

Big Bang Theory

in relation to religious Torah
considerations

Lecture delivered at a
Jewish Community Center in
Columbus, OH

1. BACKGROUND

The **Big Bang** is the cosmological model of the universe whose primary idea is that the universe has expanded into its current state from an initial state of enormous density and temperature. The Big Bang is a scientific theory, and as such stands or falls by its agreement with observations. But as a theory which addresses the origins of reality, it has always been entangled with

theological and philosophical implications.

In the 1920s and '30s almost every major cosmologist was an atheist and preferred an eternal universe for which no explanation is needed of where and when it came from. Just say that it always was like this.

Many cosmologists complained that the beginning of time implied by the Big Bang imported religious concepts into physics. This was put forward later as a proof that the universe existed always by the supporters of the steady state theory. This perception was enhanced by the fact that Georges Lemaître, who put the

theory forth, was a Roman Catholic priest.

For many years the question of the origin of everything was of big interest to all people. There were and are two main ideas. The first idea is that the world was created by G-d a certain amount of time ago. The second idea, which was supported by atheists, was that the world existed always. These two ideas were widely discussed, and argued about by scientists. It was implied that people who supported the idea about the finite time of existence of the world are the religious people, and people who supported the idea that the world (Universe) existed forever are

atheists, or as they called themselves, materialists.

In the first half of the 20th century however, the facts were discovered that were inconsistent with the idea of stable universe.

2. RED SHIFT

If a source of any kind of waves, including electromagnetic waves or sound waves is moving and coming closes to detector, the [perceived, LN] frequency of waves increases, and if the source is moving away, the frequency decreases. You all know, that when a plane, which is a source of sound waves, is coming closer to you, the sound has a higher pitch, and when a plain is flying away, the

sound becomes lower. This is because the sound is waves.

The light is electromagnetic waves. The [light] waves may have different frequencies. The high frequencies represent the blue light. The lower frequencies represent the red light.

When the astronomers investigate the sky, they see all kind of lights. However it was noted that the light from the far away galaxies (collections of stars) has more of the red light than the blue light. This effect was called the Red Shift.

What it meant was that the galaxies are moving away from the astronomer [observer] in all

directions. This meant that the universe is not stable but is constantly expanding, and that was in contradiction with the theory of stable universe.

Oscillating universe was suggested by some scientists. However the measurements showed that the expansion of the Universe was accelerating while for the case of oscillation it should have been slowing down.

3. EINSTEIN

The greatest scientist of all times, Albert Einstein developed the relativity theory. He developed equations which describe the condition of the Universe. In solving

these equations Einstein found that there is no steady state solution for these equations. That implied that the Universe is not stable.

However, Einstein did not want to give support to the idea of G-d creating the universe. So he introduced in the equations an additional term, which did not belong to the equations but the introduction of which made the solution of the equations stable. This was a fudge factor, which he called a “Cosmological Constant.” Later on when the fact that the Universe was expanding became obvious, Einstein admitted that the introduction of the Cosmological Constant was the biggest mistake of his life.

So everything was pointing in the direction of an unstable Universe that had a beginning.

4. BEREISHIS

The Big Bang (BB) theory developed by scientists, presents the creation of the Universe that, to a large extent is similar to the description of the creation in Bereishis. The light that preceded the creation (G-d said “Let there be light,” and there was light) is described well in the Big Bang theory. According to this theory, from absolute nothingness the space appeared, it was filled by light. This light was later transformed into matter, which represents our present world.

The light was converting into particles and anti-particles. These particles and anti-particles reacted between themselves, and converted back to light. However, there were more particles than anti-particles. This difference is the reason that our world consists of particles.

So, all the matter present in our universe came from this light. The equal number of particles and anti-particles were converting to light and back many times. However, when the volume increased, the energy was insufficient to continue conversion from light to particles, and light stayed in the form of cosmic

background radiation. This radiation was discovered in 1964.

That year, Arno Penzias and Robert Wilson accidentally discovered the cosmic background radiation while conducting diagnostic observations using a new microwave receiver owned by Bell Laboratories. Their discovery provided substantial confirmation of the general [Cosmic Microwave Background theory, LN] CMB predictions—the radiation was found to be isotropic and consistent with a blackbody spectrum of about 3K—and it pitched the balance of opinion in favor of the Big Bang hypothesis. Penzias and Wilson were awarded a Nobel Prize for their discovery.

The fact that the time of the world is calculated in Bereishis starting from creation of Adam, leaves six days not accounted for. These six days may be used to justify the difference in “times” when using the Einstein’s Relativity Theory. This theory states that the time intervals in a system moving with a speed close to the speed of light are decreasing, so that 13.7 billion of years will become equal to six days.

This approach unifies the religious understanding of the world with the secular considerations and resolves the known contradiction between the Torah and science. The main contradiction for the dates (5768

years from creation time in Tora and 13.7 billions of years in science) is well described and resolved in the book, “The Science of God” by G. L. Schroeder.

There are several points, which can be made, and important to understand.

5. BIG BANG

The Big Bang started with an explosion. But it was not an explosion in some empty space. Big Bang started creating space. There was nothing before Big Bang. We should not even say “before” Big Bang, because there was no time “before” Big Bang. Time started from the moment of Big Bang. And that

start was the generation of space. In a fraction of a second, the space expanded to a large value (basis of the so called “inflation theory”). In this space, a huge amount of light was created. This light was the only substance, which was created from nothing. The whole universe was made out of this light, because light may be converted to matter according to the famous Einstein equation, $E=mc^2$. Here E is the energy of the quantum of light, m-mass of the particle, created from this light.

This is NOT the Torah description. This is a rigorous scientific representation of the creation of the Universe. The word “G-d” is not present in the scientific literature.

But the question, “Why did Big Bang happen, why and by whom space was created, and who brought light from which the whole universe was created in the space, clearly, the answer is “G-d”. This is obvious, because before the Big Bang there was nothing at all, and no physical reason therefore could bring the world into existence. So the reason of Big Bang was not physical; it was supernatural. Therefore the Big Bang theory is an iron clad proof of creation of the world by G-d.

Several states passed the “balanced treatment” laws requiring teaching the Creation science together with the evolution theory.