

PART I

Creation of universe - 13

A scientific quest of modern times 13

What the world thought of heaven at the time 15

Statements from Quran on the origin of heavens and earth 16

Creation of universe - a complex affair 16

need to reflect on the creation of universe 17

The Beginning of creation 18

'linked' Sets of information 19

After the Big Bang 20

The timeline of Creation 22

Days or periods 22

Scientific division of this timeline 24

Standard model of the Big-Bang 24

Predictions of the standard model 26

Problems in the standard model 27

Inflationary universe 28

Problems with Inflationary universe 28

Other problems 29

String theory – a possible solution 29

information from the Quran regarding Creation 31

Terms used in Quran for Creation 31

The multiplicity of heavens 32

The Timeline as per quran 34

making the universe uniform 34

A crucial stage in the timeline 36

the Gravity factor 36

‘The next part of timeline’ 37

‘The heaven’ - ‘the world of our existence’ 38

Beautification of the heaven 39

Barriers of protection 40

A surprising similarity 40

The Heaven (*As-sama*) vs Heavens (*samawat*) 40

role of perspective 42

A filter verse 43

A subtle symmetry between the usage of terms 44

A peculiar word in Quran describing creation 45

Quran’s challenge regarding Isotropy of Universe 46

CREATION OF UNIVERSE - A SCIENTIFIC QUEST OF MODERN TIMES

During most of the modern scientific era, the cosmos was believed to be eternal. Why the stars do not fall upon each other did perplex the scientists, but it was not enough to threaten the picture of a static universe. The universe was believed to be infinite in spatial extent and populated uniformly by stars. Scientists thought that this uniformity of matter was responsible for universe having no privilege centre towards which the stars could fall. Even Einstein, in an attempt to explain the stability of cosmos, had 'fixed' his theory of gravitation in 1915, by introducing an extra term in his field equations. But gradually it was realized that physical universe had numerous irreversible processes that did not fit in with a static universe. The investigation of thermodynamic processes especially showed that the universe was gradually sliding towards a heat death and thus cannot be eternal.

In the third decade of the twentieth century, the publication of two papers changed the status quo in this regard. In 1927, Georges Lemaître derived the Friedmann-Lemaître-Robertson-Walker equations from Albert Einstein's equations of general relativity, and proposed that the universe had begun with the "explosion" of a "primeval atom".³ Later in 1929, Edwin Hubble published his observational data⁴ which showed that light from other galaxies was red-shifted in direct proportion to their distance from the Earth. The Hubble observation had two possible explanations. We were either at the centre of an explosion of galaxies, or the universe was uniformly expanding everywhere. The first position was untenable, given the Copernican principle which states that the Earth is not in a central, specially favored position. The second option, on the other hand, allowed for two further possibilities. Lemaître's Big Bang theory,⁵ advocated and developed by George Gamow, and Fred Hoyle's steady state model⁵ in which new matter would be created as the galaxies

³ The original paper - "Un Univers homogène de masse constante et de rayon croissant rendant compte de la vitesse radiale des nébuleuses extragalactiques" by G. Lemaître (1927) was published in "Annals of the Scientific Society of Brussels 47A: 41". Its translation appeared in "Monthly Notices of the Royal Astronomical Society 91: 483-490" (1931) as "A homogeneous universe of constant mass and growing radius accounting for the radial velocity of extragalactic nebulae".

⁴ Edwin Hubble, "A Relation between Distance and Radial Velocity among Extra-Galactic Nebulae" (1929) "Proceedings of the National Academy of Sciences of the United States of America", Volume 15, Issue 3, pp. 168-173

⁵ F. Hoyle, "A New Model for the Expanding universe", Monthly Notices of the Royal

moved away from each other. Some other models such as the Milne model,⁶ Richard Tolman's oscillatory universe,⁷ and Fritz Zwicky's tired light hypothesis⁸ etc. were also proposed, but Hoyle's 'steady state' and Lemaître's 'Big Bang' were the two most popular models used to explain Hubble's observations.

For a number of years, the support for the 'steady state' and 'Big Bang' theories was evenly divided. However, further observational evidence began to tilt the debate. The advent of large radio telescopes that could provide snap shots of universe at successive epochs for comparison corroborated the big-bang. And in 1965, it was found that the entire universe was bathed in heat radiation at a temperature of about 3 degrees above absolute zero. This discovery of a direct relic of the big bang altered the picture completely. The concept of a static universe became part of history, while big bang theory found universal acceptance. The discovery of galaxies rushing away from each other, removed the fear of stars falling on each other, and the finite birth of cosmos a few billions of years ago explained the presence of irreversible processes in it along with some other paradoxes.⁹ But it also brought new queries that needed explanations, such as what had caused the big bang, where did it occur and what was there before its occurrence?

Scientists believe that under conditions of extreme compression, such as occurred during the big-bang, there is no force in the universe capable of beating off the crushing power of gravity. Closer the galactic matter would have been packed together during the early stage of this big bang, the more powerful the gravitational pressure would have been on the matter, crushing it inwards. Since there is no theoretical limit to the compression, this crushing pressure inwards is expected to have brought the matter eventually to a point of infinite compression. This is a point at which the 'gravitational force and the density of material' must have been infinite, and the entire Cosmos is expected to have been squeezed into a single point. Physicists call this point a singularity.

Einstein's general theory of relativity also tells us that the 'space, time and matter' are not separate entities, but are linked together. This linkage implies that the outward expansion of cosmos is not simply a rushing away of galaxies from each other *in* space, but the expansion of *space itself* linked with time. If we imagine a backward movement of time and space, then at the point of infinite compression, the space is also expected to have contracted infinitely, or disappeared altogether along with

Astronomical Society, 108 (1948), 372.

⁶ E. A. Milne, *Relativity, Gravitation and World Structure* (Oxford University Press) 1935.

⁷ R.C. Tolman, *Relativity, Thermodynamics, and Cosmology* (Oxford: Clarendon Press. LCCN 340-32023. Reissued (1987) New York: Dover ISBN 0-486-65383-8).

⁸ F. Zwicky, 1929, On the Red Shift of Spectral Lines through Interstellar Space, PNAS 15:773-779.

⁹ Olbers' paradox, From Wikipedia, the free encyclopedia
<http://en.wikipedia.org/wiki/Olbers'_paradox> (14 Feb 2010)

time, since there can be *no time without space*. The big-bang thus becomes an event at which both space and time seem to have come into existence. It is also an event for which the familiar chain of cause and effect breaks, as without time there cannot be something 'before' this event.

The creation of universe has thus become an ultimate issue that is the cause of a showdown between those who believe in the creator factor and those who do not. The theists point out that because the laws of physics have been formulated in terms of space and time, they cannot be applied beyond a point at which space and time cease to exist. Therefore, at this singularity, where all the laws of physics break down, the cause of this big bang will either have to be due to something that is outside of these laws, or through a super natural agency. The atheists on the other hand, say that the introduction of Creator factor or a Supernatural agency as the cause does not solve the problem. The theists would still have to explain how the universe came about. Paul Davies explains the atheists' objections succinctly in his book 'The Mind of God' as part of a hypothetical discussion between an atheist and a theist.

'.. a God who is invoked only to explain the big bang fails in all three criteria. Far from simplifying our view of the world, a Creator introduces an additional complicating feature, itself without explanation. Second there is no way we can test the hypothesis experimentally. There is only one place where such a God is manifested – namely, the big bang – and that is over and done with. Finally the bald statement "God created the universe" fails to provide any real explanation unless it is accompanied by a detailed mechanism. One wants to know, for example, what properties to assign this God, and precisely how he goes about creating the universe, why the universe has the form it does, and so on. In short unless you can either provide evidence in some other way that such a God exists, or else give a detailed account of how he made the universe that even an atheist like me would regard as deeper, simpler and more satisfying, I see no reason to believe in such a being.'¹⁰

An attempt has been made here, to find these very answers on our existence, by combining the Quranic revelations with various scientific models explaining the observational data.

To begin such an exercise, an ideal starting point would be for us to know *how the humanity viewed the heaven in the seventh century*.

WHAT THE WORLD THOUGHT OF HEAVEN AT THE TIME

A common belief in the scientific world is that the information in Quran has been plagiarised from the 'Books of Bible'. Therefore, it would help to know what exactly the early Jewish sources thought of the heaven at the time.

According to Jewish Encyclopaedia: "The Hebrews regarded the earth as a plain or a hill, figured like a hemisphere, swimming on water. Over this is arched the solid

¹⁰ Paul Davies, *The Mind of God* (Penguin Books, England, 1993), 60.

vault of heaven. To this vault are fastened the lights, the stars. So slight is this elevation that birds may rise to it and fly along its expanse."¹¹

It is against the backdrop of such understanding of the time that the information in revelations should be studied.

