

# Big Bang Revisited

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## Big Bang Revisited

Science tells us that the Big Bang took place 13.7 billion years ago. Using powerful telescopes they found that galaxies are expanding on a continuous basis. Working backwards they have concluded that this expansion started from a single point, what they call a singularity. This singularity was an unimaginably hot and dense point and it burst open to create the universe we see around us. Extensive research is being done both by cosmologists and physicists to understand the universe. And a lot has undoubtedly been achieved, telescopes are looking deeper into space, and we have a much better understanding about how galaxies, stars and planets are formed. Yet, there are still many unanswered questions

One of the foremost questions is: What was there before the big bang? Obviously such a huge universe cannot come out of nothing. There must have been something before the big bang. What was there before the big bang? This is a question which is going to be very difficult for science to answer. Space and time only started with the big bang and the focus of science has been within the confines of space and time. Science can observe and investigate the entire goings on within the space and time framework. In a way science only started with the big bang. There definitely was something before the big bang, because, according to science, something cannot come out of nothing. And yet the paradox is that Science cannot study anything before time! So, we face an obstacle in trying to understand the origin of the Universe. In a way both the cosmologist and physicist have come to a dead end. The only way out is to accept concepts, ideas, solutions which are logical but cannot be empirically proved. But if these solutions are applied and they help in overcoming the stumbling block just mentioned above, then science should consider accepting these ideas.

This article tries to provide these ideas and solutions which we think will overcome many of the unanswered questions in science. These ideas will try to bridge the gap. Based on the teachings of Vedanta we will show what existed before the big bang and how this knowledge can help resolve some of the stumbling blocks being faced by science. Some of the unresolved questions which will be covered in this article are as follows:

1. Where is the center of the universe? Where is the  $x=0$ ,  $y=0$ ,  $z=0$  and  $t=0$  for the universe. Before Galileo, people thought the Earth was the center of the universe, and everything revolved around the earth. Galileo peered into the stars using his telescope; he found that the earth and all the other planets moved around the sun. He realized the sun was the center of the solar system we live in. Using more powerful telescopes, people found that there are billions of stars like the sun in the Milky Way; our solar system is part of this galaxy. All the stars in this galaxy are rotating around the center of the Milky Way. Cosmologists have now discovered

there are millions of such galaxies in the universe and all these galaxies moving in relation to each other. There is continuous movement in this vast universe. To find the 0,0,0,0 coordinate for the entire universe, would mean this point should always be stationary or fixed, as compared to the continuously moving universe.

Science states that the big bang is the  $t=0$  for the universe. This  $t=0$  may have been correct at the time of the big bang, but right now the big bang is 13.7 billion old or the  $t= -13.7$  billion years. It is definitely not  $t=0$ . Logically the position of 'now' can only be  $t=0$ . This 'now' is the fixed point and it is also the coordinate for  $x=0$ ,  $y=0$  and  $z=0$ . Where do you find this the 'now'? Time flows continuously, what is 'now' becomes past in a millisecond.

Science is still looking but it will never find this immovable (0,0,0,0) in the space time framework, it has to be outside this framework. If you apply the teachings of Vedanta we can find this fixed, non moving coordinate. We will be discussing this in this article.

2. The big bang was very hot and very dense, the explosion so massive that the universe has been expanding since then. Science tells us that just after the big bang the universe expanded very rapidly and the expansion was even faster than the speed of light. There is no definite way to know this, but it does contradict the Einstein theory of special relativity, which states that nothing in the universe can travel faster than light. Due to the gravitational pull among galaxies, science thought the expansion will slow down and over time it will reach its maximum limit and then the same gravitational pull will contract the size of the universe, till it collapses. This does seem reasonable, but what science is finding is that instead of slowing down, the universe is expanding at an accelerating pace. There is no proper answer as to why the universe is still expanding. Also without proper (0,0,0,0) coordinates it is also very difficult to calculate the rate of expansion.

3. Another issue for which we do not have a proper answer is: where does all this energy in the universe come from? The universe has been expanding for the past 13.7 billion years and there are no signs that the energy is running out - to continue fuelling this expansion.

Cosmologists expected the gravitational pull between galaxies to force the reduction of the rate of expansion, but instead the universe keeps expanding. They are now speculating that there is a "dark" energy which is forcing this expansion. Keeping the size of the universe and estimating the number of galaxies, cosmologists have estimated the composition of the universe in this way -

- Dark energy – 79%
- Dark matter – 26%

- Visible Matter – 5%

Only 5% of the energy is used to create the visible galaxies. We have to note that 73% of the visible universe is made of hydrogen, 23% Helium and 2% is made of the remaining elements. The cosmologist still has no clue what this dark energy/matter is. They have not seen it nor identified it. It's just an assumption to explain how the energy needed to fuel the expansion of the universe is "created".

There seems to be an infinite source of energy. If so, the question remains - what is the source which is providing all this energy?

Not only cosmology, but even science, especially particle physics is reaching a stumbling block. First they thought the atoms were the building block of the universe, then they realized the atoms were made up of protons, neutrons and electrons. On peering into these particles using Large Hadron Colliders they found these particles were made of sub-particles. In fact they have found about 140 such particles - it's a particle zoo at the sub-atomic level! On further investigation they have found these particles are made of quarks, mesons and other sub-particles. Now there is a full scale search for "strings" that quarks are made, which vibrate in 10 dimensions. I am sure the next frontier would be what are the strings made up?

