New Calculations of Space-Time Dimensions of the Visible Universe

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Abstract: No one may claim to have created the whole universe except Allah, the Almighty Creator, as stated in all holy books especially Quran. So, trying to comprehend “time and space” dimensions of the universe is beyond our human power compared to the unlimited and magnificent power of the Creator Himself. One must think that both dimensions should have limit boundaries, and not infinite. Clear implications from some verses of Quran and the verified Hadith, when scientifically interpreted, may give us clues about the answer to the question of the creation process, and the age of the universe, an answer which was there in the texts of both Quran and the verified Hadith, more than 1400 years ago. In this article I was able to predict two ultimate values for the “time width” and “distance thickness” for the observable universe. Good agreement is found with recent theories and discoveries.

Key words:

INTRODUCTION

Since the existence of human race on Earth more than two million years ago (Stephen Hawking, 2001), mankind has been and will be fascinated by the universe and its structure. The universe's precision, accuracy, and organization are far beyond the limits of any human mind. But, the most persistent question in all times is: how far the limits of the universe are, and how old it is. In that regard, many theories were established and have been discussing the creation and the age of the universe since the Big Bang, an endless debate in the present and even deep into the future Serway, (2006). Here, I am not going to argue about the creation of the universe because it is purely Creator's work not mine. But, we will discuss "space-time" dimensions of the universe, and that the answer was inside Quran and Hadith more than 1400 years ago. However, in Quran there are non-negotiable evidences about the Big Bang moment (Holy Quran), expansion of the universe (Red-Shift phenomena) (Holy Quran) and even contraction of the universe (Blue-Shift phenomena) (Holy Quran), but the process of creation itself, how it was evolved and developed, in our opinion, is non-debatable simply because we were not there at that time. Moreover, the process of creation is beyond our senses and our comprehension. No theories or models, what so ever their number is, can describe what happened or even give a clue, simply because theories are the outcome of our minds, and our minds have limits. Even the theory of George Gamow in 1948 (Heinz and Pagels, 1985; Stephen Hawking, 2001) which he describes the first half hour after the Big Bang (the three epochs; ultra-hot, hot, and cooled) is purely speculative, and there are many doubts about it. Thus, we can’t know something far beyond our comprehension as well as imagination such as the universe creation process, using our limited thoughts. What we are observing now in the galaxies and star clusters, is the consequence of the process of creation and not the process of creation itself, and there is a big difference between the two perceptions. Logically enough, one may wonder why exerting much effort to find the answer to the question of the universe creation process while the answer had existed in the texts of Quran a long time ago. Allah mentioned plainly that the whole universes and everything in them were joined together as one bulk and confined in some kind of a shell and the Creator Himself simply clove them asunder to expand in all directions (the Big Bang moment) (Holy Quran). As a matter of fact, in Quran and Hadith there are various indications that the universe is limited and has boundaries. Moreover, three or four different Hadiths mentioned that the distance between Earth and the 1st sky is a “march of 500 years” and the
distance between the 1st sky and the 2nd one is another "march of 500 years". So, the total "distance thickness" for the 1st sky will be a "march of 1000 years", and there are 7 skies (universes) between any two successive skies there will be 1000 years.

English translation for the meanings of the Hadith "While the prophet (PUH) was sitting with his companions, they saw floating clouds, and he said," Do you know what this is", they replied, "Only Allah and His prophet have this knowledge", he initiated, "this is a vapor water driven by Allah across the earth to reach people who do not thank or even ask for His help". The prophet said again, "Do you know what is above you", they replied, "Allah and His prophet have more knowledge", he said "it is a dome, a protected roof, and a kept flood", he said "Do you know how far it is", they replied "It is within Allah's and His prophet's knowledge", he said "it is as far as a march of 500 hundred years". The prophet (PUH) said," Do you know what is above this", and when they expressed their lack of knowledge, he said," There are two skies separated by a march of 500 years", and he counted up to seven skies in which the interval span between each two skies is the same as that between the earth and the 1st sky. He asked them if they knew what was above all of this. Being unable to answer, they were told that Allah's throne was placed and that the space span between Allah's throne and the top sky (7th sky) is the same as between any two skies.

Analysis:

2.1 Time Dimension of the Universe:

In trying to understand the significant meaning of the number 500 years pointed out in this Hadith, one should know that this exact number has been used to describe the time interval "width", and hence the distance interval "thickness" of each sky, and also the time or distance interval between any two successive skies. This means that, the total years between any two consecutive skies are 1000 years, and consequently there will be 6000 years to reach the 7th sky. The question is what kind of years we are dealing with? Is it earth year or we are dealing with totally different space-time frame? In other words, if we can just switch the 500 years mentioned in the Hadith to be 500 years in the time frame of the Creator, instead of literally taken them as earth years, and that each day in these years equals 6000 lunar earth years, we will have an equation to get the total number of earth year's equivalent to the 500 years in the Creator’s time frame. In the calculations, earth year will be substituted by the lunar year (≈540 days).

