QUANTUM SPACE-TIME AND THE EVOLUTION OF THE UNIVERSE

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The following is an explanation of the development of the early Universe, including the phenomena known as “inflation”, “dark matter” and “dark energy”, based upon the concept that the size of space and the speed of light contract with the passage of time. This concept means that the speed of light, c, is constant in space but not in time. This approach also provides a basis for quantasizing space-time.

The mathematical description of ex-con concepts is based upon one fundamental relationship, the ratio between two lengths, the overall length of the radius of the Universe and Planck’s length, which here constitutes a minimum length of space that actually represents the size of non-space, a length in space in which normal matter and energy cannot exist, producing quantized space. Overall length represents the radius of the observable Universe, real or theoretical, which remains constant or expands, while Planck’s length in this Universe always contracts with time relative to the overall size of the Universe and relative to itself. This contraction of Planck’s length is the fundamental action of the physical Universe. It creates the velocity between stationary matter and photons and also the apparent velocity between any two positions within the Universe. It also determines the rate that time passes for the Universe overall and the amount of time that has passed since the beginning of the Universe.

With simply the size and age of the Universe and their expansion-contraction relationship, and pi, which defines the initial shape and volume of the Universe as a sphere, and with the concept of a minimum size defined by Planck’s length, it is possible to describe all physical forms and activity in the Universe.

Using the form of a sphere, in its most simple form contraction can be considered to have two fundamental directions. One direction is defined as from the center toward the periphery of the Universe, this defining photon positions and motion in space time, and the other direction defined as toward the center of the sphere which defines the motionless center of a particular non-dilated reference frame. For a motionless observer composed of matter, it can be said that the observer and the space-time which he is in contracts in size toward its own center (usually its own gravitational center), this being one of those fundamental directions of contraction. The other fundamental direction applies to photons. The path of free photons moving away from that same observer can be said to be caused by a contraction of the space between the observer and the periphery of the observable Universe in the direction of motion of the photon. The rate of contraction per unit of space and the amount of space determine the rate of velocity between stationary mass and propagated photons, and this is always c, though this “c”, as opposed to the conventionally understanding of (c), contracts in size with time.

With the fundamental relationship of the ratio between overall length of the radius of the Universe relative to Planck's length and the two fundamental directions of contraction it is possible to develop a basic mathematical description of the creation and expansion of the Universe using the contraction approach. We begin with nothing, meaning no space of any kind, at T''=0, where T'' equals the number of Planck time units (tP) that have passed since the beginning of the creation of the Universe, a creation that begins as a pre-Universe which lasts from T'' = 0 (tP) to T'' = 2(tP).

Let's say that this creation begins as two sphere balls with the same center point, one ball's radius representing a maximum possible size for a length of space within what will be the observable Universe while the other ball's radius representing a minimum distance, the distance that light travels in a vacuum during 1 Planck time unit, this equal to Planck's length (nothing smaller since the Planck time unit is a minimum). The radii of each sphere initially expand at the same rate, from 0 to lP/(Tp^1/2) in 1/(Tp^1/2) (tP), where Tp equals about 8.08 x10^60 (tp), approximately the number of (tP) that have passed since the beginning of the Universe as measured today in terms of Planck time. Since at this point in time they are equal in size there can be no space in the Universe, nor void in the pre-Universe, under these conditions.

From this point the radii of the balls representing maximum and minimum size expand at different rates so that after 1 (tP), at T''=1 (tP), maximum radius size reaches approximately 2.60 x10^26m, approximately equal to today's perceived radius of the Universe, while the minimum radius size expands to about the size of today's Planck length. The differences between the sizes of the radii create a volume of the space between the inside surface of the ball representing maximum size and the outside surface of the ball representing minimum size. This is not the space of this Universe but instead a pre-Universe semi-void, with the surfaces of the spheres representing the boundaries of the semi-void. The radius of the sphere ball representing the maximum radius of the pre-Universe, this at T'=0, with T'= T''+1, collapses by a factor of 1/(2(Tp^½)), or 1/(2.84x10^30) from its maximum size of approximately 2.60 x10^26m to approximately 4.57 x10^-5 m. Over the same period the radius of ball representing the minimum size, this radius equal to Planck's length, expands from approximately 1.61x10^-35m to 4.57x10^-5m, this producing a collision between the expanding sphere representing Planck's length and the contracting sphere representing the pre-Universe void, this at T=0 tP, where T=T''-2, and also T=T'-1, this the age of the Universe in Planck time units. This collision creates the space of our Universe.

