

**AN ANALYSIS OF THE BIG BANG
FROM A MULTI-DIMENSIONAL PERSPECTIVE**

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Introduction

To try to explain the structure of the universe and all the processes of space-time in one paper would seem to any student of physics and science to be presumptuous and pretentious. I, myself was leery of the model that came to me one night, thinking it couldn't be that simple, until I began to see that the sheer simplicity of the idea is why so many previously mysterious, separate, pieces of the cosmology puzzle began to fit together. I ask the indulgence of any reader of this document, as it will only seem logical and plausible after all the pieces have been assembled.

This author has spent an entire adult lifetime studying cosmology, relativity, and quantum physics in an attempt to catch a glimpse of the true nature and structure of the universe. If the ideas as presented in this document are the ramblings and illusions of an overactive imagination, then I apologize in advance for wasting valuable time explaining it. I hope that, if the concepts I present here are not an accurate model for the universe, at least it will stimulate further thought in that direction

If however, it is a true and accurate model of the structure of the universe, then it would lay a foundation for new questions, new thoughts, and perhaps an entirely new concept of our place in this wondrous place we call "our" universe.

The mathematics of this model may seem lacking to some as I believe this to be more a philosophical than mathematical construct, even though the very basis for understanding and proving the model is based on the mathematics of "multidimensional concepts". This model, much like Einstein's Special Theory of Relativity, is based on the

mathematics of others who preceded me in this field, which I have assumed to be valid, to a point. It was the relativistic equations of Einstein that convinced me finally that I was on the right track. Just as Einstein "borrowed" concepts from the Michaelson/Morley/Maxwell experiments of 1897 to support his paper and ideas contained in "relativity", I have "borrowed" the mathematics of Einstein and others to support my thesis. The mathematics developed by Einstein was never properly applied to a model that explained the important "whys" of his results. These "why's" are what started me on this journey to understand the universe, and will be the basis for the questions that will eventually be answered in this paper.

The purpose of this paper is not to provide new data or conclusive "proof" of any idea, or group of ideas, but to suggest and provide an outline for a model of the structure of the universe that can lead to a better understanding of the data we already have and perhaps other "proofs" that will establish the validity of the hypotheses contained in this paper.

It has been said by some that the human mind is incapable of imagining the structure of a multidimensional universe, and that some processes are only understandable and imaginable through mathematics. I agree that when the mind fails to comprehend, sometimes mathematics provides a crutch. However, it is the opinion of this author that the structure of the universe is understandable in visual terms and only the proper perspective is necessary. It is the considered opinion of this author that an orderly process of reason and applied thought will eventually provide a clearer picture of a process more vividly than mathematics alone. Of course the presence of both is the best of all possible solutions.

Background

Sir Isaac Newton supposedly sat under an apple tree and, watching an apple fall to the ground, asked an absurd but scientifically important question, "Why do things fall toward the earth?" The immediate response to asking the question was ridicule from his peers and comments to the effect that "All things fall down. Its just natural."

All great discoveries in science and physics have begun with a question, usually "Why?". Today the physics field is replete with theories of particle physics and the origin of the universe, from Alan Guth's "Inflation" to "String Theory", to Roger Penrose and Stephen Hawking's "Black Hole" explanation. No one seems to know why or how these separate "theories" are related. To show a connection and an explanation, of all these ideas, to gravity and electromagnetism, and quantum mechanics, would be to many in the physics world the "Holy Grail" of physics and has been aptly called a "Theory of Everything". This is the goal many are seeking in physics today. No one has yet found that connection.

To propose such a connection would offer an explanation for all the "why's" that exist concerning these and other elaborate theories. Relativity left many "why's" unanswered.

Why is there a speed limit of 300,000 Km/sec. in the universe?

Why do objects foreshorten as they approach this velocity?

Why does approaching this velocity have the effect of slowing "time"?

What causes the illusion of time "passing"?

Where do objects go that fall into a Black Hole? What really is a Black Hole?

Why is the subatomic particle field of study in a state of chaos and called by some the "Particle Zoo"?

What is the nature of Space and Time?

What causes the Dual nature of Photons?

What is really happening at the realm of Quantum Mechanics and can we ever understand it?

Many would answer that mathematical formulas alone offer enough of an explanation, but my answer to that is that a number is not an explanation of anything. We can apply all kinds of equations for calculating the velocity, acceleration, and trajectory, of a falling body, but that does not really explain what gravity is. I agree that the mathematics can be right and reliable, but if I can still ask the question "WHY", it is not the complete answer. If we fully understood the nature of the universe and its structure we would not only be able to apply the equations but would also understand fully what the equations represent.

Having given great thought and study to the separate fields of cosmology, relativity, quantum mechanics, the Big Bang, and gravity, I have made an attempt to offer a credible explanation and model of the universe that would offer solutions to the "why's" given above.

While information can make for a good research project, it was Einstein who made the quote, "Imagination is always more valuable than knowledge". Within this paper, I have tried to apply my vivid ability to imagine "visual" solutions, where possible, that no one else would think of, to the problems that are the subjects of this paper, and at the same time, remember to stay true to the data and information that I have accumulated over the years.

Review of Literature

Understanding Cosmology, Relativity, and Quantum Physics cannot be accomplished by reading a ‘few’ books. There are many perspectives and opinions that differ as to the meaning of experimental data, and to have a complete, solid background in these areas requires learning not only the history of thought involved in the acquisition of knowledge, but the reasons that many of the great minds have differed in their analysis of the data.

Certain books are among my list of favorites for this pursuit. These include “The Search for Schrodinger’s Cat”, by John Gribbin (1994), “Who’s Afraid of Schrodinger’s Cat?”, by Ian Marshall and Danah Zohar(1998), “Once Upon Einstein”, by Thibault Damour(2006), “Schrodinger’s Kittens, and The Search For Reality”, by John Gribbin,(1996), “Very Special Relativity”, by Sander Bias(2007), “Readable Relativity”, by Clement Durell (1926), “Relativity, The Special and General Theory”, by Albert Einstein(1920), and many others through the years that I’ve forgotten the titles of. In each of these listed and the others, I gained at least a small bit of insight into a very complex subject.