There will be no end to this quest, because science will never find the building block of the universe 'out there'. Science is trying very hard to find and understand the underlying reality of this universe. For science to be successful in overcoming these stumbling blocks it must clearly understand and agree that

1. You, as the observer, are part of this universe - you are not separate from this universe.
2. The underlying reality of the universe is the same as your own underlying reality.

Both these suggestions seem logical and intuitively correct. The problem is that science still thinks that the universe and you as the observer are separate with no inter-connection. If you study quantum mechanics, you will find hints everywhere that the observer is needed to complete the understanding of what is happening in the sub-atomic world. The collapsing of the wave function, Heisenberg's principle of uncertainty, all indicate that science must include the observer to understand what is going on.

If you accept that the underlying reality of the universe is the same as your own underlying reality, it may be easier to find this underlying reality within you. Science has tried and it has been unsuccessful in finding the underlying reality 'out there', it is the right time to understand our own reality and therefore understand the reality of the universe. The ancient Indian Rishis and sages have already discovered this over three thousand years ago and they provided

detailed explanations in many ancient texts. Once we understand and discover our own underlying reality, we will automatically also discover the underlying reality of the universe.

The next step in this article is to discuss and try to understand this underlying reality. Once we do this, we can try and apply this knowledge to see if it helps us explain ideas which we have shown earlier that science is unable to explain.

1. What is Center of the Universe?
2. How fast is the Universe expanding?
3. What is the energy that makes up this Universe

Before we discuss the above, it's worthwhile understanding some basic concepts:

1. Understanding Our Underlying Reality
2. Understanding Photons

## **1. Understanding Our Underlying Reality**

According to Vedanta, the foundation of most Indian scripture, the underlying reality of the Universe is Brahman. The underlying reality of any living person including you is Atma or 'Real I'. Vedanta very clearly teaches us that Brahman = Atma. The underlying reality of the universe is the same as the underlying reality of "you" or "I". All living being have the same underlying reality. This is logical. So let us and try and understand our underlying reality.

1. The perception process takes place in the mind. Science agrees with this, too – the outside image falls on the retina, which is converted into an optical signal and sent to the brain for processing. Science never explains what happens after that but they do agree the final perception takes place in the mind. Science doesn't explain who the observer of the image within the mind is. Who is watching the events being played out in the mind?

According to the Vedanta, Atma or 'Real I' or 'Self' is the Observer which witnesses everything that is happening in the mind. It is the nature of the mind to be always active. This Atma is just an Observer and it never influences, neither is it affected by what is happening in the mind. It is like a witnessing a movie which is running in your mind. Though in real life a sad movie can make you cry, in this case the Atma is never affected by the movie running in the mind.

2. If Atma is just an Observer, who and what make the objects in the mind ready to be observed? The nature of Brahman/Atma is Chit or Awareness. The basic nature of the sun is to radiate light; in the same way the basic nature of Atma is to radiate Awareness. Any object which comes in contact with this Awareness becomes Conscious. Thus, all objects present in

our minds become “conscious” Only when the object is “conscious”, can Atma witness this object. It must be understood this object must be within the mind, if it is not in the mind, the object cannot be observed.

3. The last question to understand is: how are objects created in the mind? Here Vedanta and science have a completely opposite point of view. Science says that there is an existing universe ‘out there’, which is independent of the observer and this external universe is perceived by our senses. We have seen the limitation of this viewpoint, and also we are unable to find the underlying reality of the universe and we have no understanding as to who is observing what’s in the mind, and how it’s observed. Vedanta has different explanations - the objects in the mind are created by Maya Shakti, these are then projected outward like a hologram. This Maya Shakti is the creative power of Brahman/Atma. Maya Shakti creates these objects in two different ways, which are based on the

- Desires, ambitions and deeds (karmas) of the individual at a microscopic level
- Desires, ambitions and deeds (karmas) of the universe at a macroscopic level

The blueprint of life at the micro and macro level is being played out and based on this; Maya Shakti creates the full gambit of objects, emotions, sensations. Maya Shakti creates these objects in the individual mind which are in subtle form (i.e., in the mind, objects are not present in their physical form, but are mental representations, which are called their “subtle” forms).

Science suggests an ‘out there’ universe comes first which is then perceived by the observer ‘in here’. Vedanta suggests the subtle ‘in here’ universe is created first in the mind, the same ‘in here’ universe is then projected ‘out there’. Who is correct? There are many ways to show Vedanta is the correct way perception works. In my other articles I have discussed this – you may find it worthwhile reading the articles in the sequence they are presented. . Here, too, we recap that the Vedanta perspective, once again showing that what Vedanta teaches is the logical way to understand the perception process.

**Summary:** Atma is the underlying reality of you and any living being. Since Atma and Brahman are the same, Brahman/Atma is also the underlying reality of the universe. Everything in this universe including you is made up of Brahman/Atma. Why don’t we feel or realize this fact? It is our ignorance and because of this ignorance we think this universe is separate from our common underlying reality.