For this newly created Universe the overall actual size of the radius of the solid sphere representing the Universe begins as a constant size of [C'(1ptu)], or 4.57x10^-5 m in size. However, overall size can increase, through an overall time contraction, or, in other words, "time acceleration", (A), which is now the term I'll use, where (A) is the time acceleration factor. The relative overall size of the Universe, relative to the it's initial size of (C'x1tP), will equal 2(A)(change in time)(C'(1tP) after a time acceleration of (A), where change in rate of time equals approximately (T^2)/tP, and rate of growth in size equals 2C' per tP. The rate for passage of time for the overall Universe at any particular time is defined by (Ur/lP)/tP. The expansion factor of 2 is associated with the de-dilating of space-time.

Three more basic principles apply to this model.

1. As the solid sphere actually expands, or just appears to expand because of the contraction of Planck's length, new contraction points in space-time are created at appropriate rates and positions to maintain appropriate primordial substance density.

2. The combination of contraction and expansion associated with time acceleration can be described in terms of basic exponential and logarithmic functions. Expansions and contractions can be described as summations of natural sub expansions and contractions described by Tp^1/2, Tp^1/4, Tp^1/8, Tp^1/16, etc…, where (Tp) = 8.08 x10^60 ptu, approximately the apparent age of the Universe today in terms of Planck time units. These can be used to describe eigen lengths and eigen times in the evolution of the Universe

3. Overall and internal expansions are different. Overall expansion requires the Universe as a whole to expand in size, while internal expansion is caused by a reduction in rates of spatial contraction. It is also possible for both to occur simultaneously. The internal expansion rate of space divided by the contraction rate of c will always equal the change in T. Consequently, when there is a contraction by 1/T, and no expansion, the rate of apparent spatial growth is c. When there is an internal expansion by (T^½) and contraction by 1/T^½ the apparent growth in space also equals c. When there is almost no contraction, an internal expansion rate of c will produce an apparent growth rate of c. Each of these three combinations produce different mass-energy-space relationships. The first creates the primordial substance and massive time dilations. The second produces a time contracted (accelerated) condition and rapid expansions of space. The third produces normal space-time.

So we have:

A theoretical radius of today's Universe, (Ur), of approximately (2.60 x10^26)m, and a Planck length = 1.61 x 10^-35m. The ratio of overall size of the radius of the Universe relative to Planck's Length, is equal to (2.60x10^26 m)/(2(1.61x10^-35m)), which equals 8.08x10^60, equals approximately the number of Planck time units that have past since time began in the Universe (Tp). The factor of 2 added to the contracting factor will be explained later as a result of relative "repositioning". Tp equals 8.08x10^60, with Tp^1/2 =(2.84 x10^30), Tp^1/4 = (1.69x10^15), Tp^⅛, which equals (4.11x10^7), Tp^1/16 = 6.41x 10^3,Tp=^1/32, which equals 8.01 x10 etc...

We also have (c)=C'/T+1, where c equals the speed of light after (T) Planck time units have passed since the beginning of time in this Universe, C' equals the speed of light at T =0, equal to approximately 4.57x10^-5m/(tP), and T equals the number of Planck time units that have passed since the beginning of the Universe. T=0 is also the point in time when the speed of light (Planck’s length) begins to contract. We can equate (T+1) to x. As time passes from that point Planck’s length contracts at a rate of [-2C’/x^2 per (tP)^2]; x not = to zero.