Sometimes that insight didn’t come overnight, but only after much thought and other insights, I would sometimes come back to the same book to re-read passages with greater ability to grasp and understand what the message was in the first reading.

It was early in my academic career in college that I became fascinated with the subject of Relativity and even held, and participated in, roundtable discussions of the subject in my dormitory room at night with other students. In the years since I have tried

to keep abreast of the latest theories, views, and experimental data by being a regular visitor to the “Science” section at the local bookstores, and by reading research papers, Scientific American, Discovery, Astronomy, and other popular science and cosmology related magazines. The internet has been a boon for my interests and has provided an almost limitless resource for information that I couldn’t possibly have gathered otherwise. While every single book or source that I acquired information from will not be listed in the Bibliography of this paper, they are all represented in the text that follows.

Hypotheses

All theories about the history and structure of the universe begin at a common point of reference. The general and scientific community calls it “The Big Bang”. Alan Guth says that it began with a process called "Inflation" in the Quantum chaos where all particles and processes come into existence. The universe supposedly exploded into being and is still expanding much as a balloon expands when "inflated". The nature of this process has been exhaustively explored and we know the temperature and processes that took place down to the nanosecond after the initial event. This paper will not attempt to cover ground that has already been tread.

The breakthrough that unlocked the train of thought that eventually led to this paper, was an idea that I have never seen in publications or papers on the subject.

If the universe is multidimensional, is it not reasonable to think that the expansion took place not only in the physical 3 dimensions we call our reality, but also in the other dimensions as well? This would include the dimension we commonly call the 4th dimension, or time.

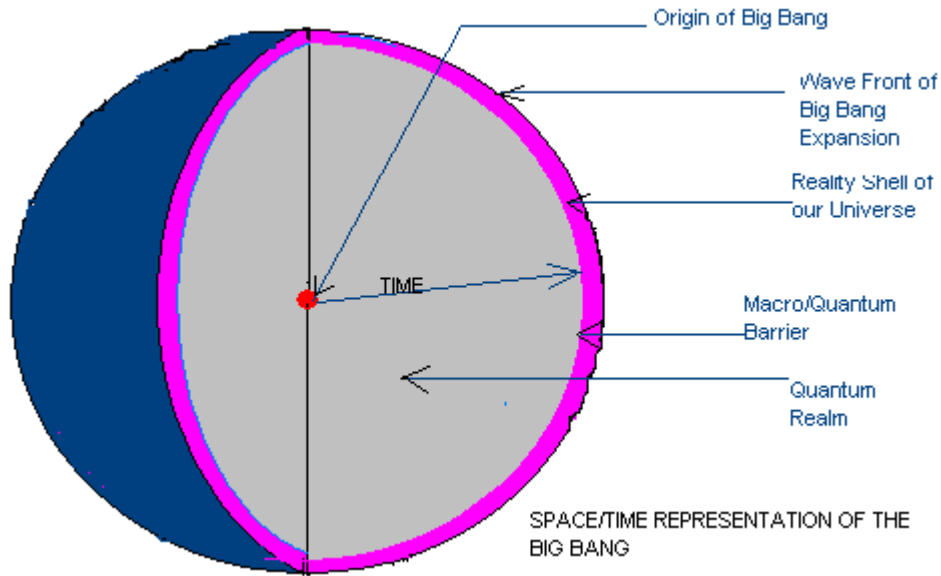
Like gravity to Newton's critics, time is the forgotten dimension when it comes to analyzing the Big Bang in that it has simply been assumed and taken for granted, that it was the lone constant in the process. The popular notion is that, if there was time before the Big Bang, it was a constant value and flowed forward at the same rate before and after the explosion.

To understand the following hypotheses you must accept that there was no time before the Big Bang and time *expanded* forward *from* the Big Bang. The key to

understanding the processes and nature of the creation of the universe is to understand that time was not a static element in the creation but was as much a part of the expansion as the expansion of the other 3 dimensions, of space, as well. It is also important to recognize that time is not just moving out from the Big Bang but is *expanding*. This may seem to the reader a trivial point, but as will be shown later, the explosion and expansion of time is all important to the visualization and understanding of the expansion of the wave of energy that we call the Big Bang.

In order to assist in the comprehension of the 4 dimensional imagery of the entire process from the moment of creation, I need establish in the mind of the reader a space/time diagram to relate all following processes to. Other space/time diagrams are usually presented in Cartesian coordinate systems with time on the y-axis and space on the x-axis. This diagram is different in that it represents time and space on a spherical diagram with time being represented radially around a central point, the Big Bang, and space represented in the outer shell of a sphere about the center.

The initial explosion created a wave front of energy that had the form of a sphere exploding outward from the center. Former images of this wave referred to it as being like a balloon inflating. I would like to retain and use that image also, with one important change. Picture the balloon with all 3 spatial dimensions on the surface with the radius of the object being the time element, not space.



It would be easy for the reader to misinterpret the above image as representing the explosion entirely in spatial units. It is crucial to the understanding of the diagram that the reader remember that the distance from the center of the diagram, representing the moment of the Big Bang, to the outer surface representing space does not infer spatial distance from the Big Bang. *The radius of the sphere is a measure of the Time elapsed since the explosion.* The reader is cautioned not to confuse concepts of the explosion of space/time with the popular concept that it was simply an explosion of space, with time being constant. There is a world of difference, and it is that difference that separates this theory from other Big Bang theories.

There is another reason that time should be the unit of measure for the radius of the sphere. There is reason to believe that time and space are reversed at the quantum level, and the region of the sphere between the center and the Reality Shell does represent the Quantum Realm.

The “Universe” that we know is the area inside the sphere, between the outer surface and the inner “Quantum” realm”, and is labeled the “Reality Shell” on the diagram. We cannot see the inner area under the shell anymore than we can see backward in time, as that is what the region represents.

It is very difficult to visualize events and objects in 4 dimensions instead of the usual 3, but a background in mathematics allows the reader to understand the limitations of such a conceptualization. One has to relate to the total picture by eliminating one spatial dimension and replacing it with the Time dimension. We have problems with that because we have freedom of movement in space but are restricted in time to move only in one direction, at a very constant rate. Because we have that restriction we cannot visualize time in the same way we do space.