STATEMENTS FROM QURAN ON THE ORIGIN OF HEAVENS AND EARTH

The statements in Quran pertaining to creation and different natural phenomena lie scattered all over the body of its text. This dispersion is in direct contrast with the Bible, where the creation of universe is presented neatly at one place, in the form of a story, at the very beginning (in the book of Genesis).

The tone of these verses is also different. Instead of narrating the story of creation, the verses *invite* the man to look at the creation of things all around him, and to *ponder* on their design and purpose, and thereby accept the evidence of a Creator. Muslim scholars believe that such a tone seems to serve two objectives. Reflection on the Design helps a man to unravel the laws of nature, while evidence of the Creator changes his perspective regarding the purpose of creation.

When we collect all verses in the Quran on the origin of universe, we find several clear statements that need to be studied not only for their information content, but also for what they reveal against the information available at the time regarding the heavens.

CREATION OF UNIVERSE - A COMPLEX AFFAIR

A verse from *Sura Gafir* asserts -

"Assuredly the creation of the heavens and the earth is a greater (matter) than the creation of men: Yet most men understand not." [*Gafir* 40: 57]

A second verse from *An-Naziat* also repeats the same theme through a poser to humanity –

What! Are ye the more difficult to create or the heaven? (God) hath constructed it: (*An-Naziat* 79:27)

Both the verses *compare* the creation of universe with the creation of 'men', and seem to inform us unambiguously that *man's creation involved lesser complexity*.

In the convention halls of some modern day university in USA, Europe, Cairo or Dubai, such a statement would not have aroused any controversy, but its appearance in the deserts of seventh century Arabia was astonishing. It was against the belief and existing knowledge of humanity.

The enormous complexity in the creation of universe has been realized only

¹¹ Kaufmann Kohler, Emil G. Hirsch, Earlier Versions, COSMOGONY, Jewish Encyclo-pedia - <<http://www.jewishencyclopedia.com/view.jsp?artid=807&letter=C#2736>> (11 March 2009)

recently with the unfolding of its supra gigantic size and scope. Moreover, from the existing traditional religious perspective too at the time, the statement was blasphemous. The Judeo-Christian world *believed and still believes that Man has been created in the image of God, the Creator of Complexity itself. Therefore, no creation could be considered higher in complexity than the Man himself.*

Ironically, scientists in general are ignorant of what exactly is mentioned in the Quran regarding the birth of man¹² or the universe. The following quote of Dr Carl Sagan from his otherwise excellent article 'Pale Blue Dot' is a classic example of this misunderstanding.

'How is it that hardly any major religion has looked at science and concluded, 'This is better than we thought! The universe is much bigger than our prophets said, grander, more subtle, more elegant'? Instead they say, No, no, no! My god is a little god, and I want him to stay that way'. *A religion old or new, that stressed the magnificence of the Universe as revealed by modern science might be able to draw forth reserves of reverence and awe hardly tapped by the conventional faiths*'.¹³

A double irony in this regard is that the quote can be found in 'The God Delusion' by Dr Richard Dawkins. It seems that both the world famous scientists, following their own faiths and biases, did not bother to check the presented information from the Scripture itself.

NEED TO REFLECT ON THE CREATION OF UNIVERSE

Another verse from *Sura Aal-E-Imran* is also interesting. It tells us -

Men who celebrate the praises of God, standing, sitting, and lying down on their sides, and *contemplate the creation* of the heavens and the earth, (With the thought): "Our Lord! Not for naught Hast Thou created (all) this! Glory to Thee! Give us salvation from the penalty of the Fire. [*Aal-E-Imran* 3:191]

The verse seems to identify a particular breed of men who can *realize* that the universe has been *deliberately designed* and is expected to have a purpose behind its creation.

The description - *those who reflect on the creation of heavens and earth* – points towards physicists and other scientists of allied subjects. The verse also conveys the involvement and intensity of their occupation with the Creator factor.

Isolating men, who reflect on verses, seems to serve another purpose also. It tells us about the need of symbiotic effort between revealed and the rational knowledge. Without such an effort, it becomes difficult to understand the information in revelations and get the benefit out of it. The next verse on the Big-bang event clarifies this point further.

¹² Jamshed Akhtar, In Search of our origins: How Quran can help in scientific research (Oriole Book Publishers 2010).

¹³ Richard Dawkins, The God Delusion, (Transworld Publishers 2007) p – 33 (The italics in the quote are mine - JA).

THE BEGINNING OF CREATION

A different verse invites the sceptics towards two fundamental events which are of paramount interest to humanity, the 'creation of this universe' and the 'birth of life'.

'Do not the unbelievers see that the heavens and the earth were joined together, before We clove them asunder and We got every living thing out of the water - Will they not then believe?' [Al-Anbiyaa 21:30]

The component of the verse regarding creation of universe reveals further interesting pointers -

1. In the phrase '*heavens and the earth were joined together*', the original Arabic word used here is رَتَّقَ *ratq*. The Dictionary explains the word *ratq* as '*action of fusing or binding together*'. The point to note here is that the word *ratq* does not represent a state but an action that was done prior to another action.
2. The second action described by the Arabic word فَتَقَّ *fatq* represents '*action of breaking, separating or exploding*'.
3. The composition of original Arabic statement makes it clear that in the creation of 'heavens and earth', the first action was of joining or squeezing together and then it was made to explode. It does *not* convey the simple idea of the presence of an original lump of matter that was exploded to produce heavens and earth.

The point to note here is that the action of *fatq*, or Big Bang in the creation of universe, has been confirmed by evidences and is accepted by majority of cosmologists. But scientists do not have any clue or evidence about what happened *before* this event. The act of fusing or joining before the event of creation, represented by *ratq* is thus a piece of information, which is being *revealed* to us in this verse.

The second component '*and We got every living thing out of the water*' is also interesting. The original words are *wajaAAalna mina alma-i kulla shay-in hayyin*. The word *wa* means 'and'; while *Jaa'la* implies making of new shapes and forms, new dispositions etc. The words *min* - 'from', *maa* means 'water', *kulla* - all, *shii* - things, and *hayyi* is life. This statement thus provides us with two significant hints:

1. Instead of the birth of man only, it is the creation of 'all things living' (*kulla shay-in hayyin*) from water (*min-al-maa*) has been mentioned.
2. 'Creation of *all* life from water' is part of the same verse that describes the creation event of *all* universe, and is linked with the previous statement through the usage of preposition *wa* (and).

The significance of this hint becomes deeper once we realize that water is not the exclusive component of our planet only. Scientists have detected vast amounts of water vapours hidden in the dark pockets of our galaxy. Prior to the launching of the Submillimeter-Wave Astronomy Satellite (SWAS) Submillimeter-Wave Astronomy

Satellite (SWAS) into orbit on Dec. 5, 1998, it was almost impossible to observe water and molecular oxygen in the cold interstellar medium, because its emission gets absorbed by the Earth's atmosphere. Only by lifting the telescope above this obscuring canopy, it became possible to measure the abundance of these molecules in interstellar space for the first time. Now, through the use of such space-based radio telescopes there is clear indication that the universe is full of water.¹⁴

Combining this information with the hint provided in Quran, two logical conclusions are reached

- the universe must be teeming with 'life (and intelligence)' arising out of water (organic life); and
- energy based 'creations', or beings not born out of water even with intellect (such as *Jinn* in the Quran), do not come under the category of 'living things'.

'LINKED' SETS OF INFORMATION

It is interesting to note here that through compositions such as cited above, the Quran reveals numerous statements containing 'sets' of verifiable and non-verifiable information at a particular moment in time. The purpose of the verifiable information with the growth of science appears primarily to establish and increase the credibility of revealed information itself, while non-verifiable component is meant to guide subtly. Relevance of such statements for the credibility test of revelations is obvious from a promise contained in two consecutive verses from *Sura Fussilat* of Quran -

Say: "See ye if the (Revelation) is from Allah, and yet do ye reject it? Who is more astray than one who is in a schism far?" [*Fussilat* 41:52]

Soon will We show them our Signs in the (utmost) horizons, and in their own selves, until it becomes manifest to them that this is the Truth. Is it not enough that thy Lord doth witness all things? [*Fussilat* 41:53]

Since the components of information in such sets are either linked topically or exist as part of a single verse, the *linkage* or combination of linked information is expected to establish the *credibility* of its *non-verifiable* part, once humanity achieves the information level to *substantiate* the verifiable component of information in the set.