We should also note that the essential nature of Atma or ‘I’ is Sat Chit Ananda

**Sat** = Real which is **the** Unborn, Uncreated, Uncaused, Unchanging Observer. Being Sat only means that the Atma always existed even before Big Bang 13.7 billion years back and it will exist even after the collapse of this universe.

**Chit** = Awareness, with Maya Shakti to create Conscious objects which can be observed

**Ananda** = is usually called Bliss because it is Complete, Full, and Self Sufficient.

## 2. Understanding Photons

A Photon is unique; it has both wave like and particle like properties. It is the only particle in the universe which travels at the speed of light - 186,000 miles per sec. According to science it is physically impossible for anything to travel at the speed of light, because it will require infinite amount of energy to push something to achieve the speed of light. Infinite means infinite, therefore it is just impossible to achieve the speed of light for any object. At the Large Hardon Collider in CERN, Switzerland, it has been possible to achieve 99.999% of the speed of light - achieving 100% seems impossible.

This really makes you wonder- if it is impossible to achieve the speed of light how come the photons achieve this speed so easily, and to top it all, they seem to be everywhere in the universe. Anything traveling at the speed of light must have infinite energy or mass, but photons zero mass. All this seems contradictory to what science is teaching us. Science knows about photons -therefore it seems a bit strange why science has not explored these contradictions. In 1905, Einstein with his theory of special relativity had provided the required tools for analyzing the implications of the properties of photons. Unfortunately, science did not take up what he started. You don't find any articles or papers anywhere which discuss these issues. If you apply the tool kit of the special theory of relativity to the photon, the implications are profound and breathtaking. We'll talk about this shortly.

### Einstein's Theory of Special Relativity

The Theory of Special Relativity deals with Space and Time. It is based on the fact that the speed of light is fixed at  $c = 186,000$  miles per second irrespective of the frame of reference. We all experience relative speed. Going in a car at 60mph, we look into another car traveling in the same direction at 55mph, and we see things inside the other car because the relative speed is only 5mph. We don't have this experience with reference to the speed of light. Light is travelling at 186,000 miles per sec and suppose you are traveling in a car at 60% of the speed of light. Sitting in the car, you would logically expect the light to travel at only 40% of its usual speed, but if you take measurements you will find to your amazement that light is still travelling at 186k miles per sec. The same applies if you increase the speed of the car to 80% of speed of light or slow down to 30% of the speed of light. The speed of light is fixed at 186,000 miles per hour irrespective of the frame of reference

To explain the implications of this theory, Einstein provided a thought experiment, as it was impossible for cars or rockets to reach speeds anywhere close to the speed of light.

You are on earth and your twin brother goes into space in a rocket. You both have the top of the range atomic clocks. Your twin brother's rocket is traveling at the speed of  $0.8c$ . You at earth measure the speed of the light, you find it be  $c$ , your twin brother also measures the speed of light, he will also find the speed to be  $c$ . How come? The clock in the rocket slows down and his ruler in the rocket gets compressed and is much shorter so that the speed of light is still  $c$ . His space time framework is more compressed, but the speed of light is still  $c$ . Your twin brother returns to earth. Your clock shows he travelled for 10 years, while his clock shows he travelled for 6 years only.

Your twin brother goes on another trip and now he increases his speed to  $0.9999c$ . He measures the speed of light and he still finds it to be  $c$ , the same as you will find on earth. His clock will be running very slowly as compared to your clock on earth. He returns after 50 days according his clock. Your clock on earth will show he has travelled for 10 years. Amazing stuff! His space time is extremely compressed.

Here's an addition to the Einstein thought experiment. Your twin brother enjoys being in space. He goes back for another trip, and now his rocket travels at the speed of light  $c$ . He is tries to measure the speed of light, but he is unable to do so. Light travels at  $c$  and his rocket is also traveling at speed  $c$ , both of them are going in parallel to each other speed wise. To make a measurement you need light to bounce of an object, but if the rocket and light are going at the same speed, it is impossible to take this measurement. When he returns to earth, your clock shows he has travelled for 10 years, he will find his clock is at a standstill, no time has passed for him. Also according to him he has covered no distance. You aged 10 years; he felt he did not go anywhere, both time wise and distance wise and therefore did not age at all.

Now replace the rocket and the twin brother with a photon. The photon will have the same experience as your twin brother travelling at  $c$  in a rocket. Here's what you could say the photon "experienced" the following according to the special theory of relativity.

- Distance travelled by photon = 0
- Time experienced by photon = 0 or standstill
- Energy content of photon = infinity. The formulae for the Lorentz Transformation will confirm this.

What is your experience as an observer stationed on earth tracking a photon traveling for 10 years?