It is similar to a situation described in a book entitled "Flatland", published in the 1800's, about a world of only 2 dimensions. The principal character in the book tries to explain that an ant moving in only one dimension, on a straight line, cannot see the line it is traveling on anymore than we can "see" time. The ant can see only the "present", or the spot it is on at any given moment. The future and past appear as nothing more than a point before and aft.

Even though the picture represents the distance from the Big Bang as time, it still can be considered as visually accurate. We can see that in this sense, time as a dimension is not that different from a spatial dimension. It would be easy to overlook another characteristic of time. The region inside the sphere is 3 dimensional, not 1. Since the inside of the sphere does not represent space but time, this implies that time itself is not a single dimension but is 3 dimensional.

Einstein's equations show that any movement in space requires also a movement in time. This concept of time allows for that in that the three dimensions of time would overlap the corresponding dimensions of space. It would be impossible to move in space without also moving in the three time dimensions. This 3 dimensional concept of time also shows that for any point on the surface of the space/time sphere there is a direct path back to the origin or Big Bang. It is also this 3 dimensional aspect of time that allows it to *expand*.

We can immediately see that every point within the "Reality Shell" that represents our universe has a unique set of time coordinates associated with it. This may seem like a new concept, but Einstein's relativity equations predicted this over 100 years ago. The difference between then and now is that when the theory of relativity was first published it was thought this unique time was a single value. Accepting this new concept of time, we now know it is a *set* of coordinates in the same way we define a point in 3 dimensional space.

Another way to imagine the 3 dimensions of time is by means of a thought experiment as follows.

Imagine a subject who possesses a switch that can "freeze" time at any moment. He/she flips the switch and observes that everything around is frozen and all events have stopped in the state they existed at the moment the switch was thrown. But, if the subject is observing this and experiences time passing still, it must be that they are on a different time line that is perpendicular to the first and will continue moving in that direction of time. This could happen once more with this 'magic' switch and the subject would see that all time on both previous time lines is frozen and he/she is still moving in

time in a different direction, otherwise they could not be 'experiencing' the observing of the first two. This new time line would be one that is perpendicular to the first two and would be the 'z' axis of a three dimensional x, y, z coordinate system.

Accepting this possibility, one would have to say that there are 3 dimensions of space and 3 dimensions of time as well.

HYPOTHESIS # 1:

TIME IS 3 DIMENSIONAL IN THE SAME WAY THAT SPACE IS 3 DIMENSIONAL, AND OVERLAPS SPACE.

Astronomers today would have a problem pointing to any region of space and saying, "This is where it all began" indicating where the center of the expansion took place. In my diagram it would be analogous to a person on the surface of the earth, being restricted to the 2 dimensional surface, trying to point in any of the east/west/north/south directions and say the center of the earth is in that direction. The Big Bang took place in space/time, not just space. The above diagram would require the reader not to point in a spatial direction toward the event, but backward in the time direction toward the center.

If the wave front of the explosion is moving outward from the origin, it must be doing so at some finite velocity. Because space is expanding and there is nothing yet in the region outside or in front of the wave front, movement of anything inside the wave front is restricted to the region inside the sphere. This implies that there must be limitations on movement within the sphere.

HYPOTHESIS # 2:

THE SPEED OF LIGHT, OF 300,000 KM/SEC, REFERRED TO IN RELATIVISTIC EQUATIONS AS A UNIVERSAL SPEED LIMIT, IS THE RATE AT WHICH THE WAVEFRONT OF SPACE/TIME IS EXPANDING OUTWARD FROM THE CENTER.

The one thing that seems to be most constant and unchangeable in the universe is the rate at which time passes. This constancy must be linked to a process that is as immovable as the universe. In fact it is. It was Einstein's equations that showed the scientific community that time was flexible, but only by moving at very high velocities with respect to other relatively "stationary" objects. This movement and its relationship to time have never been explained.

It was while writing this paper that the idea was born that time is flowing forward at such a constant rate because the whole universe is expanding at a very constant rate. This suggested that time is expanding along with space. Why then does moving at a very high velocity relative to other objects in the universe alter this very constant value?

It then was realized that if an object could move faster than the value of C , it would be moving faster than the expansion of the universe and that suggested it could "leave" the universe.

It seems as if there is a natural law that "Nothing can leave the universe or attain a velocity greater than the rate at which the universe itself is expanding. If it were possible to exceed this velocity, the object could overtake the wave front and advance past it into an area where space/time does not yet exist. With a speed limit of ' C ' any vehicle or object could never overtake the outer boundary of the wave front.

The equations of Einstein's special relativity suggest other phenomenon that seem strange to the reader and are never clearly explained by any process. They suggest that any object approaching the speed of light undergoes foreshortening, becoming smaller, and also begins to experience "time dilation" or a slowing of time relative to its an

external frame of reference. This suggests that traveling at or exceeding the speed of light would be to stop time altogether or to even travel backward in time.

The formula for this change, as derived by Einstein, is as follows:

$$W' = W \sqrt{1 - \frac{v^2}{c^2}}$$

Where W' is the clock within the reference frame of the object approaching the velocity 'C' and W is the time represented by a clock in the rest frame relative to the moving frame.

A typical application of this formula would be to an object hypothetically moving at .9C, or 90% of the speed of light, relative to an object at rest. While a clock in an external reference frame at rest relative to the moving object would show that during the time that one hour had lapsed, the clock inside the object would be indicating that only about 25 minutes had passed.

The math also suggests that if the object were traveling at the speed of light, that during one hour of external time relative to the moving reference frame, no time at all has elapsed inside the moving reference frame.

A corollary to this hypothetical situation, often overlooked is that such a traveler making a journey at the speed of light, would notice that any speed indicators on board the spacecraft would indicate that the craft was moving at infinite speed since it would be obvious that it was moving through space with no time elapsing. In fact from the

moment relativistic effects began at approximately 50% of the speed of light, it would seem that the spacecraft was accelerating unbelievably because of the combined effects of time dilation and the increasing distance being covered in each succeeding second. Because the traveler would experience that a great distance had been traversed with little or no time elapsing he/she would feel that they had instantly been teleported very far from their point of origin. At the same time, external clocks outside the moving reference frame would show that a great deal of time had elapsed.