500 years (Creator’s time frame) = 500 × 354 × 50000 earth years

= 8.85 × 10^6 earth years ≈ 9.0 × 10^8 earth years ≈ 9 billion years

Given that, we are the only living species investigating and exploring the universe, and following the cosmological principle, which states that the universe is isotropic (has the same average features; mass density, expansion factor, and so on, in any direction) and homogeneous (has the same average features at any position) when large enough volumes of the universe are sampled. We are going to consider the planet Earth to be in the center, and the whole universe as colossal concentric spheres (Figure 1), each sphere represents a sky or "universe", in that case, these 9 ×10^6 earth years will represent the "time width" between the Earth and the 1st sky in all directions. Doubling this value we will get:

1.8 × 10^9 earth years

≈ 20 billion earth years

This value represents the total "time width" of the 1st sky from the Earth and consequently this will be the "time width" between any two successive skies. So, the diameter of the 1st sky (visible universe) in years will be = 40 billion years, and due to the curvature nature of the universe (Stacy and Palen, 2002; Stephen Hawking, 2001), this will make the maximum separation between any two opposite stars along the diameter equal to the length of an "arc" that will equal to half of the circumference of the universe, and that will be of the order of 6.28×10^{38} years (= 63 billion years) (Figure 2). There are 7 skies mentioned in the Quran and Hadith, hence, the total "time width" for the whole 7 skies (universes) will be in the order of:
2.0 \times 10^{10}\text{ earth years} \times 7\text{ skies} = 1.4 \times 10^{11}\text{ earth years} \\
\approx 140\text{ billion earth years}

2.2 \text{ Space Dimension of the Universe:}

By calculating the “distance thickness” for the 1st sky we accordingly will be able to determine “distance thickness” for the whole universes (7 skies). Taking the speed of light as an alternative expression for the meaning of the word “March” mentioned in the Hadith. As a result, light year will be considered to be used in the calculations. As we know, light year = 9.5 \times 10^{12}\text{ km}. One can straightforward calculate the “distance thickness” for the 1st sky (visible universe) using the following relation:

\[20 \times 10^{6}\text{ earth years} \times 9.5 \times 10^{12}\text{ km} \approx 2.0 \times 10^{23}\text{ km}\]
\[\approx 6.7 \times 10^9\text{ parsec}\]
\[\approx 1.3 \times 10^{15}\text{ AU}\]

Where, 1 parsec = 3 \times 10^{16}\text{ m}, and 1 astronomical unit (AU) = 1.5 \times 10^{8}\text{ km}. This calculated distance is in a good agreement and can be well accepted, it is even greater than the recently measured distance between the Earth to the most remote known objects in the visible universe (= 1.3 - 1.4 \times 10^{23}\text{ km} \text{ or } = 13-15\text{ billion years}) (Brian Greene, 1999; Stacy and Palen, 2002). Even, this measured distance we can’t take it for granted, and is not totally accurate due to imprecision and errors in the measuring devices such as Hubble Telescope (uncertainty of about 25% for the recently accepted value of Hubble’s constant) (Serway, 2006; William Cropper, 2001; Stacy and Palen, 2002). These devices have errors in their measurements because most of them depend on measuring the intensity of EM radiation like; visible light, X-rays, or even Gamma rays. The intensity itself of these EM radiations is governed by the inverse square law and more over, suffers scattering, absorption and attenuation processes as EM radiations propagate through space. Now, we can conclude the total “distance thickness” for the 7 skies to be in the order of:

\[2.0 \times 10^{23}\text{ km} \times 7 \approx 1.4 \times 10^{24}\text{ km}\]
\[\approx 4.7 \times 10^{10}\text{ parsec}\]
\[\approx 9.3 \times 10^{15}\text{ AU}\]

Fig. 1: Schematic diagram shows the Earth at the origin and the 7th skies as colossal concentric spheres. The “time width” between any two successive skies is 1000 years (in Creator's time frame).
Fig. 2: Schematic diagram shows the Earth at the center and the ultimate boundaries of the 1st universe with radius = 20 billion earth years. The distance between two opposite stars at the edge of the visible universe equals the length of an arc = 63 billion earth years.

Fig. 3: Expansion of the current boundaries of the Visible Universe (yellow colored sphere) to reach the ultimate boundaries of the real Visible Universe (black colored sphere).

Conclusion:

The two predicted values computed in this article for the “time width” and “distance thickness” of the 1st sky which are = 20 billion earth years and $2.0 \times 10^{23}$ km respectively, will represent in my point of view the ultimate boundaries of the “visible universe” as we know it as well as the age of the universe, this can be widely accepted and consistent with most predicted theories (Brian Greene, 1999; Heinz R. Pagels, 1985; John and Rigden, 2003; Stacy and Palen, 2002; Stephen Hawking, 2001). The calculated value for the time width “age” is greater by almost 5 -7 billion years than the recent measured value (= 13 -15 billion years). The question now, is what about these 5 -7 billion years? In our opinions, this question might have two different answers; first, "either" the devices we are using now to explore the universe are not capable to measure the very faint EM radiations intensities coming from objects near the edge of the universe, second; "or" the size of the apparent universe now could thus be smaller than the entire real universe (1st sky) and that the apparent universe still needs to expand to cover this 5 -7 billion years gap to reach its ultimate boundaries limit (Figure 3). In both cases, whether we can’t “see” the limit boundaries or the observable universe still needs time to reach them, the expansion of galaxies or star clusters will not exceed this boundaries. In our belief, once the observable universe reaches its boundaries, the universe will start to shrink on itself and we will observe vividly the “Blue Shift phenomena” rather than the “Red Shift phenomena” marking the end of universe expansion, and this will be the ultimate destiny of the universe.

In the end, we would like to state that Quran is not a conventional scientific book but if we want to extract scientific clues from it that will depend on our understandings and interpretations, which can be correct or wrong. This research is purely a personal effort on our side to infer some verses of Quran and Hadith with
a more scientific approach. Therefore, if the calculation we made is right, this means that we have been blessed by Allah the Almighty, and if the calculation was wrong, this means that, our interpretation is incorrect and the mistake is ours.

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