- Distance traveled by photon = 10 light years



- Time travelled by photon = 10 years
- Mass of photon = 0
- Speed of light =  $c$

According to the photon, it feels it is at a standstill not covering any distance. However the observer feels the photon is covering a large distance traveling at the speed of light. How do we interpret this information? Based on the information we have understood, we can make the following important conclusions

1. It would seem that the photon travels only in the presence of the observer. If there is no observer then the photon remains at a standstill. An observer is a prerequisite for the photon to travel. In our earlier discussion we have mentioned that the only observer in this universe is the Atma, which is the underlying reality of you, me and every living being. So whenever a photon comes in the presence of Awareness in any mind – your mind, my mind or the cosmic mind, the photon becomes conscious and then and only then we are aware of the photon. It is this photon which zips around at the speed of light. The perception must take place in the mind first, only then it is possible for the photon to be observed in the physical world. It is this basic reason, why the perception process as taught by Vedanta is the only correct way to understand the phenomenon.
2. From the photon's perspective, it is at standstill in time and covers no distance. If time does not move for the photon, it must be outside time and it must be beyond the space time framework. If it was within the space time framework, time for the photon must change. What does this really mean? Anything beyond time must be in a dormant condition; it could also be called un-manifest condition. What is the "un-manifest" condition? According to Vedanta, it is in its potential form, just like a tree is in an un-manifest, potential condition within a seed. The physical tree still has not come out, but the tree is there in a potential form in the seed. So only a tree will manifest from this seed and nothing else. The photon is also in the same potential form. What potential form does the photon represent? The universe is the "potential" within the photon. We will discuss this again later on.
3. Where does the photon reside in its un-manifest condition? Since the un-manifest photon is beyond the space time frame work and as we explained earlier that the Atma is always beyond time. It is only logical conclude that the un-manifest photon exists within Atma, which is unchanging, limitless, without boundaries. Since Atma is present in everyone, including in you, therefore the un-manifest photon is present within you, within your true reality of Atma. You, as an individual person, do not feel or realize this, because, like everyone else, you are ignorant of your own true nature.

4. We saw earlier that according to the observer, the energy level or mass of the photon is zero, but according to the photon, the energy level of the photon is infinite. This photon with infinite energy is lying dormant within the Observer or Atma in an un-manifest condition. At the moment there is no infinite energy, there is only a potential for infinite energy. Whenever the Observer/Atma has the desire to view the universe, this un-manifest photon will come into the observers mind, this photon will become conscious and then it will manifest to become the universe we see around us. This manifested universe will have infinite energy.

We know from studying Vedanta that Atma/Brahman is the underlying reality of you and also of the universe. It is the Observer of your mind and it is beyond the space time framework. We have also analyzed that from the photon's point of view, the photon remains in an un-manifest condition in your Atma. When this photon enters your mind, it becomes conscious and manifests itself.

With this background and understanding let us try and look at some of the questions raised by science, which we mentioned earlier on in this article.

## 1. Center of the Universe

Where are the  $x=0$ ,  $y=0$ ,  $z=0$  and  $t=0$  coordinates for the universe? They are definitely not the big bang. The big bang is 13.7 billion years old, which means the  $t = -13.7$  billion years for the big bang. Only the location of 'now' can be  $t = 0$ . Therefore the big bang cannot be  $t=0$ . We know time and space are interrelated, and where  $t = 0$ , it also means  $x=0$ ,  $y=0$ ,  $z=0$  at the same place or location. So how do we find for the 'now' location?

1. Let us study the external objects 'out there'. If we can see a far away star, say 5 million light years away, it will take light from that star 5 million years to reach us. Now we see the sun, the light from the sun takes 8 min to reach us. We look at the moon; light will take 3 sec to reach us. We look at the plane flying in the sky, at 30,000 feet; light will take about 300 milliseconds to reach us. As the distance of the object being viewed is reduced, the time taken for light to reach us or for us to see it is much smaller. I now look at the tree outside the window; the time taken for light to reach me is 10 microseconds ( $10^{-6}$ ). I am looking at the computer screen 1 ft away typing this article, light will take about 1 nanosecond ( $10^{-9}$ ). You even watch your thoughts, this also takes some time to form, and they are not instantaneous. As the distance is reducing the time taken for the light is reducing. If you extrapolate this backward, the only logical place for  $t$  to be equal to 0 is the Observer, who is watching all these objects. We have

said earlier that Atma is the Observer, so it the Atma within you, where  $t$  becomes 0. This  $t=0$  is, in a sense, beyond time, it is always 'now'. If you think about it, the center of the universe is the Atma or the Observer, which is within you, me, or everyone. The earth, the sun, the center of the Milky Way is not the center of the universe. The center of the universe, which is your Atma/Observer, is right within you. Vedanta has always said in all its scriptures that Atma is the center of the universe. If the reasoning provided here is correct, it is only logical for science to agree and accept what Vedanta has been saying for centuries.

If you or anyone else looks around the universe, they will reach the same conclusion. Everyone has their own  $t=0$ , which is within themselves. This will apply to every living being in the universe. It would seem, therefore, I have my own  $t=0$ , you have your own  $t=0$  and every living being in the universe has their own  $t=0$ . The only way to understand this, is that each and every living being creates their own universe and this universe starts with  $t=0$ . This fact also supports what we said earlier, the Maya Shakti within each and everyone creates their own universe. If you create your own universe, you must be part of the universe. You cannot create your own universe and be separate from it. Science has to correct its thinking; the observer is non-separate from the universe.

As we have mentioned earlier space and time are inter-related. If Atma is  $t=0$ , than Atma is also the  $x=0, y=0, z=0$  coordinate for the universe.