At the initial collision there is no space in the Universe. Between 0 and Tp^⅛ tP the overall size of space appears to expand, not due to actual expansion but instead due to the contraction of our measuring stick for the size of space, Planck’s length. Due to the nature of this contraction at this time in order for any point in space to be considered to be in a constant position relative to the non-moving original center point of the Universe, this representing the center of the single non-dilated space-time frame that exists at this time, the space located at any point any distance from the center of the Universe will need to have a countering motion toward the center equal to (d/Ur)(c) where d equals the distance between the positions and Ur equals the radius of the Universe. Otherwise, without this countering velocity, mass (or primordial substance) at these positions will appear to have a velocity relative to the original center.

According to this contraction approach, at this point in time the space of the Universe acts according to Special Relativity, but not General Relativity, because of the size and nature of the contraction of space. This difference is caused by a different “shape” of space, as compared to General Relativity. At this point in time the volume of the Universe equals the volume of a sphere with a radius that is actually about 4.57x10^-5m, though the radius will measured as less than or equal to 6.62x10^-28m since Planck’s length at this time is actually equal or more than about 1.11x10^-12m. For lengths under this relative size of 6.62x10^-28m gravity does not bend space in such a way as to cause mass and energy to accelerate toward a point at the center of the volume of space. Instead, gravity’s effect on space this small is to bend it so that mass-energy, or primordial substance, in that space is accelerated toward the inside surface of the volume of space defined by these sized radii. Thus, mass-energy, or primordial substance, within the sphere is accelerated toward the inside surface of the sphere. Consequently, at this relative size radius, approximately 6.62x10^-28m, gravity's effect on space-time must be quantized. This quantization is why theorized gravitational singularities do not actually exist.

With the conventional interpretation of General Relativity every point in space-time can be described as possessing the same non-dilated condition (except for the effect of gravity), even though there are velocities between different positions. This is because these velocities are caused by what is conventionally called spatial expansion (which I say is actually a result of contracting standard of measure for space, c) and not by changes in measured inertia. With the contraction approach it is also possible to describe space-time in this way. However, with my approach, at this point in the evolution of the Universe, when its relative radius is under 6.62x10^-28m in size, the structure of space-time is different than during and after inflation. Increased densities of the primordial substance at any distance from the center are caused by a gravity like force with the source of the gravity located near the periphery of the Universe. This means there will be intrinsic differences in measured inertia and momentum, mass-energy, or primordial substance densities depending upon their distance from the initial center of the Universe. When there are increased densities of primordial substance at these positions in space at this time it is there because the space-time at these positions are already distorted by a form of gravity, producing a corresponding acceleration and velocity for the primordial substance away from the center, with position further from the center more strongly affected. This movement away from the center counters the natural velocity of positions in space toward the center of the Universe, as described earlier. This then results in a time dilation, length contraction and increase in mass-energy for the primordial substance located there, relative to the primordial substance at the motionless center. These changes in measured mass-energy are described by the Lorenzt-Einstein equations of Special Relativity. (see appendix)

Summing up the situation, the initial expansion-contraction collision creates the space of our Universe as a single contracting non-dilated normal time reference frame with a motionless center, and with corresponding relatively dilated frames at positions further from the center possessing greater relative time dilations, this producing greater density for the primordial mordial substance located at these positions. We can say at this point the Universe seems like a sphere ball with the most dense volumes of space near the inside surface of the sphere, and the least dense at the center. It should be noted here that objections due to the issue of low energy in bounded space are addressed by the spatial form at this point in time, which is different from normal. Short wavelength low energy particles can exist in this condition, since our standard of distance, Planck's length, is actually between about (4.57 x 10^-5)m and (1.11x10^-12)m at this time.

So we have:

From 0 to T^⅛ tP the space of the Universe contracts by -C'/(tP)^2 with almost no overall expansion. The overall size of the Universe can also expand, though for now we'll consider the size as constant and which does not begin to expand rapidly until about 4.11x10^7 tP, or about 2.22 x10^-36 seconds have passed since creation began. At this point a general and natural time contraction (acceleration), which can be considered to be caused by a component of the primordial substance being converted to “dark energy”, begins to “unravel” the time dilated space-time of the Universe, with the greatest time contraction near the periphery of the Universe, where space is most time dilated (most dark matter gravity). This rapid expansion occurs because the force that retains the Universe in it's compressed and time dilated state, this force today referred to as “dark matter”, begins to convert to dark energy, at a range of approximately (2.22 x 10^-36 sec(c)), or about a measured 6.62x10^-28m. As each point in space exceeds this relative distance from the center of the Universe, exceeding the range of the local binding force of dark matter, it rapidly accelerates away from the center, this phenomenon today known as the “inflationary” phase of the expanding Universe.

