

## **An Overview of the Past and the Fate of the Universe**

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**Abstract:** The term universe derives from the Latin word “universum” and is defined as all matter and all space (“all things”) Its Arabic synonym is “كائين” (Kaien) meaning everything that exists.

Until mid-twentiethcentury, it was believed that the infinite universe always existed and will exist forever. Based on this theory, the static universe has no beginning or end. However, later studies and calculations by physicist and scientists found that the universe emerged from a big bang at an instance. Moreover, it was observed that, contrary to what the materialists believed, the universe is not stationary but rather developing and expanding an increasing rate.

This information is consistent with the findings of contemporary scientists. As stated above, astronomical physicists have concluded that the universe with all its spatial and temporal dimensions came to existence as a result of large explosion a long time ago. This large explosion which is referred to as the Big Bang resulted in the creation of the universe from nothingness. All the scientists agree that the Big Bang happened some 13.7 billion years ago from an extremely hot and dense point.

No matter existed before the Big Bang. All the universe was created from nothingness where there was no matter, no energy and no time. This fact was unknown until recently but was mentioned in Quran 14 centuries ago. The American Space Agency NASA discovered the remnants of a big explosion in 1992. This major discovery is a strong evidence that explains the creation of the universe from nothingness.

According to Quran, everything is made of water. The Big Bang theory states that the universe was extremely dense and hot at its earliest state and that it subsequently expanded and cooled very quickly. The expansion of the universe will continue until such time when the distance between galaxies is so large where gravity and expanding forces decline and the Big Crunch occurs where the expansion of the universe ultimately reverses and the universe recollapses followed by formation of a new universe.

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### **I. INTRODUCTION**

Since creation, human beings have been searching for answers about how the universe began and where it will end. They would think about the creation but over the ages, except for the religions, no other school of thought was able to provide an answer to their questions. Until 1900, scientists believed that the universe is infinite and static, but these did not satisfy humans. So, scientists came up with the Big Bang theory. This theory states that the universe started from an extremely hot and dense point approximately 13.7 billion years ago. Ever since its creation, the universe has been expanding to its present scale. The Big Bang theory is the prevailing model for the evolution of the universe at its earliest stages. In the 1960s, there were two theories among the astronomy community – the Big Bang theory and the Static Universe theory. After extensive observations by scientist, the Big Bang theory prevailed over the Static universe model.

This paper will focus on three principle issues: Creation of the Universe or the Big Bang; Expansion (continuity); and the end of the universe or the Big Crunch.

#### **Brief History of the Big Bang**

One of Albert Einstein’s equation of general relativity constitutes the basis for the Big Bang theory. However, one cannot name Einstein as the developer of this theory as he initially did not agree with this theory and accepted it only when credible evidences were offered by other scientists.

English astronomer and physicist Arthur Eddington and Belgian astronomer Georges Henri Joseph Édouard Lemaître first proposed this theory based on Einstein’s equations of general relativity which caused astonishment among all the scientists. However,scientists,today, credit American Astronomer, Edwin Hubble for this theory. Using a powerful telescope, Hubble managed to observationally confirm the theory of an expanding universe which in turn supported the Big Bang theory. Later in 1964, more evidences were gathered by Arno Allan Penzias and Robert Wilson to confirm the Big Bang theory. These two scientists, working on microwave receivers, encountered radio noise which was not emanating from earth and they could not explain. They concluded that the noise was the cosmic microwave background radiation, the radio remnants of the Big

Bang. With this detection, the Big Bang theory was almost unanimously confirmed. Further successful observations were made by a group of American astronomers led by George E. Smith in 1992 using NASA satellites. After these observations, all scientists confirmed the Big Bang as an established fact.

### The Universe

The Universe is a large and ever-expanding space and its contents (including galaxies, clusters, stars, planets, satellites, meteors, asteroids, comets, ordinary matter, dark matter, black holes, radiations, gases and other space objects. (Faiz, 1391).

All these space objects will surely require a space to house them which we call the universe or the world. Scientists call it the infinite universe. The universe whose length and width are still unknown to everyone. Thousands or maybe hundreds of thousands of clusters each containing hundreds of thousands of galaxies with each galaxy consisting of thousands of star systems and stars, planets and satellites are out there in the universe all put together in an amazing order following fixed orbits. Over the ages (the numbers still known to human), the order in the universe has not changed at all based on which scientists can predict many natural phenomena in future months and even years. (Hotak, 1391).