2. If you look closely at what we have just discussed, you would agree that whatever we see out there is all dated or past. That far away star is 1 million old, the sun is 8 min old, the moon is 3 sec old, the plane in the sky is 300 milliseconds old, the tree outside my window is 10 microseconds old, and the computer in front of me is 1 nanosecond old. We do not see any 'now' objects, we only see 'memory objects' (for lack of a better word), which are no longer current. The full universe is only made up of 'memory objects'. This applies to both living and non living objects. Can anyone show me 'now objects'? However hard you try, you won't find any 'now object' in this universe, you will only find 'memory objects'. We are so used to this that we don't realize what's really happening. I am sure scientists are aware of this, but think of it, perhaps as trivial.

With this understanding, it feels like the Observer within you (which is Atma) is watching a movie being played in your mind - from some type of cosmic DVR (Digital Video Recorder)? The movie you play from a DVR always shows recorded objects, it is never 'real time'. In the same way, there must be some sort of cosmic DVR which is playing 'memory objects' in your mind.

## 2. How fast is the Universe expanding?

We now understand that Atma, the Observer within you, is the  $x=0, y=0, z=0$  and  $t=0$  coordinate for the universe. It is the center of the universe. Atma is the unchanging, unmoving always fixed  $(0,0,0,0)$  coordinate for the always moving, always changing universe we see out there. This fixed  $(0,0,0,0)$  coordinate is within each one of us and should be used to take all measurements. This will overcome the inconsistencies due to relative frames of reference. For example, you are traveling in a car at 55 mph and the car in the next lane is traveling at 60 mph. If you measure the speed of the car in the next lane, you will reach the conclusion that it is traveling at 5mph. This is inaccurate information because the car is actually travelling at 60mph. There is no way for you experience this because your car is traveling at 55mph. For you to calculate the speed of the car correctly at 60mph, you must be at complete rest, outside your moving car.

Everything in this universe is in motion. The earth is moving around the sun, the sun moves around in the Milky Way and the Milky Way is moving around in the galaxy. The only fixed point in this universe is Atma, so measurement should be taken from this fixed point. Fortunately Atma is not something out there, but within each one of us.

To understand how fast the universe is expanding, let us first calculate the size of the universe.

### Size of the Universe:

Science tells us that the age of the universe is 13.7 billion years old. We have shown earlier that all objects we see out there are in the past. Using powerful telescopes scientists are hoping to peer into the past to see the beginning of the big bang 13.7 billion years back. If we can do this, the experience of seeing the “big bang” will be a real spooky one! In order to do so the photon from the big bang will have to travel a long way to reach us. As clarified earlier, photons don't travel, it's already here. But we think the photon has travelled 13.7 billion years to reach us. The size of the universe will be the distance travelled by the photon from the big bang. This is the outer limit, because there was no universe before the big bang.

So, the size of the universe: 13.7 billion light years or  $12.9 \times 10^{25}$  meters. One light year is the amount of distance light travels in one year, which is  $= 9.46 \times 10^{15}$  meters

When explaining his theory of relativity, Einstein showed that the universe has a space time framework and this framework is like a fabric underlying the universe. Nobody has identified this fabric, but we know if any mass or energy is put on this fabric, this fabric would curve around the mass. To visualize this, think of a stretched trampoline. If you put a ball that is heavy enough into the center of the trampoline, the trampoline will curve around the ball. In

the same way, the space time framework will also curve around any mass put on its fabric. The higher the mass, the greater is the curvature of the space time fabric.

The size of the universe is the size of the space time fabric which is 13.7 billion light years or  $12.9 \times 10^{25}$  meters.

Is this space time fabric expanding? Definitely, yes. How much? Let us try and understand this. If you assume the universe is 13.7 billion years old 'right now'. After one second, the age of the universe will be 13.7 billion years + 1 sec. The photon now has to travel an additional 186,000 miles to reach us, which means the size of the universe has grown by 186,000 miles. After 10 seconds, the size of the universe would increase by  $186,000 \times 10 = 1,860,000$  miles. After one year from now, the size of the universe will increase by 1 light year. 1 light year is the distance light travels in one year.

From the above, we can conclude that the Rate of expansion of the Universe = 1 light year per year.

If you can imagine the space time fabric as an elastic rubber sheet, starting from the observer ( $t=0$ ) to the edge of the universe. The end at the observer's side is fixed; the other end which is outer edge of the universe is being pulled outwards. This elastic space time fabric is expanding by 186,000 miles every second. It is expanding at the speed of light every second, which is one light year every year.

So, as long as time flows, the expansion of the universe will continue at the speed of light. The expansion of the universe is directly related to the amount of time which has elapsed. The expansion of the universe will come to an end only when time comes to an end. When will that happen? No one seems to know this. According to Vedanta, time will come to an end when the nominated karmas for this life cycle of the universe are exhausted.

It must be understood that only the edge of the universe is expanding at the speed of light, anything in between will not expand at the same speed, it will be proportional to the distance from the observer. Using the same rubber sheet example, if you pull the outer edge by a certain distance, the inner parts will not be stretched by the same amount. The stretching will be more at the outer edges and it will be much less as you move inwards to the other side, which is fixed. This means that the rate of outward expansion of galaxies, stars etc, would really depend upon how far these galaxies are far away from the observer. The observer is  $t=0$ . Stars close by will expand more slowly, as compared to stars which are further away. This is because the space time fabric for the stars nearby will stretch less as compared to the stars which are further away.