We should understand this expansion as the aggregation of two distinct expansion factors. One is what I earlier referred to as internal expansion. This expansion results from the reduced contraction rate, in this case to almost zero, of the Planck length. The internal expansion rate is this at this time because during the period of overall expansion there is a degradation of the rate of contraction of c, to a rate of(-1/T^3)/tP, effectively reducing the contraction of c, close to 1:1. This produces “internal expansion”, an actual expansion in the size of c relative to what it would have been if it had contracted at its previous rate of contraction, (-1/T^2)/tP. This then has the effect of reducing the rate of apparent expansion of space, by a factor of (1/T)/T, by a total 1/(Tp^1/8) in this example, because of this expanded standard of measure, c. At this point in time, during inflation, there is a corresponding actual expansion of the radius of the Universe, which until this point has held steady at a value of about C'. Part of this expansion is produced by this relatively larger c, creating what would be a total expanded internal size of (Tp^⅛)C'. This produces the requisite expansion-contraction ratio where change in T equals the expansion rate divided by the contraction rate. The second type of expansion produces what today is known as inflation, this at a rate amplified by a factor of Tp^¼(Tp^⅛). This brings the total "amalgamated" expansion to a factor of Tp^½.

After overall expansion begins there is an increasing rate of expansion for the radius of the overall size of the Universe increases, reaching a maximum, then slowing, eventually returning to zero. The slowing is produced when expansion reaches a maximum limit, causing a rebound force of contraction. The direction of this contraction is different from the original contraction in that the original contraction was toward a single motionless centerpoint in the Universe. This revived contraction is toward a multitude of center points dispersed throughout the Universe through the inflationary expansion, as explained in the appendix. This space now acts according to the laws of General Relativity. After the inflationary period ends and the overall size of the Universe is constant and stable, the contraction rate of Planck's length continues, at a reduced rate of 1/(TT^½), while internal expansion rates continue at the reduced rate of (T^½)/tP.

It should be noted here that the inflationary period is the product of a time contraction, by a factor on the order of 1/(2.84x10^30), which in turn equals a time acceleration factor on the order of 2.84x10^30. Consequently, the time-accelerated Universe completes its time cycle of 8.08x10^60(tP) at about 2.84x10^30(tP), about 1.4x10^-13 sec. In a manner of speaking the Universe is fully constructed at this point, meaning that all possible futures are already constructed. The realized forms of the Universe at each point in time then become exposed as the reality of the present as time passes, a passage that is defined by rates of contraction of Planck's length.

As explained, dark matter, which until Tp^⅛ tP has been existing as part of the primordial substance, begins to convert to dark energy at Tp^⅛ tP. Consequently, from about (2.22 x 10^-36sec after the initial creation of the Universe until about (9.13x10^-29)sec, an overall expansion occurs, at an average rate of 2(Tp^¼)/(ΔT). This expansion lasts for (Tp(¼)-(Tp^⅛)tP, until about (1.69x10^15) tP, or (9.13x10^-29)sec, producing an expansion equal to 2(Tp^½)(C'), this equal to about 2.6x10^26m, approximately equal to the present radius size of the Universe. However, from the perspective of an observer at that point in time, with Planck's length, our standard of measure, at this time larger than today's Planck length by a factor on the order of approximately 6.91 x 10^22, or about (1.11x10^-12) m, the Universe will appear to have a radius of only approximately 2.6x10^26m/2(6.91x10^22), equal to about (1.88x10^3)m.

For a precise mathematical description of actual and apparent expansion of the Universe three distinct time periods must be considered in terms of expansions and contractions:

1) (0≤T≤Tp^⅛)tP,
2) (Tp^⅛≤T≤Tp^¼)tP,
3) (Tp^¼≤T≤Tp)tP.