### Creation of the Universe with a Big Bang

Until the beginning of the 20<sup>th</sup> century and the development of new theories, scientists looked at the universe from the perspectives of Descartes and Newton. For the scientist from the earlier centuries, it was odd to believe that the universe had history. From their perspective, natural laws were eternal that determined characteristics of the matter in time. Development such as birth, life and death were explained by some simple atomic reactions that were unchangeable. In fact, they thought matter had no history. Based on these false concepts, materialists considered matter the fundamental substance in nature and believed that all things including consciousness were the results of material interactions. They argued that the matter scattered across the universe based on the laws of nature and after long interactions caused the galaxies, stars and planets ... to come into existence and in some of these planets such as the Earth life started after natural evolution.

Philosophers such as Karl Marx and Friedrich Engels, though not scientists, considered such scientific concepts of primacy of matter over consciousness as the fundamental pillars of their thoughts. However, some of Einstein's equations of general relativity and the established theories of the 20<sup>th</sup> century scientists fundamentally changed the situation and formally ended materialism. One of these theories is the creation of the universe as a result of a Big Bang. (Faiz, 1391).

If general relativity is true, the universe emerged from a big explosion of an extremely hot and dense state. With the expansion of the universe, it cooled. In ( $10^{-43}$  seconds) a hundredth fraction of a second after the explosion (Planck epoch), the temperature of the world reached 100 billion degrees Celsius and the universe was primarily consisted of photons, electrons, and neutrons (very light particles) and antiparticles and some protons and neutrons. Within immediately three minutes after the explosion, when the universe cooled and reached a temperature of approximately 1 billion degree Celsius, protons and neutrons started joining together and forming nucleus of helium, hydrogen and other light elements. A hundred thousand years later, when temperature dropped to a few thousand degrees Celsius, the speed of electrons decreased to a level which allowed light nucleus to attract them and form atoms. Heavier elements such as oxygen and carbon which we are made of were formed billions of years later after the burning of helium in the core of stars. (Hawking, 1391).

According to the Big Bang theory, the universe did not exist 14 to 20 billion years ago. There were no galaxies such as the Milky Way, no star like the sun or no planet such as the Earth or no satellite like the Moon. There were no celestial bodies. The particle that is the building block of any element (atom) did not exist either and there were protons, neutrons, electrons or smaller particles. There were no time and no space. There was no sound, no color and no dimension.

Even if we imagine that there was nothing except for an absolutely void and dark space, this is a wrong imagination because there was no space.

The question is where did this vast universe where it takes billions of years for the light to travel from one corner to another come from?

Quran has repeatedly emphasized on the creation of the universe from nothingness. This was considered unscientific until late 20<sup>th</sup> century. Science then considered it impossible for something to come into existence from nothing. Scientists such as Newton insisted that material interactions over time can result in creation in a gradual evolution. However, modern science considers it imperative for the creation to come to existence from nothingness.

Quran says:

بَدِيعَ السَّمَاوَاتِ وَالْأَرْضِ ۗ وَإِذَا قَضَىٰ أَمْرًا فَإِنَّمَا يَقُولُ لَهُ كُنْ فَيَكُونُ ﴿١١٧﴾

"He is the Creator of the heavens and the earth: when He decrees a thing, He merely says, "Be," and there it is." (Quran: 2:117)

God decided to create the universe and by merely saying “Be” he created the universes from tiny particle. Scientists call it this tiny spot as the early universe.

The early universe was so tiny and dense that like a drop in an ocean compared to the existing universe. Scientists later realized that the early universe was far smaller and tinier than thought. It was smaller than the Earth. Elbert Einstein believed it was smaller than atom. Scientist first that this comparison as an over exaggeration but later unanimously agreed that the first particle (early universe) was not only smaller than atom but tinier than atom nucleus. One can, therefore, fairly say that the early universe was extremely tiny, extremely dense and extremely hot with a temperature reaching billions of degrees Celsius. Since its mass was equal to today’s universe, it was extremely dense.

The elements of this densestate of the universe were not material but rather pure energy with singularity force. What force it was, we do not know yet. But the current universe has four forces or fundamental interactions: Gravitational force or interaction; electromagnetic interactions; and the strong and weak interactions which produce forces at minuscule subatomic distances and govern nuclear interactions (Faiz, 1391).