HYPOTHESIS # 3:

ALL MOVEMENT IN SPACE IS ALSO A MOVEMENT IN TIME IN THE DIRECTION TOWARD THE CENTER OF THE SPACE/TIME WAVE FRONT.

There arises a serious question about moving at relativistic speeds and its effect on time. Why does movement, any movement, result in time slowing down? The answer lies in the expansion of space. As space carries us along in its expansion we are forced to also move in the positive direction of time, as that is also the direction that time is expanding. When we move at relativistic speeds we are “breaking” away from the grip that space has on us, and the expansion of time and space is passing us by. From another perspective, we would also be moving toward the inside of the space/time sphere mentioned earlier. There is an analogy that simplifies this description.

Imagine that space, due to the expansion of the Big Bang, is like a giant conveyor belt that is pulling everything contained in it along on the belt toward the outer edge of the space/time sphere or wave front, at the speed of light. If the belt is sticky enough, all objects will tend to stay on the belt and will be carried along on the ride of the Big Bang expansion. Somehow, when an object approaches the speed of light, it breaks free from the “sticky belt” and is no longer pulled along with it in time. As a result it is left behind

and “senses” that time is no longer passing, or expanding, at the same rate as before. This would explain why an object moving very fast in ANY direction experiences the phenomenon of Time Dilation. The object would have “jumped off” the conveyor belt of space. This is a partial explanation for the relativistic effects that occur in Black Holes due to gravity. According to Einstein’s General Theory of Relativity, gravity and the presence of objects of great mass, distorts space and time within the boundaries of high gravitational influence. I would compare this to “breaking away from the sticky conveyor belt” analogy.

This would explain why traveling at the speed of light is analogous to traveling opposite in the space/time direction to the direction the wave front is traveling, resulting in a slowing of the sense of time for the reference frame.

At this point it is important to point out a very important property of time.

HYPOTHESIS # 4:

WE EXPERIENCE THE ILLUSION OF TIME BECAUSE THE MASS OF THE UNIVERSE IS ROTATING THROUGH SPACE-TIME IN THE DIRECTION OF THE ORIGINAL SPIN OF THE PRIMORDIAL MASS.

Time is not moving past anything because there is nothing to move past. That is why it is so important to realize the difference between the movement of time and the expansion of time. Space is expanding at the same rate that the time dimension is. We are carried along on the wave front of the expansion because space and time are expanding at the same rate.

In order to understand the following explanation of time, it is important to grasp a fundamental concept.

From this moment on, the space dimensions and time dimensions will be referred to simply as “Space-Time”, as a single entity. This is because for all practical purposes, they behave as if they are one entity.

Also, the reader must imagine that all of space-time is comprised of an infinite number of points on a coordinate system that has 4 coordinates, 3 of space and one of time.

The illusion of time passing is the result of the changing of the coordinates for an object due to its movement from point A to point B. This is valid since relativity states that all movement in space is also a movement in time.

The question has to be asked, “Why does time pass when an object is not moving?”. The answer is that even objects that appear to be stationary are still moving and this goes back to the beginning of the expansion. At the initial explosion, all matter (or energy), all space, and all time, was thrown out from the center of the blast equally, and the expansion of space-time began. Matter followed later due to having a property of mass called inertia and was slower than space-time to respond. An unusual phenomenon occurred in that the initial mass had a property called “SPIN”. As we now know, subatomic particles have this as one of their properties and as we look out into the heavens we see that all galaxies and massive bodies have a certain amount of spin.

When an object that is spinning undergoes a transformation, spin is conserved due to a physical law that says, “In any transformation of matter, angular momentum (spin), is conserved”. In the Big Bang this law was manifested in the matter that was thrown out by imparting some spin to all mass, as well as the universe as a whole.

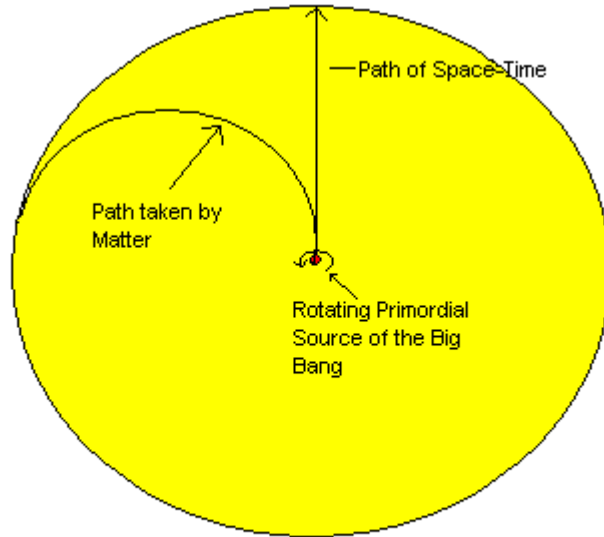
When, in the writing of this paper, a problem arose concerning how time was passing, it was realized that in order for time to “pass” it must be moving relative to

something else. In an explosion that cast everything out linearly in a straight line, space-time would not be moving past anything, particularly the matter that followed, because there would be nothing to move past because all things were moving at a constant velocity, the speed of light. However, it was realized that if matter had a rotational property, it would not go out in a linear fashion but would rotate about the center of the explosion. The reason for this rotation as matter moved out away from the center is explained by the effect matter has on space-time itself.

It is well known from relativity that a massive object distorts space-time and creates the illusion of objects moving in a circular path about the center of mass. At the time of the explosion, space time was most distorted around the massive center and as the explosion took place, as space-time expanded linearly outward, all matter followed the outward expansion toward the wave front as well as the curvature of space time. This resulted in a spiraling motion outward toward the wave front while at the same time taking on a rotation about the center of the explosion due to a phenomenon called “Frame Dragging”. In this way space-time, expanding straight out from the center would be moving differently from matter. Space-time does not have momentum or inertia and would not be affected by the conservation of angular momentum as matter is.