Unfortunately, Muslim scholars concentrate only on the part of information that has already been verified, and try to show the west that the knowledge achieved by them was already mentioned in their 1400 year old text. The western scholars predictably, reject this information arguing the use of such 'revealed' information that can be identified only after the western scholars discover it through their own rational efforts. The real purpose of 'revealing' the knowledge thus gets lost in this off-track

¹⁴ SWAS Mission To Support Deep Impact, June 28, 2005, cfa press release <<http://sao-www.harvard.edu/press/pr0522.html>> Home Page of SWAS (The Submillimeter Wave Astronomy Satellite) <<http://www.cfa.harvard.edu/swas/>>

quibbling between these two large segments. It is unfortunate that both sides do not realize that the real component of the revealed knowledge that has been sent as guidance is in fact the *non verifiable parts of the verses*, and its advantage can only be gained if a symbiotic effort is carried out in the light of both revealed and rational knowledge.

The subject of origin of universe is an ideal area that can be used to illustrate the true value of this symbiotic effort. It is one which is well covered by revelations, and modern scientific efforts in its study are also extensive and in a continual stage of progression.

AFTER THE BIG BANG

Another verse informs us ..

And the heavens We have constructed it with power/strength. And We are expanding it. [Az-Zariyat 51:47]

In this verse, the first component is *Waassamaa banaynaha bi-aydin*. It contains three prepositions and three words. The prepositions are *wa* meaning 'and', *al* represents the article 'the', and *bi* usually means 'with'. The words are *sama* – heaven; *banayna* – He constructed or built. The addition of *ha* in the word *banaynaha* turns it into We constructed. The word *aydin* is from *ayid* – which means aiding with strength, power or energy. Thus it is interpreted literally as –

And the heaven We have constructed it, aiding with power/energy.

In the construction of universe, 'aiding with power' or fresh input of energy is an information that seems to point towards a particular creation model discussed ahead.¹⁵

The second component *wa-inna lamoosiAAoona* contains two prepositions *wa* (and), *inna* (We), and the word *mus'una*, which is the plural present participle of the verb *ausa'a*. This verb has several listings in the Lexicon - 'to make wider, more spacious, to extend, to expand'. Thus the exact literal translation of the words used in the verse is 'And We are expanding it'.

Commentators of Quran down the ages, being unable to comprehend what exactly God means by 'expanding the heaven' have tried to rationalize the statement on the basis of their own understanding. Maulana Abdul Majid Daryabadi interpreted this verse as - 'And the heaven! We have built it with might, and verily We are Powerful.' The meaning of the verb 'to make wider, to expand' he associated with power of the Creator instead of with the heavens. A Yusuf Ali [1934] has translated it as 'For it is We Who create the vastness of space'. Pickthal has also given a similar meaning 'We have built the heaven with might, and We it is Who make the vast extent (thereof). Hamidullah talked of the widening of the heavens and space, but he

¹⁵ See the 'Cyclic universe' ahead, where fresh input of energy is the essential component of Dr Steinhard's cyclic model of creation.

included a question mark with his interpretation. Arberry explained it as 'And heaven -- We built it with might, and We extend it wide'. Only few of the modern scholars like Muhammad Asad, Khalifa and QXP have interpreted it correctly.

Predictably, this second component of the verse has received maximum attention of scholars who are critical of Quran. They have tried to reject this interpretation either by citing past commentaries of Quran, or by alleging that it is a case of plagiarism from the Bible. Denis Giron, a scholar¹⁶ argues that this statement in *Soorat az-Zaariyaat* (51:47) is essentially the same as that contained in *Isaiah* (42:5 & 51:13). And since *Isaiah*, which predates the advent of Quran, can also be correlated with the expansion of the universe, any pre-Islamic Jew or Christian who repeated what is found in *Isaiah*, would be making such a statement without necessarily intending it to be a reference to the expanding universe. Denis Giron's argument has strength but it ignores obvious evidence. The first book of Bible, the Genesis, opens with a narrative describing the timeline of creation, in clear concise details. This narrative has always been considered as the official Biblical view of creation; and it *does not contain any references of the big-bang or the subsequent expansion of the universe*. The question that arises is that if the Prophet was plagiarising information from the Bible, why did he accept this version partially (creation in six days as explained ahead), but rejected its opening which does not describe big bang. Additionally, how could he have extracted information about expansion of heavens randomly from the middle of the Bible containing more than 31,107 verses, without any *means to check the veracity of any particular information, way back in the seventh century?*

Our contention is that similarity of information should not always be taken as an evidence of plagiarism from an earlier source. If portions from Quran and Bible, or information from *Sura az-Zaariyaat* (51:47) and *Isaiah* look similar, it can also be considered as the truth coming from the same Source. We must not forget that in the presence of so many diverse races and languages, the Genesis was the Book that had informed us about the birth of humanity from a single person. This information was against the logic of the era, and has received support only recently through the efforts of the genetic scientists. Based on this support, can we accuse the scientists of plagiarizing their results from the Bible, because the Biblical statement was already in existence?

Discussions on such futile allegations, unfortunately, camouflage a subtle pointer in the verse. In Quran, wherever the entire creation is referred, the words 'earth and heavens' come together. But wherever the reference is not general but specific to either 'earth', heaven' or 'heavens', the related words are mentioned alone. In this verse, as the act of expansion is mentioned with 'the heaven' only, a less frequent

¹⁶ Denis Giron, 'Expansion of Universe in Quran and Bible'. This article was previously available at <http://geocities.com/denis_giron/zaariyaat-isaiah.html>. With the closure of geocities.com, I have not been able to find it on the web. However, I have saved a copy of the original article.

occurrence than 'earth and heavens', the verse seems to be corroborating a key part of science's current understanding of the universe, called metric expansion of space, which is supported by all cosmological experiments, astrophysics calculations, and measurements to date.

In the metric expansion of space¹⁷, the space itself changes rather than objects in a fixed 'space' moving apart into 'emptiness'. It is as if without objects themselves moving, space somehow 'grows' in between them. This is what is called Hubble expansion, the moving apart of all gravitationally unbound objects in the universe. The usage of 'earth and heavens' together at this place would have introduced an error as earth is not expanding, but in fact shrinking, a scientifically supported observation mentioned in another verse.

THE TIMELINE OF CREATION

Although, the Quran differs from the narrative of Genesis on the initial Big Bang event and the subsequent expansion of space, its division of the timeline of creation in six days¹⁸ is somewhat similar, albeit with a difference. In Genesis, the creation of earth, heavens, sun, moon, stars, plants, animals and man is mentioned to have occurred in a *clearly defined order*, while the Quran *does not lay down the details of each day* in any of the verses. The only clear statement it makes is regarding the creation or accretion of earth from the very beginning in two days and for producing its sustenance in four days.

Say: Is it that ye deny Him Who created the earth in two Days? And do ye join equals with Him? He is the Lord of the Worlds. [*Fussilat* 41:9]

He set on the (earth), mountains standing firm, high above it, and bestowed blessings on the earth, and measure therein all things to give them nourishment in due proportion, in four Days, in accordance with (the needs of) those who seek (Sustenance). [*Fussilat* 41:10]

DAYS OR PERIODS

This usage of the word 'days' in both Genesis and Quran, naturally raises the query as to how the 'days' mentioned in scriptures should be interpreted. In Quran, the Arabic word used for the day *yaum* is not necessarily limited to a single diurnal day. Linguistically, it can mean a day, as well as a period both. Its plural أَيَّامٌ '*Ayyam*' especially is consistently used for long periods. The same is true for the Hebrew *yaum*. The 'Old earth Society'¹⁹ takes up this stand and believes that the six days in Genesis

¹⁷ Metric expansion of space, From Wikipedia,

<http://en.wikipedia.org/wiki/Metric_expansion_of_space> 7 Nov 2008

¹⁸ [*Araf* 7:54; *Hud* 11:7; *Yunus* 10:3; *Furqan* 25:59; *Sajda* 32:4; *Qaf* 50:38 and *Hadid* 57:4]

¹⁹ 'Answers In Creation', Bringing the Bible and Science Together Without Conflict, Old Earth Belief <<http://www.answersincreation.org/old.htm>> (2 April 2009)

mean six long periods. The ‘Young Earth Society’²⁰ on the other hand does not accept this usage, and insists that the Creation of universe occurred in six days, about six thousand years ago. They explain the evidences of apparent vast age of earth through ‘flood geology’.²¹ But, among Muslim scholars, there is no such hardening of stances²² in this regard. The primary reason behind it is that apart from the traditionally accepted Arabic usage of *Ayyam*, there are also internal evidences in Quran, which suggest the existence of relative time periods in Cosmos.

Two verses state plainly that ‘Days’ of God are *different* from those of humans, and *imply* diverse time scales.

He rules affairs from the heavens to the earth: in the end will (all affairs) go up to Him, on a Day, the space whereof will be a thousand years of your reckoning. (As-Sajda 32:5)

The angels and the spirit ascend unto Him in a Day the measure whereof is (as) fifty thousand years: (Al-Maarij 70:4)

The existence of two *different* relative time periods relating to two diverse phenomena, establishes clearly that there is no *fixed* unit value for a ‘Day of God’ and the term implies simply a *long* period of different duration.