Based on our understanding of the stretching of the space time fabric, let us try and calculate the stretching of the sun, which is the closest star for us.

- The size of the universe is 13.7 billion light years and it expands by 1 light year every year
- The sun is  $1.58 \times 10^{-5}$  light years away from us, it will expand by  $1.58 \times 10^{-5} / 1.37 \times 10^{10} = 1.15 \times 10^{-15}$  light years
- 1 light year =  $9.46 \times 10^{15}$  meters
- Therefore  $1.15 \times 10^{-15}$  light years = 10.8 meters per year.

The outer edge of the universe is expanding at the speed of light, but the space time fabric around the sun is expanding only by 10.8 meters per year. If you can make the same calculation for galaxies or stars further away, the expansion rate will be much higher as compared to the sun.

One interesting and very important conclusion one can make from this discussion is that the space we see around us is created by time. We saw that as time moves forward, the size of the universe increases. We understand what space is, it is visible, and we can experience it. What about time? Time cannot be seen, it is not visible, but it can be experienced - it is subtle. Anything subtle must be a mental event created by the mind, because the mind is also subtle. Mind creates times, and time creates space, therefore it is only logical to conclude that the mind creates space. In other words, the space time fabric is created by the mind itself. Mind is the underlying reality of the space time fabric.

So, we can now understand that the universe is created by the mind. The universe is not separate from the observer. We have shown this in so many different ways. I hope science too will see the logic of this argument.

### **3. Energy which makes up this Universe**

When we last discussed, we saw that photons, from their own standpoint, are in an un-manifest condition. They are in their potential state. The potential form of the photon represents the universe; it is not one photon, but a collection of all the photons in the universe. A good analogy would be that the potential form is like software code that represents all aspects of the universe. Just like the software needs a CPU to manifest itself, the potential form of the photon needs a mind to manifest itself.

When the un-manifest photon comes in contact with our minds, it manifests itself and becomes a Vritti, which is like a mental wave within the mind. I believe these mental waves or vrittis are

the same as the probability waves which are explained by quantum physics, they are so similar in their functionality. We know from quantum mechanics that the probability waves collapse in the presence of the observing system. In the same way the mental waves of the photon collapse in the presence of Atma, which is the observing system in our minds. Maya Shakti then projects this collapsed wave function as the visible physical universe we see around us.

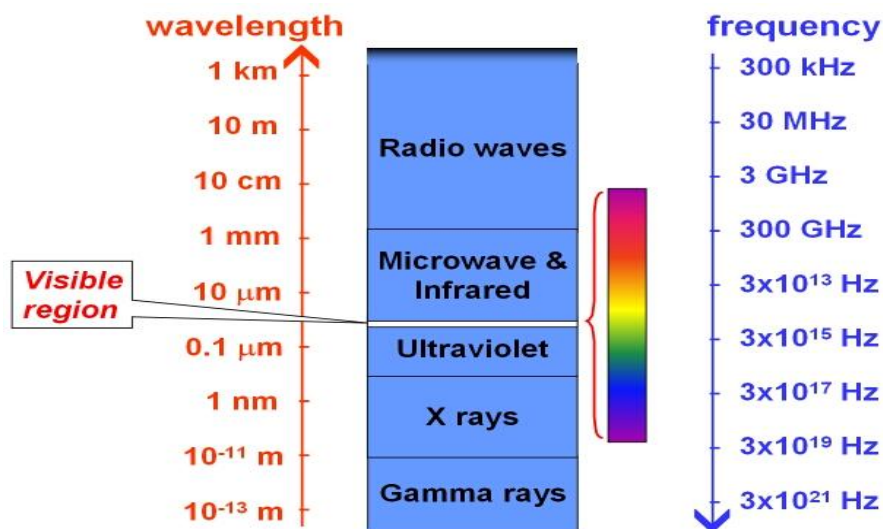
Put in simple terms, the universe is a manifestation of just the photon. In its un-manifest form, the photon had a potential for infinite energy. This infinite energy is now unleashed into the entire universe.

### Types of Energy in the Universe

As we have seen, the photon is the only particle in the universe which travels at the speed of light. If we apply the theory of special relativity to the photon, the photon will feel it does not travel any distance, that time is at a standstill and that it has an infinite amount of energy. In the presence of the observer or from the point of view of the observer, the picture is very different, infinite energy is distributed all over the world and photons are zooming around the universe at the speed of light.

The photon has an infinite amount of energy, but this finite universe can use only a finite amount of energy. You as an observer can only see a part of the universe and therefore only a finite amount of energy is required. I am guessing that the unused energy of the photon remains in an un-manifest condition.

It must be clearly understood that the only energy available in the universe is the energy provided by photons.



A photon in a wave form is also known as an Electromagnetic Energy Wave (EMV). The known spectrum of light starts from Radio waves (300 KHz) to Gamma rays ( $3 \times 10^{21}$ ) Hz. This spectrum of energy covers the universe. It is the source for everything. All objects are made up of energy and this energy comes with the manifestation of the photon in the presence of the observer or Atma.