Why is this important?

In the writing of this paper all possible ways were considered in which the illusion of the “passing of time” was possible and all failed logically except this one. The conclusion was that there was an initial “spin” to the primordial mass from which the matter of the universe was created.



Expansion paths taken by Space-Time Vs. Matter

Because all the mass in our local inertial frame of reference is moving with space-time outward and at the same time moving laterally through space-time, due to the original rotation of the primordial mass, we experience the phenomenon of a continual changing of our space time coordinates at a very constant rate, causing us to “sense” that time is passing. All events that take place in our frame of reference have different space-time coordinates, therefore all events have a different position in space-time

If time can only occur when the space-time coordinates of a given object are changing, and the initial explosion at the Big Bang was entirely linear with respect to both matter/energy and space-time, time would not pass, because all things would be thrown off equally. There would be of no changing of coordinates, only expansion of existing points.

For time to be “passing” something must be changing. What is changing is that, all matter is “rotating” through space-time, about the center of the explosion. Therefore, at every moment, every material object in the universe has a different set of coordinates.

It could be argued that there was no “matter” at the time of the explosion, only radiation and plasma, but this quickly condensed out and material elementary “particles” began to form and behave as matter. The conversion of pure energy to matter according to the $E=MC^2$ formula took place very quickly after the explosion. Just as super massive Black Holes have an effect on surrounding space-time, yet do not have “matter” in the form we know it, the primordial object from which the universe was formed affected space-time in the same way.

As matter rotates through space-time, every point in every “bit” of matter is being redefined with a new set of space-time coordinates. Every time this set of coordinates changes, we experience an “new” moment in time. This would only happen if matter were moving laterally through space-time to some degree. A linear movement alone would not produce this effect, due to the velocities being the same.

An interesting side effect of this process is that time is speeding up. As objects experience the passing of time because of movement through space-time, this passage, and thus the changing of coordinates would be proceeding faster if space-time were expanding. At any given moment, matter would be moving through more points of space-time due to expansion than at a previous time. After 14 billion years of expansion this change in rate would be small because as a balloon grows larger at a constant rate of inflation, the surface will be changing less and less the larger it gets.

Nevertheless there is an increase in the rate at which time passes, however small, due to the expansion of the universe, because matter is passing through more and more space-time due to the rotational component of its movement from the center. This change would be imperceptible except for observation of very distant objects, such as galaxies, from which the light started toward us at a time when time flowed more slowly. The result would be the appearance that the galaxies were accelerating outward faster as time goes on.

This illusion is being observed today and is mistakenly interpreted as being due to “Dark Energy”, when it is actually due to a distortion of space-time.

A simpler explanation of this effect is that, since we are observing events that took place in the past at a time when time itself was moving slower, with eyes that are experiencing a faster rate of time, all past events and processes will appear to be speeding up, or accelerating.

One question that remains unanswered concerning the Big Bang is “Where is the vacuum created by the blast?” In every explosion the blast throws all material out from the center of the blast. If all material thrown out is given the same velocity, as was in this case, then all “blast debris” should go out together as an ever-expanding shell of a sphere. There should be very little left in the middle. The effect would be very similar to a “smoke ring” that is sometimes given off when a gun or cannon is fired, except that it would be a 3 dimensional sphere.

When a bomb bursts, the crater left behind contains none of the original material that was there originally. By this logic, there should be a huge hole in the universe from

which the Big Bang originated from, surrounded by all the matter, Space-Time, and anything else that was thrown out, contained in a spherical “shell”.

All previous Space-Time diagrams of the Big Bang show matter being distributed evenly throughout the universe, leaving the impression that matter is evenly scattered about the center of the Big Bang. This would not be possible in a uniform explosion in which the initial energy of the explosion would impart equal velocity to all matter.

All matter we see today should be equidistant, within a range, from the source of the blast, leaving a vacuum in the center. When we measure the distribution of galaxies in the universe today we get a result that is reasonably homogeneous and even because we can only see the “shell” of the wave front given off by the explosion. This “shell” also includes Space-Time that is also moving evenly outward from the center along with the matter contained within it. We see no “hole in the universe because only the matter thrown out originally is visible to us. The “hole” would not contain space-time because it has been thrown out also, leaving a region of chaos, void of all that is familiar to us.

Could this region be the area portrayed earlier on the inside of the Space-Time diagram, underneath the area labeled the “Reality Shell”? If so then that diagram is really more accurate visually, dimension-wise, than was suggested earlier because all known Space-Time and matter is shown contained in a spherical shell about a region of quantum chaos. This lends support to the original concept of a Quantum “Barrier” separating the visible Space-Time universe we see from the Quantum chaos that lies underneath all physical matter, and suggests that this concept is an accurate representation of the universe..

One of the most interesting predictions of relativity is the suggestion that objects approaching the speed of light undergo a foreshortening in the direction of travel. The reason for this is more complicated and is rooted in present-day knowledge of Quantum mechanics.

It is now known that when we examine objects smaller than subatomic particles strange things begin to happen. Probability becomes the dominating factor in determining events at that level and even space and time itself begin to have limitations that are exhibited in experiments, such as the famous double slit experiment. Lately, particles have been observed that actually travel backward in time and the idea of particles itself is obscure. String theory has been advanced as an explanation for some of this phenomenon but the size of the strings is unimaginably small and may never be approachable with experimental methods.

For reasons not yet fully understood, size is a very significant factor in understanding the processes of creation of particles and events. It seems that we live in a "Macro" world of static energy and particles that obey static rules of physics in a very stable manner, while underneath all things that we recognize as our "reality", lies another universe of chaos where events and objects are in a constant flux of creation and destruction. This is the world of Quantum Mechanics.

As I, like others who have studied this quandary, became frustrated by the lack of rules by which to make predictions of what was going on at this level, it occurred to me that perhaps there is a natural boundary between our "macro" world and this "sub-micro" realm.