An additional point to note here is that had there been just a single verse in Quran instead of two, mentioning a specific relative time as equivalent to a ‘Day’ of earth, this latitude of interpretation would *not* have been available to us. The Muslim scholars and commentators would have felt no hesitation in *adopting that particular figure* of the relative time (1000 or 50,000 years) for the calculation of the periods involved in creation of heaven and earth. But because of this double usage, the possibility of this mistake has been avoided. The six *ayyam* of creation cannot be fixed²³ definitely and have been understood to represent long periods of varying length .

Can we find out what had happened in the ‘six’ periods, covering the evolution of cosmos from big bang till the accretion of earth and the birth of life and intelligence on it? Were these periods equal or unequal, and how exactly were they divided?

The Quran describes the creation of heavens and earth as a greater matter than the creation of man. Therefore, it is logical to assume that the time involved in the creation of stars and planets (divide in *two* periods), would also be greater than the subsequent time allotted for evolution of life and man on earth (divided in *four* periods).

²⁰ The Young Earth Creation Club <<http://www.creationists.org/>> (4 August 2009)

²¹ Flood Geology, Wikipedia <http://en.wikipedia.org/wiki/Flood_geology> (5 June 2009)

²² Not a single English Commentator of Quran, such as Yusuf Ali, Majid Daryabadi, Pickthal, Maaddodi, Arberry, Asad, Shakir, Sarwar, Khalifa, Hilali/Khan, H/K/Saheeh, Malik, Mohammad Ali, Qaribullah, QXP or Free Minds, have commented that the six days mentioned in Quran represent the diurnal day of earth.

²³ Note#1031, p-413, The Holy Quran, IFTA, Saudi Arabia.

SCIENTIFIC DIVISION OF THIS TIMELINE

Scientists divide this important period (from Big Bang to the accretion of stars and planets) into three major *phases* (or *days* as per the scriptural terminology) instead of two, but their division seems to have a different criterion than that of Quran. It is defined by the limitations that experimental abilities of the time places on human knowledge.

First phase of this division is the earliest classical space-time that can be conceived, the Planck epoch at 10^{-43} seconds after the Big Bang. At this instant, the universe was only 10^{-33} cm across, and its density was 10^{94} gm cm⁻³. Theory of Relativity predicts a singularity at this instant. This is a moment that is expected to remain forever beyond the experimental capabilities of physicists. Scientists can only speculate about the quantum processes at the Planck epoch, in their attempt to find answers about the origin of the Universe itself, but no one has a fully self-consistent theory about it as yet.

Second phase begins after the Planck epoch and extends to about one hundredth of a second after the Big Bang. This epoch covers temperature regimes, whose experimental understanding is at best partial at this time²⁴. This partial understanding requires reasonable *guess* work or extrapolation to hypothesise on what may have happened in this period.

Third phase extends from about one hundredth of a second after the Big Bang to the present day. Temperatures regimes are within the experimental capabilities of the modern age, and scientists can describe the processes reliably well.

STANDARD MODEL OF THE BIG-BANG

The 'standard model' explaining the final phase presents scientifically testable hypotheses regarding several crucial parts of the big bang, such as 'expansion of the Universe', 'origin of the cosmic background radiation', 'nucleosynthesis of the light elements', and 'formation of galaxies and large-scale structure'. The remarkable agreement of these predictions with the observational data has given the scientists considerable confidence in the model.

The twin bases of this 'standard model' are - projections from the mathematical model of big bang derived from the Einstein equations of general relativity, and knowledge of particle physics.

The size of Universe at particular time frames is calculated by putting the values of matter and radiation density of the early Universe, in the Einstein equations. These values are extracted via observations of the ancient light in our night skies reaching us from the past.

The other base - the knowledge of particle physics, is the result of a long journey

²⁴ High energy particle accelerators at CERN and Fermi Lab allow us to test physical models for processes which would occur only 0.0000000001 seconds after the Big Bang.

into the structure of matter itself. Peeling through it like the layers of an onion, physicists have discovered five levels of matter - the molecular, atomic, nuclear, hadronic, and the quark. At the rock bottom of this structure, they have encountered two dualisms - the mass energy dualism (mass is simply a form of bound energy) and the wave particle dualism (fields and particles are not distinct but complementary). Using the wave particle duality, physicists have tried to describe *everything* in the universe including light and gravity, as particles grouped under two categories – Fermions and Bosons. Fermions (electron, proton, neutron and quark) represent all the matter in the universe while the Bosons (photon, graviton, W and Z) represent particles which give rise to ‘forces’ between the matter particles.²⁵ These forces of interaction have been further divided into four types: gravitational force, electromagnetism, light nuclear force and strong nuclear force. This division incidentally is not something basic. Physicists hope to find a unified theory soon which will explain all the forces as different aspects of a single force.

The reason behind this optimism is that electricity and magnetism, which were considered to be two different forces, have been combined into electromagnetism about a century ago, while a few decades later, the ‘electromagnetism’ and ‘light nuclear force’ was also demonstrated to be part of a single ‘electroweak force’. An interesting aspect of this merger is that what appeared to be a number of completely different particles at low energies were actually found to be the same type of particle, only in different states. At high energies all these particles behaved similarly, but with the drop in temperature, the particles acquired different states, breaking their symmetry spontaneously, like the different states of water – steam, liquid water and ice.

In the evolution of universe, these two concepts - *unification at high temperature* and *phase transitions due to spontaneous symmetry breaking with the fall in temperature* - seem to have played key roles.

The general picture is that the early universe was filled homogeneously and isotropically with an incredibly high energy density and concomitantly huge temperatures and pressures. At the Planck epoch, all the four fundamental forces had the same strength, and possibly existed unified as one fundamental force. As the universe expanded and cooled, it went through phase transitions, analogous to the condensation of steam or freezing of water as it cools. These phase transitions created the universe as we know it.

Physicists claim that first to separate from rest of the fundamental forces of interaction in this hot and ultra dense brew, was gravity. Then, as the universe expanded and cooled, the strong nuclear force also separated from the electroweak force, breaking the ‘Grand unification’.

As the universe continued growing in size, the temperature further dropped. At a

²⁵ Standard Model of Fundamental Particles and Interactions Chart, Contemporary Physics Education Project <<http://pdg.ge.infn.it/particleadventure/frameless/chart.html>> (15 Feb 2010)

certain temperature, by an as-yet-unknown transition, the quarks and gluons combined into protons and neutrons, somehow producing the observed asymmetry between matter and antimatter. Still lower temperatures led to further symmetry-breaking phase transitions that put all the forces and elementary particles into their present form. At about hundred seconds after the Big bang, some protons and neutrons combined to form the universe's deuterium and helium nuclei in a process called Big Bang nucleosynthesis. *The nucleosynthesis ended when the universe was three minutes old.*

The universe expanded and cooled further for thousands of years till matter gradually stopped moving relativistically. After about 70000 years, the rest mass energy density of the universe came to gravitationally dominate that of radiation. And after more than 300,000 years, the temperature came down to such a level that electrons and nuclei began combining into atoms, mostly producing hydrogen. This caused the density of universe to fall. The universe which was opaque till now, became transparent. The radiation decoupled from matter and began streaming through space, largely unimpeded.

Over time, the slightly denser regions of the nearly uniformly distributed matter gravitationally attracted nearby matter and thus grew even denser, forming gas clouds, stars, galaxies, and the other astronomical structures observable today.

PREDICTIONS OF THE STANDARD MODEL

The standard Big Bang model has been fairly successful in describing the evolution of the universe as some of its important predictions have been confirmed through observations. For example –

1. Theoretical calculations for the nuclear processes few seconds after the Big Bang that resulted in the synthesis of free neutrons and protons into the light elements (e.g. deuterium D, helium-3, and helium-4), predict that about a quarter of the Universe should consist of helium-4. *The current stellar observations corroborate this result.*
2. Hot Big Bang model also predicts that at a certain juncture (about 100,000 years after the Big Bang), when temperature of the Universe must have dropped sufficiently for electrons and protons to combine into hydrogen atoms, the energy would have decoupled from the matter. This radiation, unable to interact effectively with the background gas, should have been propagating freely ever since in the space. With its wavelength being stretched by the expansion of the Universe, such radiation must have lost its energy ever since, but would still be detectable as the faint echo of the Big Bang.

Discovery of this relic radiation by the two researchers in 1967, established the big bang model. The cosmic microwave background, which was originally estimated to be about 3000K has now been measured as 2.7K only.

PROBLEMS IN THE STANDARD MODEL

To understand any work based on science and religion interface, the awareness of different scientific models along with their problems, suggested solutions, and further investigative work in this regard is essential as only then can the hints from the verses be understood and intelligently utilized.

Despite the self-consistency and remarkable success of the standard Hot Big Bang model, several unsolved problems regarding the initial state of the universe, still remain.