### How the Universe Continues to Exist

The universe is mainly made of hydrogen and helium. These two elements are the lightest elements. Other elements are rare in the universe. Elements such silicon, corban and other elements can be found inside stars, nebulas and planets.

The universe is kept together by four invisible forces or interactions: Gravitational and electromagnetic interactions are the two familiar forces. There are two additional strong and weak interactions or forces. The latter two produce forces at minuscule, subatomic distances and govern nuclear interactions.

Here too, the Holy Quran provides a powerful statement:

وَالسَّمَاءَ رَفَعَهَا وَوَضَعَ الْمِيزَانَ ﴿٧﴾

“And He has raised up the heaven and has set a balance.” Quran: 55:7)

Newton proved that a strong force called gravity exists in space keeping all celestial bodies in order and at certain orbits and the celestial bodies considering their sizes keep one another in order pulling on each other and ultimately keeping each other in orbit. Developments in sciences and modern scientific researches proved that any star or planet in space has a center of gravity and that despite continuous orbit, the distance between these centers of gravity remains unchanged. God Almighty interprets gravity in Quran as the invisible pillars of the sky. (Galagar, 1395).

اللَّهُ الَّذِي رَفَعَ السَّمَاوَاتِ بِغَيْرِ عَمَدٍ تَرَوْنَهَا

“It is Allah Who has raised the heavens without any supports that you could see.” (Quran 13:2)

### The Expanding Universe

Fourteen centuries ago when astronomy and science was at primitive stages, Quran stated the following about the expanding universe:

وَالسَّمَاءَ بَنَيْنَاهَا بِأَيْدٍ وَإِنَّا لَمُوسِعُونَ ﴿٤٧﴾

“AND IT IS We who have built the universe with [Our creative] power; and, verily, it is We who are steadily expanding it”. (Quran 51:47)

The Arabic term “Sama” meaning sky or universe has been used the Quran repeatedly. The term “Sama” implies space and the universe. In the above verse, it also means the universe referring to the expanding universe “We who are steadily expanding it” The Arabic term “Mosioon” derives from the Arabic term “Awsia” meaning expanding. In the above verse the term “Mosioon” therefore means steadily expanding.

Until early 20<sup>th</sup> century, science thought the universe was static and had existed for ever while new observations and studies using new technology established that the universe had a beginning and has ever since been expanding.

At the beginning of the 20<sup>th</sup> century, Russian physicist, Alexander Friedman and Belgian astronomer Georges Henri Joseph Édouard Lemaître established that the universe has constantly been expanding. These were based on observations in 1929. American Astronomer, Edwin Hubble observed with his telescope that stars and galaxies were consistently moving away from one another. This was the most major development in astronomy. During his observations, Hubble found that star lights change to red as the distance increases. This is because based on the laws of light physics, the light coming forward appears purple and the light further way appears red. In a nutshell, based on Hubble’s observations, stars and galaxies were moving away from each other. In a world where everything is moving away, it means the universe is expanding. (Yaftali, 1398).

To better explain this, we can consider the world as surface of a balloon. The more air you pump in the balloon the more the spots on the surface of the balloon move away from one another. Celestial bodies mover away when the universe expands. This was theoretically proposed by Albert Einstein who was the greatest

scientist of the 20<sup>th</sup> century. However, due the prevalence of the Static Universe theory at the time, Einstein did not insist on his new theory but later referred to it as his biggest mistakes in his life. This fact was described in Quran when today's modern and advanced telescopes and technologies were not yet invented. This is because Quran is word of God, the Creator of all the worlds. (Yahya, 1385).

### Complete Balance in the Universe

الَّذِي خَلَقَ سَبْعَ سَمَاوَاتٍ طِبَاقًا ۗ مَا تَرَىٰ فِي خَلْقِ الرَّحْمَنِ مِن تَفَوتٍ

*"Who created the seven heavens one upon another. You will see no incongruity in the Merciful One's creation."* (Quran 67:3)

Millions of stars and galaxies in orbit in the universe in complete balance. Planets and satellites not only rotate around their own axis, they also orbit around the systems which they are part of. At times, 100 to 300 billion stars' orbits cross each other's path but amazingly, they never collide to one another. This miracle is bigger than we can explain. Speed in the universe is bigger than we could measure it using our earthly measurements. Planets, stars, and galaxies each weighing thousands of billions of tons are moving across the universe at extremely high speeds.