What if there is a lower boundary to the size of all spatial objects and once that boundary is crossed, you enter a realm where the ideas of space and time are undefined or nonexistent. There is a good analogy that helps to understand the diagram. If we visualize the previously mentioned space/time diagram as the sphere of the earth, our macro 3 dimensional universe could be seen as the crust of the earth, while the "sub micro", or quantum, realm would be the inside of the sphere or the "mantle".

But Einstein's equations predict shrinkage only in the direction of travel for a moving object at close to the speed of light. The previously offered hypothesis suggests that the entire object shrinks in all dimensions.

In support of this idea is a mathematical 'proof' contained in a paper entitled **Millennium Relativity** ©2001 by Dr. Joseph A. Rybczyk in which he states at the conclusion,

“At this point one might conclude that a moving particle, object, or body of mass will shrink in size relative to a stationary frame of reference as the relative speed increases. As stated previously, however, it is the standard of measure that shrinks and not the distances themselves. This shrinkage which also affects the measure of distances traveled by any electromagnetic energy propagated by the mass, will occur proportionally in all directions and only become significant at very high speeds that are in themselves a significant fraction of the speed of light. In other words, all objects and propagated energy fields, or more correctly all distances, even those in space will be subject to a standard of measure that shrinks in direct proportion to the size of the moving light sphere defined previously.”

It is apparent that Dr. Rybczyk also believes that objects moving at relativistic velocities experience shrinkage in all dimensions, and believes he has mathematical proof of this. This would be direct support of the idea that a relativistic object will indeed shrink in all dimensions, not just in the direction of travel.

Why this happens has always been a puzzle that required an explanation that was never forthcoming. If the reader understands the above mentioned space/time diagram it

can be understood that all movement in space also involves movement in time because time has 3 dimensions also, and overlaps space. At this point I would like to propose another hypothesis.

HYPOTHESIS # 5:

ANY ATTEMPT TO EXAMINE EVENTS SMALLER THAN A QUANTA OF LIGHT IS ACTUALLY AN ATTEMPT TO CROSS THE "MACRO/SUB-MICRO" BOUNDARY OF QUANTUM MECHANICS AND IS, IN EFFECT, ENTERING THE INSIDE OF THE SPACE/TIME WAVEFRONT SPHERE.

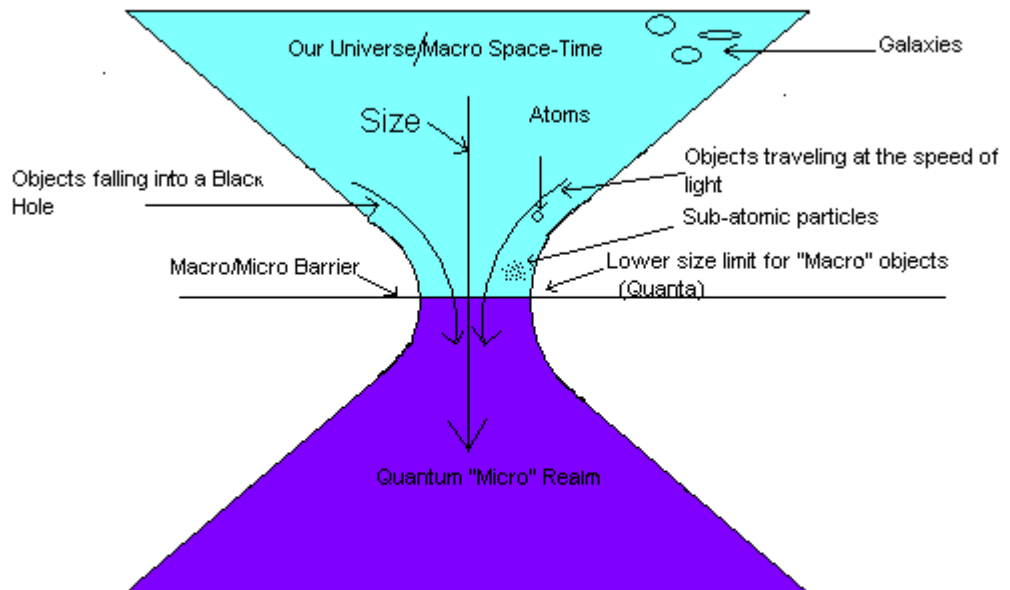
The idea of not being able to observe or measure any particle at the quantum level, suggested in Heisenberg's Uncertainty Principal was always a stumbling block to this writer, as I could see no reason that anything could not be measured, and measured very accurately, under the right conditions. It then occurred to me "What if measurements at that level are meaningless because of a property of space?"

At first, this idea seemed too radical to be practical to me, but I remembered that Einstein's equations predicted that objects traveling close to the speed of light exhibited foreshortening. This was the idea that confirmed to me that I had hit on something important. If objects traveling at the speed of light actually become smaller it could be because they had crossed the space/time wave front boundary and were on the inside of the sphere. This is exactly what happens when we examine objects that are smaller than the given upper limit for quantum effects. Both events accomplish the same thing. They cross over the boundary from the Macro universe into the Quantum "sub-micro" universe and are on the inside of the space/time wave front sphere. This could happen if the object had "broken loose" from normal space, as described earlier.

This concept brings to mind the Chronogeometric structure of the Poincar'e-Minkowski space-time diagram with the hourglass figures describing the space-time region around a given position. I would like to use the hourglass figure in another way to

illustrate the relationship of the universe we know to the “hidden” universe, equally real, that lies in the Quantum realm. The top half of the hourglass would represent the “Macro” part of the universe and the bottom half the Quantum realm, with a bottleneck in the middle representing the ‘barrier’ described above. It really doesn’t matter that the Quantum region is approached by examining very small objects from the Macro side, as, once through the barrier or bottleneck, size is irrelevant.

The following diagram illustrates the relationship between the “Macro” universe we experience and the “micro” universe of the Quantum Realm.



Space-Time Vs. Size

This figure is another “hourglass” diagram that shows the size relationship of our “macro” universe to the Quantum Realm. As can be seen all objects must decrease in

size in relation to the rest of the universe, below the “Quanta” threshold in order to move through the “neck” of the hourglass, into the Quantum Realm where space and time are meaningless in our understanding.