The first such problem is related to the structure of the Universe. If the space is maximally symmetrical, meaning that space at every point looks the same in all directions, then space has to have constant curvature. Such a constant curvature can have only three options for the geometry of space: positive, negative or zero curvature. The positive curvature represents a closed Universe, where space expands from zero volume in a Big Bang, reaches a maximum and then contracts back to zero volume in a Big Crunch. The negative curvature represents an open Universe, where space has infinite volume and remains expanding forever in time. The zero curvature on the other hand, also represents an open Universe, but here the space is flat, non-compact, and extends infinitely in any direction. It also implies an eternal expansion of space in time.

The expanding Universe as observed today, seems to have enough energy density to make it appear flat, or in scientific parlance, to have zero spatial curvature. But this observation suggests another problem. The Einstein equation predicts that any deviation from flatness in an expanding Universe filled with matter or radiation will only get bigger as the Universe expands. So any deviation from flatness at a much earlier time, even a tiny one, would have grown very large by now. If the deviation from flatness is very small now, *it must have been immeasurably small at the start of the part of Big Bang*. So, the real query is, how could the Big Bang start off with such immeasurably small deviations from flat spatial geometry or with values so close to the unstable critical value between perpetual expansion, and then re-collapse into a Big Crunch?

The second problem is that the universe appears to be unfathomably uniform. From one edge of the visible universe to the other, the microwave background radiation filling the cosmos is at the same temperature everywhere. When one considers the fact that the two edges are nearly 28 billion light years apart, and that our universe is only 14 billion years old, and since *nothing can travel faster than the speed of light*, then the query arises as to how the heat radiation could have travelled between the two horizons to even out the hot and cold spots created in the big bang, and leave the thermal equilibrium we see now? This difficulty is known as the horizon problem.

The third problem is that Particle theories predict the existence of exotic particles like magnetic monopoles (magnet with only one pole) from the symmetry-breaking phase. The relativity theory tells us that the Big Bang should have produced a lot of

them, enough to make one hundred billion times the observed energy density of our Universe. But so far, physicists have been unable to find even one.

The density fluctuation of the early universe is also difficult to explain. The perturbations that gravitationally collapsed to form galaxies must have been primordial in origin. Scientists are not sure as to where they arose from.

INFLATIONARY UNIVERSE

Surprisingly, all these problems get resolved if we assume that a phase transition at the very beginning caused the universe to experience exponential growth. In this Inflation model, our Universe starts out as a rapidly expanding bubble of pure vacuum energy, with no matter or radiation. After a period of rapid expansion or inflation, and rapid cooling as a consequence, the potential energy in the vacuum is converted through particle physics processes into the kinetic energy of matter and radiation. The Universe heats up again and we get the standard Big Bang. If this phase occurred *before* the radiation-dominated era, then the Universe could evolve to be extraordinarily flat *when* the radiation-dominated era began. With such an extraordinarily flat beginning, the lumpy evolution of the radiation- and matter-dominated periods would be consistent with the high degree of flatness that is observed today.

This model also solves the horizon problem. In an inflationary phase, the space itself is predicted to undergo rapid expansion; therefore light travels faster than its optimum limit and gets farther. Thus light could have crossed the whole Universe by the end of the inflationary period, and so the isotropy of the radiation from the Big Bang would no longer be inconsistent with the speed of light limit.

In the particle physics that underlies the inflationary idea, there would also be only one magnetic monopole per vacuum energy bubble, which means only one magnetic monopole per Universe. Thus, it solves the magnetic monopole problem too. It is also suggested that during inflation, the seeds of structure formation were laid down in the form of a primordial spectrum of nearly-scale-invariant fluctuations.

It is because of all this inherent promise that cosmologists consider the inflationary universe theory as the most favoured pre-Big Bang cosmology.

PROBLEMS WITH INFLATIONARY UNIVERSE

Unfortunately, despite the solutions and promises, inflation as described, is far from an ideal theory. It is too hard to stop the inflationary phase, and the monopole problem has other ways of resurfacing in physics. Many of the assumptions that go into the model, such as an initial high temperature phase and a single inflating bubble, have been questioned and this has given rise to the development of alternative models.

Today's inflation models have tried to address these problems and have evolved beyond the original assumption of a single inflation event having given birth to a single Universe. These alternative models feature scenarios where universes nucleate

and inflate out of other universes, in the process called eternal inflation.

OTHER PROBLEMS

Other problems also exist that do not have their solution in an inflationary universe, such as the baryon asymmetry (presence of more particles than antiparticles) in the universe. Cosmologists have confirmed that the universe is predominantly made of matter and is not split into separate regions of matter and antimatter.

Another problem is the difference between the estimated mass needed to keep the average galaxy from flying apart, and the presence of enough visible matter in the form of stars and interstellar gas in the universe. It is now widely believed by physicists and astronomers that most of the matter in the Universe which is holding the galaxies together gravitationally is *invisible*. It is called dark matter and no one really knows what this dark matter really is. Nucleosynthesis calculations suggest that the dark matter of the Universe does not consist of ordinary matter - neutrons and protons. Some researchers tend to think that dark matter could consist of super-symmetric particles that are very heavy but couple very weakly to the particles observed in accelerators now.

A different problem is that the presence of dark matter, though sufficient to hold the galaxies, *is not enough to close the Universe*. Recent measurements show that the share of dark matter is only about 26% of the total of closure density; the normal matter in the form of gas and stars adds up to 4%, and the rest 70% of the Universe is dominated by a *mysterious* source of energy, called the *dark energy*.

No one as yet knows the exact nature of dark energy, and an unveiling of this mystery will most probably reveal new physics. Nevertheless, a few characteristics of this dark energy can be outlined. This energy acts as a repulsive force or is anti-gravitation. It does not cluster like matter but is distributed homogeneously in the Universe. It is seen as responsible for the acceleration of the Universe today, and is probably related to a vacuum energy density.

Thus, although the Big Bang began with a radiation dominated era, the dominant forms of energy in our Universe *now* are *matter* and *vacuum energy*. Second, the latest measurements support a flat Universe which is expected to expand forever. Third, some mysterious energy is making the expansion of the Universe accelerate in time. Fourth, studies of galactic motion show that ordinary visible matter in stars, galaxies, planets, and interstellar gas makes up only a small fraction of the total energy density of the Universe, and most of the matter in the Universe is dark matter.

STRING THEORY – A POSSIBLE SOLUTION²⁶

The scientific perspective outlined above makes it clear that the standard model of

²⁶ John M Pierre, SUPERSTRINGS Home Page <<http://www.sukidog.com/jpierre/strings/>> (17 Aug 2008)

particle physics, though fairly successful, is still unsatisfactory and there are many theoretical reasons to expect some physics beyond the Standard Model in this millennium.

It is very likely that this new understanding will make the Standard Model appear as primitive and incomplete as scientists now find the atomic model that described physics and chemistry at the end of nineteenth century. Nevertheless, as atoms, Maxwell's equations and Newtonian gravity still have some relevance and utility today, scientists also expect that any new theory developed in this millennium will have the Standard Model embedded within it.

Many theorists believe that the underlying theory of everything that resolves all the open problems of the Standard Model will be provided by some incarnation of string theory. This is an apparently consistent quantum theory of gravity that requires super-symmetry and is rich enough to accommodate a grand unified theory. String theory embodies a very high degree of symmetry that extends and generalizes both the symmetry of the Standard Model as well as the general coordinate invariance of general relativity. It is a mesmerizingly beautiful theory that has already provided us with many elegant mathematical insights, and continually promises to revolutionize our vision of the geometry of space-time.

According to the String theory, there are no elementary particles but only pieces of vibrating tiny one dimensional strings. And each of their vibration modes corresponds to a different particle representing all the matter and forces of nature, including gravitational force represented by Gravitons. Thus it allows us to calculate the probability of transitions from one quantum state to other involving gravitons without encountering the infinities and anomalies that have plagued all previous attempts based on applying ordinary quantum field theory to Einstein's general relativity.

The point to remember here is that the strings are not "made of" anything: they are the *fundamental constituent of matter*. They appear in the form of carrying energy, resulting from the symmetry-breaking phase transition in the early universe.