Is there a limit to the Electromagnetic Spectrum? Logically, if you think about it, there could be higher frequency waves than Gamma rays and lower frequency waves than Radio waves. There is no reason why not. Maybe science still has not located these waves with higher and lower frequencies that the currently available range.

### **Dark Energy**

Science tells us that dark energy is required for the expansion of the universe. We saw earlier that the expansion is taking place within the space time fabric. When the space time fabric expands, the universe expands. It's logical to assume that lot energy is required for stretching the space time fabric. What type of energy is it that's required? No one knows, therefore it's called "dark" energy. The source of all the energy in this universe is photons; therefore dark energy should also have some type of relationship with the infinite energy provided by photons

### **Big Bang Revisited**

We now have a better understanding of how photons provide the required energy for the universe. We also saw that the underlying reality of the universe is  $t=0$ . We all have our own  $t=0$ . Let's now apply this knowledge to better understand 'memory' objects and 'now' objects and also try show the real meaning of the 'big bang'. Let's see if we can get a better understanding of what the big bang really means.

### **Memory Objects**

We saw earlier that everything in this physical universe is made up of 'memory objects'. There are no 'now' objects in this universe. Everything is 'old' and 'past'. Nothing is current and neither is anything real. 'Real', 'Live' or 'Now' objects cannot be Memory objects. Just to give an example, if you go to a stadium and watch a sporting event, this event would be a 'live' event. Your friend is busy and records the event to watch it the next day. When he watches, his is a recorded event, and what he is watching are memory objects, they are not 'live' or 'real' objects. If you apply this to the universe, you know that everything you see is in the past, and a memory object, so it cannot be the real "live" event.

1. Therefore, if you see any object, then you can conclude the following



- Since it's a memory object, it must be a "recorded" event.
- If it is a recorded object, it must be stored somewhere in some type of storage or memory device.
- To see a memory object, it must be played back from some type of memory or storage device.

All this indicates that there is some type of cosmic DVR, which is playing all the memory objects. Maya Shakti, the creative power of Brahman or Atma is this cosmic DVR, which is playing out the blueprint of your life and also the life of the entire universe. This Maya Shakti creates stores and plays back all the memory objects. The space time framework is the screen on which these memory objects are projected. Maya Shakti is the DVR, the space time frame work is the projection screen and the movie being played is the current cycle of creation and dissolution, with memory objects of the universe. Atma is the observer of this movie called Life.

2. You will never find the composition of the real object by looking at memory objects. Going back to the earlier example of the recording being viewed by your friend, he is looking at the memory or recorded objects being played back on the screen. If he starts zooming in the image to see what the objects are made of, the only things he will find on the screen are pixels! If he spends his entire life only watching recordings and he never sees any real objects, he will conclude that the all objects are made of pixels. What a wrong conclusion this would be! The only reason he reaches this conclusion is because of his ignorance of the real objects. We can apply the same logic and reasoning for the memory objects of the universe. We will never understand what is 'real' by looking at memory objects. Because of our ignorance we think the memory objects are real and therefore we are trying our best to find the reality of the universe in these memory objects. Science will never find the underlying reality in these memory objects.

3. If the objective is to find laws and the structure of the memory objects making up the Universe, then Science has done an excellent job. So much progress has been made. Newton has given a clear picture how these memory objects move in relation to each other. All the laws of motion predict the precise movement of these memory objects. Chemists and biologists have an in-depth understanding of the structure of memory objects. Einstein with his theory of relativity explained the composition of the memory objects. With his famous equation  $E = mc^2$  equation, he showed that mass and energy are interchangeable. Energy is intangible while mass is tangible. Energy is subtle, while mass is gross. They are exactly the same except that mass is the gross version of subtle energy.

We have seen that with the manifesting of the photon, the entire universe is filled with electromagnetic energy and this energy is used to create all the memory objects we see in the universe. The basic building block of any memory object is the Hydrogen atom. This Hydrogen

atom mixes to create Helium, Carbon and all the other 92 known elements. All the memory objects are made up of these 92 elements. All memory objects are made of combinations of these 92 elements. The underlying reality of these 92 elements is the energy provided by photons.

It is interesting to note that all the laws of classical physics, before the introduction of quantum physics, apply to the memory objects. In contrast, quantum physics does not apply to memory objects but to waves, which are not the function of memory objects but of the mind. This understanding shows us clearly the difference between classical physics and quantum mechanics.

### **A Big Bang - Every Moment**

Science tells us that the big bang happened 13.7 billion years ago. If you analyze it properly, the process of the photon manifesting from its un-manifest condition is really what the big bang means. It did not happen once 13.7 billion years ago but it happens every time the observer wants to observe the universe. When the un-manifest photon comes in the presence of the Observer/Atma in my mind, your mind or the cosmic mind, the photon manifests to become the universe. So, in a sense, there's a big bang happening constantly. When you observe the trees outside your window, it means a big bang just happened.

When the big bang took place 13.7 billion years ago, the cosmic DVR started, like the beginning of a movie. The projection screen of the space time framework at that time was very small because time had just started. The only memory objects available were an abundance of Hydrogen atoms. Fast forward 13.7 billion years and when the big bang takes in our minds now, the projection screen of the space time framework is massive, 13.7 billion light years wide. The memory objects have changed over time; they have now become billions of galaxies with billions of stars and planets.

