the universe.

Early Universe

About 13.75 billion years ago of the contents and energy in the Universe was contained in a singularity with infinite density and temperature. It began to expand rapidly this expansion is known as "Big Bang" (6). After the Big Bang the universe was like a hot Soup of particles (i.e. protons, neutrons and electrons). When the universe started cooling the protons and neutrons began. Early refers to within the first few seconds after the Big Bang. It took 3, 80,000 years for electrons to be trapped in orbits around nuclei forming the first atoms. The universe was once just the radius of the Earth to the sun which happened when the universe was about a trillionth (10^{-12}) of the universe back then was (10^{29}).In the early universe matter and anti matter were being created equally out of the radiation. Very early universe when the temperature was 10 billion 7 k.

Evidence is there to support the Big Bang theory

Three major scientific discoveries provide strong support for the Big Bang Theory

1. Hubble's discovery in the 1920's of a relationship between a galaxy's distance from earth and its speed 7.
2. CMBR: The discovery in the 1960's of cosmic microwave background radiation (CMBR).
3. The relative abundance of H and him.

4. The key pieces of observational evidence lend support to this theory. Among these the CMB radiation considered it to be the strongest evidence for the Big bang theory.

Status of Big Bang Theory

In short Big Bang Theory hypothesis states that all of the current and past matter in the universe came into existence at the same time. The earliest and most direct observational evidence of the theory are the expansion of the universe according to Hubble's law. Discovery and measurement of the cosmic microwave background and the relative abundances of light elements produced by Big Bang.

These predictions need to be compared to the observation of the abundances of the different nuclei. Deuterium is very fragile isotope easily destroyed after BBN. More precise observations of damped Lyman systems at high red shift have leaded to provide the mean value.

The Hot Big Bang Model

The hot Big Bang model is the cosmological model. This next evolution takes into account a better description of the matter content of the universe. It can be concluded that the universe was dominated by radiation. When the temperature T becomes larger than twice the mass m of charged particles. Some interactions may be efficient only above a temperature as long as the interaction rate T is larger than Hubble expansion rate in cosmology: The hot Big Bang given the measured radiation temperature of 2.735 Kelvin (k). The energy density of the CMB can be shown to be about 1,000 times smaller than the average rest energy density of ordinary matter in the universe.

The hot Big Bang is the period at whose end stages. We are living during which the observable path of the universe was initially dense and hot. During which it has been expanding and cooling. Some people refer the Hot Big bang as the "Big Bang".

Experiment of Big Bang Theory

Materials required

- *Colour tape*
- Paper pieces
- Balloon
- Scale
- Needle
- Sketch or marker
- Worksheet

Procedure

In this experiment, first take a balloon and put the paper pieces on to it. Then blow little bit air onto it and take a sketch to mark the letters over the balloon. First, marks the letters H consider it as home galaxy that is Milky Way galaxy. Then mark the letters A, B, C, D, and E around the letter H and consider it as stars, planets asteroids and comets around our galaxy. Then take a scale to measure the distance of H from A. Similarly we can measure H from B, C, D, and E also. Then mark the distance after 2nd blow on to it. Then we will mark the same measurements and tabulated. Similarly, for 3rd blow also.

From this measurement, we can observe that distance after 1st blow will be increased after 2ndblow and then it will be increased after 3rd blow also. Then I will take the same blower balloon and burst it down with a needle. All the paper pieces inside the balloon are scattered here and there in un even manner around our tape marking. The particles scattered outside the marking are known as dark matter and the particles scattered inside the marking are the stars and planets around our universe.

Table 1: Distance between the Points on the Balloon

Distance from Home galaxy "H"	**Distance after 1st blow**	**Distance after 2nd blow**	**Distance after3rd blow**
Dot A	4.5 cm	5 cm	5.5 cm
Dot B	4 cm	4.4 cm	4.9 cm
Dot C	3.9 cm	4.2 cm	4.5 cm
Dot D	5.5 cm	5.8 cm	6.4 cm
Dot E	2.3 cm	2.5 cm	2.7 cm

Conclusion

The Big Bang theory is important for us to understand because it layout a framework explaining how the universe was created and breaks down the time line in which things were created and formed. We are able to see evidence of this theory as technology is constantly advancing and improving. Since everything begins to exist has a cause of its existence and since the universe began to exist we conclude therefore the universe has a cause of its existence. In conclusion this theory tries to enlighten what occurred at the beginning of the world.

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