A peculiar problem of this theory is that the only consistent framework to describe those strings implies a 10-dimensions world in which 6 dimensions are curled up into a small compact space, a tiny 'ball' of 6-dimensional space about 10^{-33} cm across, associated with every point in our 4-dimensional universe. Owing to the scale, their direct detection is not easy, but these extra dimensions are the ones which determine the properties of the world we live in. The larger (3+1)-dimensions are what we perceive as the ordinary space and time.²⁷

Another problem is that physicists have found five mathematically consistent Superstring theories. Although each one of them was competing for the title of the theory of everything, each seemed to represent a small island somewhere on a world of its own, and difficult to explore due to the lack of proper tools. Fortunately, over

²⁷ Leonard Susskind, 'Superstrings', *Physics World* November 2003 p 29-35

the years, techniques have been developed to explore these theories more thoroughly, and this exploration has demonstrated that the five string theories are actually *different islands on the same planet*. Thus, there seems to be an underlying theory of which all string theories are only different aspects. This has been called M-theory, where M has various connotation, such as, Magic, Mystery, Mother of all theories or even an inverted W, the initial of Witten, the name of the scientist who has proposed this theory. An island found on the M-theory planet corresponds to a theory that lives not in 10 but in 11 dimensions. It seems to tell us that M-theory should be viewed as an 11- dimensional theory that looks 10-dimensional at some points in its space of parameters. Such a theory could have as a fundamental object a Membrane, as opposed to a string. Like a drinking straw seen at a distance, the membranes would look like strings when we curl the 11th dimension into a small circle. Another problem with M-theory is that although its equations may be unique, it has billions and billions of different solutions, each dictating a possible environment having its own laws of physics, its own elementary particles and its own constants of nature. Even the number of space-time dimensions is expected to be different.

To explain our particular universe, physicists had long hoped for the discovery of some selection principle that could pick one valley in the landscape - and that that valley would be our universe. But till now, this selection principle has proved to be a mirage.

An alternative answer to what makes our universe so special might be the anthropic principle, which says that we are here to observe it only because that world is fine-tuned for it. Unfortunately, many physicists remain dogmatic in their thinking that the anthropic principle is uncomfortably close to intelligent design.

INFORMATION FROM THE QURAN REGARDING CREATION

Consequent to the verses, which have already been quoted on the subject of creation, additional information is presented here. Through the use of unusual compositions and enigmatic words, these verses communicate some of the concepts on creation very clearly, while a few of the hints they provide remain unclear. The attempt here is to present an idea of what the Quran is actually saying, rather than to rationalize the meanings of words, so that the researchers who are working on these topics, may understand the hints better, if not today, then sometime in the future. The most important need of this exercise is to understand the Arabic terms used and how these were understood by early scholars.

TERMS USED IN QURAN FOR CREATION

The Quran has used several words in association with the act of creation, giving different nuances to meanings conveyed. Some of these words are *khalaqa*, *badaa*, *jaala*, *qada*, *amr* and *fatara*. The most frequent word used is *khalaqa* for creation in general.

It has been used at least 32 times in association with the creation of 'heavens and earth'; and 3 times [*Luqman* 31:10, *Al-Mulk* 67:3, *Nooh* 71:15] with the creation of

'heavens' only. The English word 'creation' does not convey the full connotations of the original. The *khalafa* implies 'creation with the idea of measuring and fitting it into a scheme of other things'. If we look at the referred verses afresh with this connotation in mind, all the 32 statements acquire a depth which can not be fully communicated through a translation.

Another word is *bada*. It means to begin and commence. When this word is used with *ain*, it becomes *bada'a*, which means to originate, to do a thing for the first time, the primal creation. The Quran has used this word with 'heaven and earth' twice [*Al-Baqarah* 2:117, *Al-An'am* 6:101].

To Him is due the primal origin of the heavens and the earth: When He decreeth a matter, He saith to it: "Be" and it is. [*Al-Baqarah* 2:117]

Third word in this regard is *Jaa'la*. It implies making of new shapes and forms, new dispositions etc. The Quran has not used this word with the creation of heavens, but it has been used extensively (235 times) with the creation and making of *other* things in the 'heavens and earth'.

Two other words, used with reference to creation of 'heavens and earth' in Quran are *qada* قَضَا and *amr* أَمْر.

In the verse from *Sura Fussilat* - He **completed** them as seven firmaments in two Days and He assigned to each heaven its **duty and command**, both words *qada'* and *amr* have been used. [*Fussilat* 41:12].

The dictionary lists the meanings of *qada* قَضَا - to decide, resolve, order, prescribe, complete and to execute etc. Here it has been translated as 'completed'. The *amr* أَمْر on the other hand implies edict, command, direction and order, and has been translated as 'duty and command' in the verse.

The two other words *sawwa* and *fatara* with respect to creation have been discussed ahead in detail.

THE MULTIPLICITY OF HEAVENS

Another important assertion of Quran is regarding the multiplicity of heavens in the universe. In English translations of scriptures, the word 'heaven' has often been used for 'sky' and 'Paradize' both. The Arabic Quran however makes a clear distinction between these two terms. For earthly gardens and Paradize, the word used is *Jannat*, which literally means a concealed place, and for the sky around us, the term is *sama*.

The plural word *samawat* سَمَاوَاتٍ, translated as 'heavens', has been mentioned 190 times in about 175 verses of the Quran.

These heavens are 'seven' in number [*Al-Baqarah* 2:29; *Al-Israaa* 17:44; *Al-Muminun* 23:86; *Fussilat* 41:12; *At-Talaq* 65:12; *Al-Mulk* 67:3 & *Nooh* 71:15]; and have been stated clearly to exist 'one above another' [*Al-Mulk* 67:3, *Nooh* 71:15].

The significant point here is that the repetition of 7 heavens in such large numbers, confirms the Quran's stance on the existence of a *more complex* universe than the four dimensional space-time of physicists. The huge number of such

mentions also *precludes* the possibility of *interpretational error*. Moreover, an unusual factor in this regard is that the Quran *does not mention each heaven individually*. There are no stories of iconic characters moving between different heavens *in the Quran*; and absolutely *no references* to first, second, third, fourth or any of the other heavens *except a single heaven*.

The *Hadeeth* records do mention details about the Prophet's nocturnal journey or *isra*, where he moved between different heavens, met different prophets and was shown Hell and Paradise spread over seven heavens²⁸, but no such details about the *isra* are present in the Quran. The only reference to the incidence is found in the first verse of *sura Al-Israaa*.

Glory to (Allah) Who did take His servant for a journey by night

From the Sacred Mosque to the farthest Mosque,

Whose precincts We did bless, - in order that We might show him some of Our signs: for He is the One Who heareth and seeth (all things). [*Al-Israaa* 17:1]

From all the references, what comes out clearly is that the verses of the Quran mention either seven heavens collectively or a single heaven, and this important heaven is referred everywhere as *as-samaa* السَّمَاءُ - *the heaven*. In fact, it is so ubiquitous that it has been mentioned 118 times out of 120 references, where the word سَمًا *sama* (heaven) is used in *singular*, in comparison with *samawat* (heavens), its plural. The two exceptions are the verse [*Hud* 11:44], where يَا سَمَاءُ *ya samao* - 'O heaven!' is used, and the verse [*Fussilat* 41:12], where all the three words سَمًا *sama*, السَّمَاءُ *as-sama* and سَمَآوَاتِ *samawat*, are included in the same verse in different context.

Traditional understanding of scholars is that above the earth lies heaven, which God has divided into seven layers at the time of creation. The layer closest to the earth is the one visible to us directly, while other layers lie progressively distant from us. Therefore, commentators believe that when Quran refers to *as-sama* or *samawat*, the object of address includes heavens above us, irrespective of whether the word used is singular or plural. It is because of this understanding that English translations do not adhere faithfully to the usage of singular and plural of the Arabic original in this regard (examples of such usages have been given ahead).

Maulana Maududi, a renowned Muslim scholar has discussed the problem involved in the interpretation of heavens. He says: "It is difficult to explain precisely what is meant by the 'seven heavens'. In all ages man has tried, with the help of observation and speculation to conceptualize the 'heavens', i.e. that which lies beyond and above the earth. As we know the concepts that have thus developed have constantly changed. Hence it would be improper to tie the meaning of these words of the Quran to any one of these numerous concepts. What might be broadly inferred from this statement is that either Allah has divided the universe beyond earth into

²⁸ Miguel Asin, *isra* in 'Islam and the Divine Comedy' (Goodword books, New Delhi – 13)

seven distinct spheres, or that this earth is located in that part of the universe which consists of seven different spheres."

The opinion of the non-Muslim scholars on this topic is also understandably confused. *None of the Books of Bible mention the creation or existence of seven heavens.* The word though has been referred to in singular and plural both. Only in 2 Corinthians 12:2, Paul mentions a third heaven but that reference is also vague – 'I know a man in Christ who fourteen years ago was caught up to the third heaven. Whether it was in the body or out of the body I do not know – God knows.' The Books of Bible also do not differentiate clearly between the physical heaven (sky) and the spiritual heaven (*Jennat* or Paradise). We have also seen that the Jewish people regarded the heavens as a solid vault, arched over earth, with stars fastened on its surface.

It is for these reasons that information about seven heavens in Quran is thought to have been borrowed, not from the Bible, but the more ancient Greek and Persian sources. The problem of accounting the mix up of information from Judeo Christian and ancient sources of Greece, Persia and Babylonia, has been resolved via attributing this information to the lower literacy level of the Prophet Muhammad.