Going further with the movie analogy, we know a movie is made up of a series of different still frames and each still frame is projected to make up the whole movie. In the same way the movie played by the cosmic DVR is also made up of still frames, it projects each frame on the space time fabric. This projection of each frame of the movie is really what should be called the big bang. The big bang takes place every time you observe a frame from the movie of the Universe. Like in the movies, every frame of the cosmic movie will be different from the previous frame. Memory objects will have moved to a different place, some memory objects will be in the process of dying, while new ones are being created.

## 'Now' Objects

The far away star is 1 million old, the sun is 8 min old, the moon is 3 sec old, the plane in the sky is 300 milliseconds old, the tree outside my window is 10 microseconds old, and the computer in front of me is 1 nanosecond old – we saw this earlier. We do not see any 'now' objects, we only see 'memory objects', which are no longer current. The question is, does there exist a 'now' version of memory objects? If yes, - where do they exist, how do they exist and what are they made of?

Science adds to the confusion. When it talks about memory objects, it seems to refer to 'now' objects. When scientists discover a planet 5 million light years away, they talk as if it is a 'now' object, but really it's a memory object. They are talking about an object which is 5 million years old, no one knows where that object is 'right now'. Does it even exist, has it been destroyed by meteor. No one can be certain. One certainty is that the 'now' object cannot be in the same location where the 'memory' object was 5 million years ago..

It almost feels like that there two different universes one is 'now' universe and the other is universe of memory objects. We know where the universe made up of memory objects is, it is right in front of us. The question where is the universe of 'now' objects. You will never find the 'now' universe by looking at memory objects. You cannot extrapolate the memory objects to the future to understand the 'now' objects or the 'now' universe. It the same as the earlier example of seeing recorded images on TV and trying to find out what the 'real' and 'live' objects in the live event in the sports stadium are made up. If you study the recorded images on TV, you will only find pixels. You will not find the reality of the live objects.

So where is the 'now' universe where everything is 'now', where there are no memory objects? This is just not possible in the space time framework. To be in the 'now' universe, every object in this universe must be at  $t=0$ . If it is not  $t=0$ , then it is not a 'now' object, it is a memory object. We have seen the Observer/Atma/Brahman is  $t=0$ , which is fixed and non-moving as compared to the moving universe. We have seen that the Brahman/Atma is the underlying reality of you, me and of everything in this universe which is observed. It is the only 'now' universe, where everything is  $t=0$ , both for the Observer and Observed. The Observer is the subject and the observed (object) is the universe. Both the subject and object are  $t=0$  in Atma/Brahman. Atma/Brahman is complete (with both the subject and object) and is the only reality of the universe. Everything else is a memory object.

Let us look at this from another perspective. We know that the sun we see is 8 minutes old and it is a memory object. Let us play around with this. Now, for whatever reason, suppose the sun is only 3 minutes old; it would mean the sun has moved closer to the Observer (and much hotter). If the sun is 30 seconds old, the sun is extremely close to the Observer, but it is still a

memory object. If you keep extrapolating this and finally if  $t=0$  for the sun, it would only mean that the sun is within the Observer/Atma. We have seen earlier that  $t=0$  is the coordinate for the Atma/Brahman. For the sun to be a 'now' object, it must be within Atma/Brahman. At  $t=0$ , the sun is a 'now' object, and this 'now' object is beyond the space time framework and is within Brahman/Atma. Like we discussed for photons, anything outside the space time framework must be in its un-manifest or potential form. Therefore at  $t=0$ , the sun must be in its 'potential form'. This potential form of the sun must be part of the un-manifest photon. Actually we are using the word 'within' for ease of explanation, in reality there is no 'within' Atma/Brahman. This would suggest that there is some other entity or reality within Atma/Brahman. Atma/Brahman is Sat (Real), it is indivisible, unchanging and it is homogenous with no parts. This only means that the 'now' photon and the 'now' sun is Brahman/Atma itself, it is completely non-separate from Brahman/Atma.

This reasoning and logic is applicable to every memory object in the universe. The only 'now' universe is Atma/Reality, this is the only place where everything is  $t=0$ . The 'now' universe is Atma, while memory objects universe is the universe we see around us.

So do we have two universes? Can there be two universes? Vedanta says that the only universe is Atma/Brahman, but due to our ignorance we have forgotten our true nature of being Atma. This ignorance creates the mind and this mind manifests the photon and creates the physical universe with all the memory objects. Due to our ignorance we think the physical universe is real and we keep looking for the reality within this physical universe.

## Conclusion

From this article it becomes quite clear that we have to re-evaluate our understanding of the "big bang". We have to understand Atma, which is the underlying reality of you and also the Universe. Atma is the observer of what is happening in your mind. The universe is created by the individual mind with the help of Maya Shakti, the creative power of Brahman. Science also has to re-evaluate its understanding of the photon; it is the only particle which travels at the speed of light. This has many implications. Once we understand Atma and photons, many of the inconsistencies in our understanding of the big bang can be explained. The fixed, non-moving 'now' of the universe, the expansion rate of the universe and also how the universe really works, all these have been discussed in this article.