For instance, the Earth spins at its own axis at a speed of 1670 km per hour while the fastest bullet tested so far travels at a speed of 1800 km per hour. One can see how fast the earth rotates despite its large mass and size. The Earth's orbit around the Sun is sixty times faster than the speed of the bullet at 108000 km per hour. If we can make a car that can travel at this speed, we could travel around the Earth in just 22 minutes.

The numbers for the Sun are far more extraordinary. The speed of the solar system is beyond our imagination. The Milky Way galaxy along with its 200 billion stars travels across the space at a speed of 950,000 km per hour.

In such a complex and fast-moving system, collisions are very likely. But not collision occurs and continue to live peacefully. This is because everything in the world is put in balance and configured by God Almighty as we read in the verse of the Holy Quran that there is no incongruity in the creation. (Noorzad, 1388).

### Steady Expansion of the Universe until Its Destruction from a Quranic Point of View

وَالسَّمَاءَ بَنَيْنَاهَا بِأَيْدٍ وَإِنَّا لَمُوسِعُونَ ﴿٤٧﴾

*AND IT IS We who have built the universe with [Our creative] power; and, verily, it is We who are steadily expanding it.* (Quran 51:47)

The above verse of the Holy Quran specifically talks about the expanding universe which has been scientifically proved by Astronomy. When Einstein proposed his relativity theory about the expanding universe, he did not know the depth of this reality. Later science confirmed that the universe was expanding.

It is obvious that the Milky Way Galaxy is so wide that it contains billions of stars. In order for the light to travel across the Milky Way, it will require some four hundred thousand light years. We know that in addition to the Milky Way, there other galaxies out there in space with diameters across billions of light years. We can see that the universe is very, very large and billions of light years across. We can only give numbers and our brain cannot process it. This is consistent with the verse of the Holy Quran which said: *"We are steadily expanding it"*. Science and Quran both confirmed that the universe was expanding and not static as earlier proposed by Einstein. Now both Muslim and non-Muslim scientists propose that the universe expansion will ultimately stop at some point. Therefore, astronomers explain creation and future of the universe in the following stages:

1. The Big Bang when the current universe came into existence;
2. The steady expansion of the universe;
3. The phase when expansion of the universe stops;
4. The phase when the big demise or destruction occurs; celestial bodies such as stars, planets and satellites will crash ending the current universe. Scientists call this phase the Big Crunch. (Simon, 1398).

Scientists recently proposed the Big Crunch theory (phase 4) according to which the expansion of the universe will ultimately reverse and the universe will re-collapse destroying all celestial bodies such as the stars, the satellites and the planets. As we can say, Quran clearly described this phase some 1500 years ago.

يَسْأَلُ أَيَّانَ يَوْمَ الْقِيَامَةِ ﴿٦﴾ فَإِذَا بَرَقَ الضُّبُرُ ﴿٧﴾ وَخَسَفَ الْقَمَرُ ﴿٨﴾ وَجُمِعَ الشَّمْسُ وَالْقَمَرُ ﴿٩﴾

*"Asking [derisively], "When is that Resurrection Day to be?" (6) But [on that Day,] when the eyesight is by fear confounded, (7) and the moon is darkened, (8) and the sun and the moon are brought together."* (Quran 75:5)

يَوْمَ نَطْوِي السَّمَاءَ كَطَيِّ السِّجْلِ لِلْكِتَابِ ۚ كَمَا بَدَأْنَا أَوَّلَ خَلْقٍ نُعِيدُهُ ۚ وَعَدَّا عَلَيْهَا ۚ إِنَّا كُنَّا فَاعِلِينَ ﴿١٠٤﴾

*On that Day We shall roll up the skies as written scrolls are rolled up; [and] as We brought into being the first creation, so We shall bring it forth anew a promise which We have willed upon Ourselves: for, behold, We are able to do [all things]! (Quran:104)*

يَوْمَ نَطْوِي السَّمَاءَ كَطَيِّ السِّجْلِ لِلْكِتَابِ

*“On that Day We shall roll up the skies as written scrolls are rolled up. (Quran:104)”*

The skies will be suddenly rolled up like newspapers are rolled up. The decree is issued and executed. Peoples’ deeds are done and the world beloved to human is no more. A new existence and a new universe appear:

كَمَا بَدَأْنَا أَوَّلَ خَلْقٍ نُعِيدُهُ

*“As We brought into being the first creation.” (Quran:104)*

As we easily created the universe the first time, we will bring into being another existence. We will resurrect the people to account for their deeds.