Unfortunately no serious effort has been done by scientists to study the original words of Quran. The data outlined ahead demonstrates amply that the information on the 'creation and fate of universe' in Quran is much more complex than previously thought of, consistent with itself, and extensive. *It guides towards the picture of a Super String based, cyclic, 10-dimensional Universe, teeming with life and intelligence and unfolding according to an ultimate 'mother of all programs'.*

THE TIMELINE AS PER QURAN

Continuing the information from *sura Fussilat*, where accretion of earth in two days [41:9], and for producing its sustenance in four days [41:10] is mentioned, two more consecutive verses [41:11, 12] of the same group are presented here that further elaborate the first two days of creation.

Moreover He comprehended in His design the sky, and it had been (as) smoke: He said to it and to the earth: "Come ye together, willingly or unwillingly." They said: "We do come (together), in willing obedience." [*Fussilat* 41:11]

So He completed them as seven firmaments in two Days; and He assigned to each heaven its duty and command. And We adorned the lower heaven with lights, and with guard. Such is the Decree of the Exalted in Might, Full of Knowledge. [*Fussilat* 41:12]

MAKING THE UNIVERSE UNIFORM

The above verse [*Fussilat* 41:11] as per Yusuf Ali's translation has four components. First tells us - 'He comprehended in His design the sky'. This statement is the translation of *استَوَى إِلَى السَّمَاءِ istawa ila assama*. Surprisingly, the meaning of *istawa* is not understanding or comprehension. The dictionary lists the meanings

of اِسْتَوَى *istawa* as making things equal, parallel, uniform etc. [Steingass], or achieving balance. The ‘equator’, an imaginary line, which divides the earth equally and uniformly between north and south hemispheres, is called *khattu-l-istiwa* in Arabic as *khat* means a line. *Lughat Al Quran* informs us that as per convention, when *istawa* is used with two (or more) objects, it denotes an act of introducing equality, harmony or uniformity between them. But when the object is single, it signifies an act of achieving stability and balance for the object.

In Quran, *istawa* has been used fifteen times; eleven times in association with the preposition *Aala*, meaning ‘on’ or ‘over’, twice with the preposition ‘*lla*’, which points the direction of action towards the object; and twice without any prepositions.

Out of the eleven references using the preposition *Aala*, four are easy to understand. In *Sura Hud* [11:44], the usage is - *waistawat AAala aljoodiyyi* – And it (Nooh’s Ark) stabilized/settled on Mount Judi; in *Sura Muminoon* [23:28] *Fa-iza istawayta anta waman maAAaka AAala alfulki* – And ‘when thou hast stabilized/settled on the boat - thou and those with thee’; in *Zukhuruf* [43:13] *Litastawoo AAala thuhoorihi* – so that ye may stabilize/settle on their backs (animals under your command); and *Al-Fat-h* [48:29] *faistawa AAala sooqihi* – so it stabilizes on its own stem.

The usage of *istiwa* at six other places [*Araf* 7:54; *Yunus* 10:3; *Rad* 13:2; *Furqan* 25:59; *Sajda* 32:4; and *Hadid* 57:4] with *Aala*, is comparatively difficult to understand. The expression used is same - *summa istawa AAala alAAarshi* – ‘then stabilized on/over the throne’. These words follow the description of the completion of creation. The problem comes from the fact that we do not know what exactly is God’s throne? Is it a static object like a king’s throne or a dynamic mechanism for administration of the universe? Moreover, what is God and how does He act? All these questions have been discussed in detail ahead, under the chapter ‘How God governs the universe’.

The seventh reference [*Ta-Ha* 20:5] has a different order of composition. In this verse, the reference is unambiguously towards ‘The Beneficent on the throne’, and *istawa* or stabilizing is mentioned *after* the throne - *Alrrahmanu AAala alAAarshi istawa*.

Out of the four remaining references, in two verses, *istiwa* is used without any preposition. In *Qasas* [28:14], the words are *Walamma balagha ashuddahu wa-istawa* – When he (Moses) became strong in maturity and stabilized (in life); and in *sura An-Najm* [53:6,7], an encounter is described with Holy Spirit - *Thoo mirratin faistawa* - Endued with Wisdom: so he stabilized, *Wahuwa bial-ofuqi al-aAala* - while he (Jibril) was in the highest part of the horizon.

The last two references mention *istiwa* with *as-sama* – the heaven [*Baqr* 2:29; *Fusilat* 41:11]. The usage here involves a different preposition - ‘*lla*’, which points the direction of action (stabilizing) towards the object (the heaven).

The point that emerges from all this usage is that if we interpret the word *istiwa* as an act of ‘stabilizing or balancing’, the statement *istawa ila assama* would mean *He*

stabilized or balanced the heaven or made the heaven uniform and homogeneous.

Such a statement corroborates the cosmologist's view point about the early universe, and the act of stabilizing may point towards an *end to the act of rapid inflation perhaps.*

Several commentators have understood *istawa* as an act of climbing to get settled (e.g. on the throne or on the top of hill). This understanding has resulted in the interpretation of *istawa ila assama* as 'He turned to the Heaven' (Pickthal); He lifted Himself to heaven (Arberry); He directed Himself to the heaven (Shakir) etc.

A CRUCIAL STAGE IN THE TIMELINE

After the hint about making the heaven homogeneous, the next component of the verse [Fussilat 41:11] - and it had been smoke - *wahiya dukhanun* - is also peculiar. *Wa* means 'and', *hiya* - 'it', while دُخَانٌ *dukhan* is translated as smoke.

There are four important points to be noted here. The prepositions that have been used confirm that *As-sama* - 'the heaven' is being referred to here as 'smoke'. Second, the smoke represents a hot gaseous medium with matter particles present in it; therefore, this word is allegorically most suitable to represent a stage when extremely high temperature of the Universe had dropped sufficiently for formation of matter particles in it. Third, with the formation of matter particles, the opaque universe must have started to get transparent, but it was still closely packed, and scientists have described this state as similar to fog. Aply, one of the derivatives of the word used, *dakhan*, signifies such a change, represented by dusiness, or dinginess inclining to blackness (Lane). Fourth, the Big Bang model predicts that at this stage, as the electrons and protons had begun to combine into hydrogen atoms, decoupling the matter and energy, the radiation unable to interact effectively with the background gas, must have begun to propagate freely from *this time onwards*, losing its energy with the expansion of Universe.

It was the discovery of relic radiation *from this crucial stage* described in this verse that finally managed to establish the big bang model. Therefore this component of the verse is describing another important stage in the timeline.

THE GRAVITY FACTOR

The third component describes the communication of an instruction - *faqala laha walil-ardi i/tyia tawAAan aw karhan*. The words have been translated as - "He said to 'it' and to the earth: 'Come ye together, willingly or unwillingly'."

As the matter began to form, gravity must have started to play its role. In most of the translations of this component, few crucial subtleties remain missing. The word *fa-qala* means 'thus was said'; and in لَهَا (*laha*), the *ha* is an attached pronoun representing her/it, prefixed by the preposition *lam* - which represents 'for'. The word لَهَا (*laha*) thus is not a simple 'it'. The term instead represents - 'for it'. Likewise, the words *walil-ardi* وَلِلْأَرْضِ also means 'and for earth' and not simply 'to earth'. The addition of *lam* changes the picture. The instructions are not for a pre-existing earth

and 'it' to come to God willingly or unwillingly. The communication seems to be directed towards the portions of matter (*dukhan*) allotted 'for earth' and 'for it (the matter)' that ultimately accreted to become stars and planets. Such an 'instruction' to *specific group* of matter particles, suggests that the *seeds of structure formation were already present at this stage* and perturbations were simply directed to gravitationally collapse to form gas clouds, galaxies, stars and planets. In this regard, we should remember that the force of gravitation was making the matter 'willing', while the force of dispersion (whatever be its source - the dark energy, Einstein's cosmic constant or something else) was making it 'unwilling'.

The last component of this verse - *فَالْتَأْتَيْنَا طَائِعِينَ* - *They said: "We do come, in willing obedience"* is indicative of the fact that it was the gravitational force which actually prevailed in such cases. The third and fourth component of verse thus presents another hint for scientists regarding the timeline of creation.

With this dialogue, an important point to remember is that the Quran does not corroborate that man has been created in the 'image of God'. Therefore, the God should not be visualized as an older majestic version of man, sitting on a throne, and instructing the earth and the skies to come to Him. The subtle and unique concept of Creator is discussed in detail ahead, along with the probable presence of 'series of instructions', unfolding the universe as per a program, and originating in Creator.