HYPOTHESIS # 6:

OBJECTS SMALLER THAN A QUANTA OF LIGHT DO NOT HAVE SIZE AS MEASURED IN SPATIAL TERMS AND EXIST AS A "QUANTUM OBJECT" WITHOUT DIMENSIONS.

We have a term that seems appropriate for such an object that comes from another field of study. It is called a "*singularity*". Another “Why” question that begs an answer is, “ Why does light exist in particle-like “quanta” when it is actually a wave”?

HYPOTHESIS # 7:

THE BASIC UNIT OF SPACE IS IN DISCREET “QUANTA” UNITS, BELOW WHICH THE TERM “SIZE” HAS NO MEANING, AND IT IS THIS PROPERTY OF SPACE THAT CREATES QUANTA OF LIGHT, NOT A PROPERTY OF LIGHT.

A good analogy of this concept arises in the “computer” realm. All information in a computer is in the form of Bits and Bytes. It is impossible to store information in a unit less than a “bit” because that is the basic unit of information. To say that any information is less than a bit in size is meaningless. In a like manner, space, like light and other massless particles, exists only in discreet “Quanta” units, below which it is impossible to assign a “size” to any object. Since it was determined over 100 years ago that Light “particles” can only exist in small packets called ‘quanta’, we can now predict that this restriction is due to a property of space, and not light itself. The ‘quanta’ would represent the smallest amount of energy that could be “stored” in a “bit” of space, due to space itself not allowing anything to be of a smaller size.

This argument also lends support for the previously stated hypothesis that there is a Macro/Quantum barrier below a given size particle, as nothing of any substance could take on a “solid” or spatial form smaller than that value.

This also offers an explanation for the dual nature of light “particles”. A ‘quanta’ of space is the smallest unit of space that a wave of energy can fit into and as such it appears to be ‘particle-like’ and ‘wave-like’ at the same time. The ‘particle’ form has a size and dimensions, while the wave nature is evident in certain experiments. It seems that light is wave energy that would be continuous in a continuous medium but breaks up into discrete “particles” because space itself is not continuous, but exists as discrete entities. Perhaps this is a description of all “particles.

The string theory predicts that all energy in the universe exists as either “open” strings of vibrating energy or “closed” strings. These strings are so small that they can take on and combine in almost an infinite numbers of variations of form, and then manifest themselves in the units of space just described in the way Photons of light do. This energy can have any wavelength, and therefore various levels of energy, and a variety of “spin”, “color”, “strangeness” configurations. From this mix we get the “Particle Zoo”.

Critics may say that this sounds a lot like a resurrection of the “Ether” concept that was discarded a century ago, however, the exact nature of “ether” was never determined or defined. The basic idea of Ether at the time was that it was a medium, like water, that existed IN space and permeated the universe. This theory is a basic concept of space itself. It cannot be argued that space does not exist. If that were true then what is it that is

distorted in the presence of a massive gravitational field. There must be something there to distort.

We now have insight into another important prediction of Einstein's equations. At the time they were made public, it was quickly realized that by carrying the mathematics of relativity to their extremes, an object of certain mass could, through gravity, actually be compressed out of existence. The idea was, at that time thought to be simply a mathematical oddity that could not possibly happen in nature. We have since learned that those objects do in fact exist in space and are called Black Holes. Roger Penrose and Stephen Hawking gave us an understanding of the processes that take place within Black Holes and defined the outer shell of the objects as an "event horizon". One of the unanswered questions about black holes is "Where do objects go that fall into Black Holes?"

Is it possible that the term "event horizon" actually describes another form of the Macro/Quantum boundary described above and is the point at which an object falling into a Black Hole enters the inside of the space/time wave front sphere? It is well known that anything falling into a Black Hole is compressed into a point in space called a singularity. At some point the falling object would become smaller than quanta-size and would enter the realm of quantum physics, or as I described earlier the "Macro/Sub micro" boundary of quantum mechanics.

This provides a new meaning to the term "point". A point as traditionally defined is dimensionless. Under this new perspective, a point is anything that exists in the quantum region that lies below the lower boundary of space.

HYPOTHESIS # 8:

ANY OBJECT FALLING INTO A BLACK HOLE ENTERS THE INTERIOR OF THE SPACE/TIME WAVEFRONT BOUNDARY, AND EXISTS AS A QUANTUM OBJECT WITHOUT SPATIAL SIZE OR DIMENSIONS.

Although size and dimensions of any such object would cease to be definable, it seems mass of the object is a property that continues. As is well known, it is possible for quantum objects to have certain properties such as spin, mass, "color", "strangeness", etc. and still exist. More needs to be known about how quantum objects behave in order to gain a fuller understanding of such processes. This paper makes no pretense to the understanding of those facets of quantum mechanics.

From the results of experiments that have taken place within the last 10 years, it has become increasingly clear that a boundary exists that separates the stable macro world we live in from the "Sub micro" world of quantum physics. Once that boundary is crossed the characteristics of space and time as we view them in the "macro" world, blur and become confused in the chaos of the quantum realm.

It is possible to enter this realm in 3 possible ways. One way is to become smaller than a quanta of light, at which point spatial dimensionality ceases to exist and the result is that the object becomes a singularity without dimensions. A second way is to accelerate to the speed of 300,000 Km/sec and becoming small through relativistic effects of that velocity. A third and final way to enter the Quantum realm is to fall into a Black Hole and, once past the event horizon, relativistic effects and gravity overcome mass and compress an object into a singularity.

Questions remain as to the nature of this "realm" and what happens to anything of mass that enters into it. Hawking and Penrose has shown that a singularity retains mass, angular momentum, electric charge, perhaps spin, but little else. Any other information

about its former state is lost. This suggests a state that would not be very different from the initial state at the time of the Big Bang. Because the Big Bang event lies at the center of the inner space of the space/time sphere previously described, objects that fall into this inner region may fall all the way back in time to the center of the sphere, or the time of the Big Bang itself. Perhaps the inertia of a falling mass into the quantum realm carries it backward through time to the beginning of time itself.