1) When (0)≤T≤Tp^⅛)tP, (0)sec to about 2.22x10^-36 sec, the measured volume of space in the Universe equals the volume of the sphere representing the overall size of the Universe, which at this point in time remains a constant with a radius of 4.57x10^-5m, minus the volume of a sphere with the same center as the first sphere but with a radius equal to Planck's length at the time, this equal to (C')/T+1, this representing the size of "non-space". The volume of space in the Universe at T=0 then equals (volume 4.57x10^-5m)-Volume((C')/T+1), so at T=1, Volume =0. As time, (T), increases, V increases.

The maximum apparent velocity between two resting points for mass is created by the contraction of the maximum distance possible between those points in space, and this equals [C'-(C'-{(u^2)-1)^½}/(u)]/T, while the velocity of light equals C'/T. As explained in the appendix, with my approach at this point in time velocity is not not just apparent, but actual. Maximum actual velocity at maximum separation produces a maximum time dilation. Velocity of mass-energy and its time dilation factor (u) increases from zero at the initial moment of the collision until it equals approximately Tp^⅛ (approximately 4.11x10^7), at approx 2.22 x 10^-36 seconds after the beginning of the Universe. This means that the primordial energy that is created at the instant of the initial collision is then distributed through the Universe for about the first 2.22 x 10^-36 seconds of the Universe. This period of time represents a quantum time period, giving a quantum length of (2.22 x 10^-36 seconds(c)), equal to about 6.62x10^-28.

Under these conditions at any given time during this pre-inflation period maximum velocity for mass equals c-(c-(((x^2)-1)^½)/x. As maximum possible velocity increases, maximum possible time dilation increases, as does measured relative mass and relative length contraction. The maximum measured mass occurs when the time dilation factor (u) equals (Tp^⅛)ptu, this at maximum velocity for mass, which equals c-(Tp^⅛ vel). At this maximum possible velocity and time dilation time contraction (inflation) occurs.

2) When (Tp^⅛)≤T≤Tp^1/4, from about 2.22x10^-36 to about 9.13 x10^-29 sec, as the range of the binding force (6.62x10^-28m) is exceeded, velocity is produced by de-dilation (expansion) of space. Overall expansion (inflation) commences at an average rate of [(Tp^½)C']/(Tp^1/4), over a period of (Tp^¼) tP, which equals [(Tp^1/4) C' per tP, while internal contraction almost, but, not completely, stops. This lasts for a period of approximately (Tp^1/4)-(Tp^1/8)tP, or about (9.13x10^-29)sec-(2.22)x10^-36)sec, so approximately 9.13 x10^-29) sec. While an average rate of [(Tp^½)C']/(Tp^1/4) exists over a period of (Tp^¼) tP, we can produce an acceleration-deceleration curve for expansion that shows that a proportionally higher rate of acceleration occurs between Tp^1/8 tP and Tp^⅛(Tp^1/16) tP. When we make the average overall expansion rate average (Tp^1/4)(Tp^1/32)/tP over this period of time, approximately

2.63x10^11 tP, or about (1.42x10^-32)sec}, total overall expanded size at this point in time will equal approximately (Tp^1/4)(Tp^1/32)C'(2.63x10^11)tP, or 2.73 x10^28 m, this equal to approximately the present size of the Universe (8.08x10^60)tP(c) divided by (Tp^1/32), or 8.01x10, giving an overall radius of (1x10^59)m. From this point in time, at 2.63x10^11 tP, or about (1.42x10^-32)sec}, until 9.13x10^-29 sec, the average expansion rate will be reduced to [C'/(Tp^1/8)]/tP so that at 9.13 x10^-29 sec overall size of the Universe measured in terms radius will equal (Tp^½)C, or about 1.3x10^26m, ½ the present day size. Under these circumstances, there also must be a contraction for Planckn's length, buy a factor of 1/(Tp^1/32) in order to fulfill the requirement that the rate of expansion times rate of contraction must produce a rate of growth equal to c.