'THE NEXT PART OF TIMELINE'

The next verse of the group reveals further significant information -

So He completed them as seven firmaments in two Days; and He assigned to each heaven its duty and command. And We adorned the lower heaven with lights, and with guard. Such is the Decree of the Exalted in Might, Full of Knowledge. [*Fussilat* 41:12]

The beginning of this component of the verse through *fa* – (Thus/So), which ties up with the accretion of matter in the previous verse, clarifies that *completion* of seven heavens, along with the accretion of earth and other structures of universe, and allotment of command (*amr*) for each heaven, all occurred in *two* periods. The significance of this information is that it points us a dividing line at which the two periods ended, and the next phase began for producing the sustenance on earth in four periods.

The next statement - '*And We adorned the lower heaven with lights, and with guard*' – reveals three important hints. First, it identifies a single important heaven out of the seven heavens, calling it *السَّمَاءُ الدُّنْيَا* *assamga addunia*. Second, it tells about beautification of this particular heaven with lights; and third, the existence of protection in this heaven. Discussing each hint individually we find more information emerging from these pointers.

‘THE HEAVEN’ - ‘THE WORLD OF OUR EXISTENCE’

As mentioned already, the verses of the Quran refer either to seven heavens collectively or to a single important heaven – *as-samaa* السَّمَاءُ - *the heaven*. Significantly, in this verse and two others, this heaven has been mentioned along with another word الدُّنْيَا *ad-dunia*, which means *the world of your existence, the area where you live, the area around you*. The Quran calls the ‘life of this world’ as *hayat ald’dunia*, where *hayat* means life. In comparison with afterlife (a superior existence in terms of duration and gifts), *dunia* is considered a meaner place. Some identify the word *dunia* with planet earth, but it is not so. The Arabic word for earth is *ardh*. If a person’s existence is based on the moon, his *dunia* will be around him, with the lunar base as its centre.

The usage of السَّمَاءُ الدُّنْيَا *assamaa addunia* without any linking prepositions and repeated three times in the Quran, is important. The presence of a preposition defines the meaning. A preposition like *alaa* meaning ‘over’ or ‘above’ would have clarified its meaning as the ‘sky above or over your world’, but without any defining preposition, the word *ad-dunia* itself becomes the qualifying word for this particular ‘heaven’.

Accepting the meaning of *dunia* as *the area around you or closer to you*, the majority of commentators (Yusuf Ali, Asad, Shakir, Khalifa, Saheeh, Malik, Hilali, George Sale, Rodwell & Muhammad Ali) have translated the two words variously as ‘lower’, ‘lowest’ or ‘nearest’ - heaven. Significantly, implicit in this understanding is the traditional belief that earth is a surface on which a person is standing, and seven heavens exist *above it* like canopies, one *over* another, with only the *nearest* heaven visible to us. However, such a view raises queries that need rational answers. What is the boundary of this heaven; how distant the nearest canopy is from us and how thick is this canopy? Judeo Christian view was that the heaven was a solid (crystal) vault, figured like a hemisphere, and arched over earth. Regarding the distance, they believed that it was so near ‘that birds may rise to it and fly along its expanse’. Early Muslim commentators had accepted the view of Jewish scholars with the additional belief that ‘there are seven such domes one over another’.

The problem here is that the exact words of Quran do not seem to support a flat earth or a geo-centric universe, popular concepts of the time. Mentioned as shaped like an egg of the ostrich [An-Naziat 79:30]²⁹, an obvious question in this regard is that if the earth is a sphere and the space *surrounding* us is the heaven, why do we then *exclude* the earth from the *as-sama* enveloping us, especially as *no* linking preposition like *alaa* (over or above) exists between the words *assamaa addunia*, to tell us clearly that the heaven lies over the earth?

For most of us, who are habitual of comprehending sky as a canopy *over our heads*, it is difficult to grasp this idea, but equating *ad-dunia*, with the ‘heaven’, the

²⁹ The shape of earth as per Quran is discussed ahead - JA

verse seems to tell us that apart from 6 heavens, we have a *seventh*, which is *ad-dunia* (*dunia* prefixed by the article *al*), the very place of our existence, the 4-dimensional space-time, which includes our earth and extends around it till the end of universe. It is this 'heaven', which has been beautified with lights and protection.

'And We adorned the heaven - the world of your existence with lights, and with guard'.

The scholars connected with 'Understanding Islam' have an interesting comment in this regard -

'It seems that the huge universe that we live in, the one whose boundaries are not yet known to man, is just one of these heavens (universes) there are seven others, of which we -- with all our scientific developments -- do not know anything about. Certain verses of the Quran clearly indicate that the whole huge mass of space around us is just one of these universes...' ³⁰

BEAUTIFICATION OF THE HEAVEN

Regarding beautification of *as-sama* (the heaven) with lights, the original Arabic words are زَيْن *zain*, which means to adorn, to beautify, and مَصَابِيح *masabeeh* - the plural of *sabeeh*, the burning sources that produce light and heat.

If we reflect on the information given, several significant pointers emerge. First, the word *masabeeh* is not a dual plural but signifies *more than two* burning sources. The reference therefore is not to the obvious pair of lights in the sky - the sun and moon. It is the stars which are being referred here including our own sun. Second, instead of using the usual term *kawakib* for stars, *masabeeh* has been used, signifying clearly that these stars are the producers of light. Third, a human source, describing the provision of lighting in the sky, above the earth, should logically have pointed to the presence of sun (*Shams*) and moon (*Qamar*) primarily; or the sun, moon and stars altogether; but by *excluding* the two major sources of light, the verse seems to have discarded the terrestrial perspective. By mentioning stars alone, the so called luminous mass, the verse is describing the beautification of *as-sama*, the space-time, extending over close to 30 billion light years across. Fourth, such information should not be dismissed lightly by claiming that prior scriptures like Bible too have mentioned 'lamps in the sky' and therefore the information has been obviously plagiarized from Bible. To resolve the charge of plagiarism, which is often repeated casually, similar Biblical verses should be closely studied for *comparing* the information content, such as those describing the stars as small lamps attached to the Firmament [Daniel 8:10, Matthew 24:29, Mark 13:25, Revelation 6:13, 8:10, 9:1 and 12:4]. The *inclusion* of information in the Bible, such as - 'Then another sign appeared in heaven: an enormous red dragon with seven heads and ten horns and seven crowns on his heads. His tail swept a third of the stars out of the sky and flung them to the earth' Revelation

³⁰ What about Seven Heavens? Understanding Islam <<http://www.understanding-islam.com/rq/q-014.htm>>, (15 Feb 2010)

[12:3,4]; and *exclusion* of this information from the Quran, shows that the belief in 'plagiarism from an earlier source' is incorrect in this case, and a 'common source hypothesis' should be preferred between two scriptures.

BARRIERS OF PROTECTION

The third hint is regarding the barriers of protection. The original word حَفِظَ *hiftha* means to guard and protect. The information about barriers of protection in the space-time may imply several protections, from light speed barrier and huge distances to numerous other energy barriers around stars and planets.

A SURPRISING SIMILARITY

The super string theory for explanation of the origin and structure of universe is the only theory which needs 10 or 11-dimensions world for mathematical consistency. The larger (3+1) - dimensions in it are the ordinary space and time, while the extra 6 or 7 dimensions have been speculated to exist as curled up into a small compact space associated with every point in our 4-dimensional universe.

The points to note here is that the Quran does not specifically state that the universe has 10 or 11 dimensions. It only informs us that God has created *seven* heavens, and out of these, *one* is the *world of our existence*. It is our modern scientific understanding that this 'heaven' - the 'world of our existence' has four dimensions - three of space and one of time, making a total of ten dimensions (6+4).

This important heaven is referred at all places as *as-sama* - *the heaven*, and has been unambiguously identified with our world, in at least 3 verses of Quran [*As-Saffat* 37:6; *Fussilat* 41:12 & *Al-Mulk* 67:5].

The Quran also tells us that all heavens exist '*one above another*' [*Al-Mulk* 67:3, *Nooh* 71:15]. The original word translated as 'one above another' is طَبَقَ *tibaq*. The dictionary lists the meaning of its root as cover, veil, close, fold up; and its variants *tabq*, *tabaq*, - be shortened, curtailed, cling to the side, be closed; *tatbiq* - cover entirely, provide with a lid, fold up, close the hands, pile up in layers, make one thing fit another etc. The meanings seem to broadly corroborate the String theory explanation, which tells us that the extra dimensions lie in layers, in a small area, curled or folded over each other.

It is in such matters that a symbiotic effort is needed as scientists can better extract the hints from revelations, and scientific explanation in return, can help us comprehend the unfamiliar concepts that Quran wants to communicate through these particular words.

THE HEAVEN (AS-SAMA) VS HEAVENS (SAMAWAT)

Notably, the verse from *Fussilat* [41:12] is also not the only one to disclose this information through an incidental choice of words. The Quran reveals numerous verses that use the words heavens سَمَواتٍ (*samawaat*) and 'the heaven' (*as-sama*) distinctly.