وَعَدَّا عَلَيْهَا ۚ إِنَّا كُنَّا فَاعِلِينَ ﴿١٠٤﴾

*“So, we shall bring it forth anew a promise which We have willed upon Ourselves: for, behold, we are able to do [all things]”! (Quran:104)*

Scientists believe when the mass of the world is large enough and the expansion ultimately stops, the universe expansion will reverse, and this process is called the Big Crunch. This will mark the end of all forms of life. According to the Big Crunch theory, the expanded universe will shrink quickly and lose its entire mass and will change into a singular point with infinite density. The universe will once again reach a state in which it is extremely dense and hot. This theory is consistent with what is described in Quran. (Sadat, 1396).

إِذَا السَّمَاءُ انْفَطَرَتْ ﴿١﴾ وَإِذَا الْكَوَاكِبُ انْتَثَرَتْ ﴿٢﴾ وَإِذَا الْبِحَارُ فُجِّرَتْ ﴿٣﴾

*“WHEN THE SKY is cleft asunder, (1) and when the stars are scattered, (2) and when the seas burst beyond their bounds.”(Quran 82:2)*

Based on the Big Bang theory, expansion of the universe will continue infinitely. As the galaxies move away, the distance between them expands leaving behind an empty space. The matter’s density will weaken so fewer new stars will form. The old stars will die out one after another and the universe will ultimately become a dark void. (Rohani, 1393).

Quran also talks about the sky falling apart and becoming red:

فَإِذَا انشَمَّتِ السَّمَاءُ فَكَانَتْ وَرْدَةً كَالدِّهَانِ ﴿٣٧﴾

*“And when the sky is rent asunder, and then becomes red like red hide.” Quran 55:37*

فَإِذَا النُّجُومُ طُمِسَتْ ﴿٨﴾

*“So, when the stars are made to lose their light.” (Quran: 77:8)*

Quran continues:

وَإِذَا النُّجُومُ انكَدَرَتْ ﴿٢﴾

*“And when the stars darken.” (Quran 81:7)*

These events will mark the end of the world which we are fond of and call it home.

## II. CONCLUSION

In 1930, a scientist by the name of Edwin Hubble proposed a theory for the creation of the universe. This theory is called the Big Bang theory and is the most scientifically accepted theory about the origins of the universe.

Based on this theory, the universe was created approximately 15 – 20 billion years ago as a result of a large explosion which threw celestial bodies across the heaven. At the time of the explosion, the entire energy and materials were concentrated at one tiny but very dense and hot spot. What existed before the Big Bang is totally unknown to everyone and is a matter of great consideration for the scientists.

This was not an ordinary explosion but rather one that filled the heavens and the space with certain nucleus that were evading one another. Hubble observed that the universe was steadily expanding. He found that the speed of galaxies was proportionate to their sizes.

In addition to understanding the speed of galaxies which all originated from one single origin, there are other evidences that support the Big Bang theory. In 1964, two scientist, Arno Allan Penzias and Robert Wilson who were working on microwave receivers, encountered radio noise which was not emanating from on single source but were coming in from all directions across the universe. They later found that the noise was the cosmic microwave background radiation, the radio remnants of the Big Bang.

According to Quran, everything is made of water. The Big Bang theory states that the universe was extremely dense and hot at its earliest state and that it subsequently expanded and cooled very quickly. The

expansion of the universe will continue until such time when the distance between galaxies is so large where gravity and expanding forces decline and the Big Crunch occurs when the expansion of the universe ultimately reverses and the universe recollapses followed by formation of a new universe.

We can summarize the findings of the researches and observations by scientists and astronomers as follows:

- The universe came into existence as a result of large explosion, the Big Bang;
- The universe has a beginning and an end and is not eternal;
- Galaxies are expanding;
- Galaxies are moving and their speeds depend of the distance between them;
- Similarities can be observed in all galaxies;
- Galaxies are moving away from us.

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