In any case, it is very probable that any venture into this realm is a path to destruction of any information or form of the object that existed before the journey.

HYPOTHESIS # 9:

ANY OBJECT THAT ENTERS THE QUANTUM REALM BY ANY MEANS WILL ALWAYS BE CARRIED BACKWARD THROUGH TIME TO THE BEGINNING OF THE UNIVERSE AND THE BIG BANG.

In regard to gravity, if we consider that it was the energy of the Big Bang that thrust all matter and space/time outward, there lies a fundamental problem that requires an answer. In quantum physics all matter created requires a counterpart. Matter requires antimatter also be created to balance the creation. All things created in the quantum realm are created in pairs as a positive version and a negative version. Where is the negative energy counterpart to the positive energy of the Big Bang that created the universe? We can answer that question by considering what positive energy has accomplished. It has expanded the space/time continuum and the matter within to approximately 14 billion light years radius. If the gravity of a Black Hole has the effect of sending matter back to the beginning, we would have to consider gravity as the negative energy counterpart to the positive energy that began it all.

HYPOTHESIS # 10:

GRAVITY REVERSES THE EXPANSION OF THE UNIVERSE AND SENDS MATTER BACK TO THE BEGINNING OF TIME. IT REPRESENTS NEGATIVE ENERGY AS A COUNTERPART TO THE POSITIVE ENERGY THAT CAUSED THE EXPANSION.

If every galaxy contains a central massive Black Hole as is now believed, it seems likely that eventually all mass will find its way into the clutches of the gravity of the Black Hole. It was once thought that the combined gravity of the universe would slow down the expansion and that the universe would eventually begin to collapse back into a super massive Black Hole to begin the process all over again. This was sometimes referred to as the “Big Crunch”. It now seems more logical that the mass contained within the universe will continue to expand indefinitely, but with Black Holes at the center of every massive body that is expanding outward, all matter will eventually find its way back to the beginning by falling into Black Holes. Are there enough Black Holes in the universe to accomplish that? I believe there are and as the universe ages all matter will eventually end up in that manner.

HYPOTHESIS # 11:

THE UNIVERSE WILL END BY A PROCESS OF ALL MATTER EVENTUALLY FALLING INTO MANY SEPARATE BLACK HOLES IN MANY SEPARATE EVENTS AND BEING SENT BACK TO THE BEGINNING OF THE BIG BANG.

This would also represent a new beginning and a new start of the clock of time. Perhaps at some point after enough matter has accumulated in the “primordial” Black Hole, a critical value of mass would accumulate and begin the process all over again.

Conclusion

The space/time diagram I have described above is a visualization of the world we call "space" represented as a spherical shell expanding outward from the instant that the creation of the universe took place. The field of astronomy has already determined, to a high degree of accuracy, that all objects located on the "shell" are expanding away from each other at the same time that they are becoming farther away from the initial explosion on the line representing time.

The hard concept to grasp is that we live in the shell and cannot "see" the inside of the sphere because we cannot look backward in time, represented by the inside of the shell. We have barely been able to make intrusions into this realm through Quantum Mechanics, and experiments have confirmed the existence of the chaotic nature of events that take place there.

Any analysis of the Big Bang must take into consideration all factors, i.e. all dimensions, as it is the beginning of all that we call the "Universe". Because of recent developments in the field of Quantum Physics, concerning the theory of a "Multiverse" and multiple dimensions, we must consider that the process of inflation affected all things that make up what we call 'reality' and that all these things were created in that instant. Only when all factors are considered will a true picture of the creation of the universe and its structure emerge.

Time is the most important and least understood of all dimensions and it has not been given the attention due it other than in Einstein's Special and General Relativity theories.

It is also becoming more apparent to theorists that the realm of Quantum Mechanics and Quantum effects is more bazaar and confusing than we ever dreamt. With all the complexity of competing theories, Inflation, String Theory, The Copenhagen advocates, etc., there must needs be a single simplified description of the structure of the universe, or multiverse if you will, in order to bring order out of chaos.

An important idea that this paper has advanced throughout, is easy to overlook. The Big Bang, space, time and everything in between, are still operating and in existence, in a multidimensional sense. Instead of taking the position that the past is irrecoverable and unapproachable, it has been shown that a study of how universe operates today, as a whole, must include all of these things to be understandable. This is the “multidimensional” approach.

This paper has attempted to answer the important “Why’s” and other questions that are outstanding in physics today. The hypotheses advanced have addressed the following issues, with what this author believes are reasonable explanations:

Why is there a speed limit of 300,000 Km/sec. in the universe?

Why do objects foreshorten as they approach this velocity?

Why does approaching this velocity have the effect of slowing "time"?

Where do objects go that fall into a Black Hole? What really is a Black Hole?

What is the nature of Space and Time?

Why does Time “pass”?

What causes the Dual nature of Photons?

Why is the subatomic particle field of study in a state of chaos and called by some the "Particle Zoo"?

What is really happening at the realm of Quantum Mechanics and can we ever understand it?

Whether they are accurate and true or not is for someone else with the resources and means to prove. If the hypotheses put forth in this paper are true, then the universe, as we know it is only a small part of the whole. There must exist underneath the reality we cherish, another ‘universe’ of quantum effects where the physical laws we hold to be irrefutable, are meaningless and time and space cease to exist as we know them. This does not mean that we cannot understand this new world if we apply imagination and perseverance to the effort. After all, “Imagination is much more important than knowledge”, and it is entirely possible that rich rewards are forthcoming if we can gain that understanding.

This paper has been an attempt to describe a model for the universe and its beginning that puts everything in perspective in relation to space, time, relativistic effects, gravity, and Quantum “strangeness”. Hypotheses have been offered that show a different picture of the universe than traditional views. It is important that a true picture of the structure and processes be advanced before real progress in simplifying the theoretical landscape can be accomplished.

The hypotheses put forth in this paper are either, as yet unproven, or represent a new interpretation of “proofs” already existing. However, this writer feels that there is enough supporting evidence to venture a belief that they are accurate. It is the hope of this writer that they will eventually be proven to be true and that perhaps this paper will play a part in spurring someone on to that proof.

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