Maximum red shifts are produced at this time. Red shifts that we measure today reflect the actual size of wavelengths at that time, not just stretched versions expanded by the expansion of space. While it is true that the rapid expansion of space is producing these redshifts, after inflation it is the contraction of space with time that produces their apparent relative growth. Relative growth, since the wavelengths actually remain the same size as initially created, even though other aspects of energy and space-time that the wave represents do change. It should be noted here maximum time contraction produces a maximum sized frame that encompasses all space- time. This defines an all encompassing "membrane" of "accelerated" space that connects all the Universe and which can be transversed in 1 Planck time unit. It is the fundamental quantum level of space-time.

3) When [(Tp^1/4)≤T≤(Tp)]tP, (from about 9.13x10^-29 sec until now), the actual overall expansion of space by time acceleration (inflation) has stopped, while the rate of the contraction of space has degraded from an original rate of approximately -c/Tp^2 per tP to a rate of approximately -c/(Tp^3) per tP, which causes what I call "internal expansion"; an expansion in the size of Planck's length relative to what it would have been had the rate of contraction had returned to pre-expansion rates. This reduces the total apparent expansion rate of space in the Universe by a factor of [1/(T^1/2)] per tP. Thus, from (Tp^1/4) tP to (Tp^1/2) tP, from about (9.16x10^-29) sec to about (1.53x 10^-14) sec, the amount of apparent excess radius expansion as measured at (1.53x 10^-14) sec, will be reduced to about (Tp^1/4) c, as opposed to the (Tp^1/2)c that you would expect at normal contraction rates. Consequently, the radius of the Universe at (1.53x 10^-14)sec will then measure about (Tp^1/4)(1.53x10^-14)c, or about 7.71x10^9 meters. There will be an excess of overall radius by a factor of about (Tp^1/8) after approximately (Tp^1/2)(Tp^1/4) Pt (equal to about 25 sec), and thus an apparent size for the radius of the Universe at that time of about (3.07x10^17m), equal to about 30 light years. After about (Tp^1/2(Tp^1/4)(Tp^⅛)tP, or about 300 years, the Universe's radius will appear to be about 300,000 light years, (Tp^1/2(Tp^¼)(Tp^⅛)(Tp^1/16)tP (c), etc..

These results are consistent with presently accepted results produced by today's conventional methods. More accurate results may be obtained by varying expansion-contraction rates by including smaller blocks of time (quantum levels) in the analysis; such as (Tp^1/16)ptu, (Tp^1/32)ptu, etc. It then is possible to alter the time duration of the overall expansion, ("inflation") and still obtain the proper expansion profile that exactly matches observations.

The cosmic net formation can also be explained with the ex-con approach. Dark matter is a gravity amplifier caused by overlapping ripples in space-time which act as an amplifying resonator for gravity. The amplified density of the primordial substance near the periphery of the Universe before the inflationary period is also caused by these overlapping ripples. These ultimately produce the cosmic web that forms after inflation. These rings of more gravitationally dense areas of space, which appear as a ring of dense gravity near the periphery of the Universe just before the inflationary period begins, will contract in size relative to the overall size of the Universe during the inflationary period, this because of a reduced expansion rate for the maximum dilation positions relative to the overall expansion rate of the radius of the Universe. We can say that before inflation there are two distinct spheres, one which represents the furthest positions for photons, the other, the furthest for matter, from the center of the Universe. For the sphere representing matter's positions, contraction relative to the overall size of the Universe by a factor of 1/Tp^1/32 produces an average size of the radius of the filaments that comprise the cosmic net. We can add a third sphere which contracts by a factor of 1/(Tp^1/16), producing the average size of the radius of galaxies.

THE END

Appendix:

Here I explain the concept of a Universe with an initial single non-dilated reference frame centered at the center of that Universe, with space at any distance from the center moving toward the center, thus enabling positions in space to maintain a constant relative distance from the center. This compares to the conventional view that there are multiple non-dilated reference frames which are created as space expands into the Universe, this an aspect of General Relativity. In both cases there is only one time reference frame at the initial point in the Universe. Conventionally this condition is referred to as a singularity, with space breaking out of this singularity, first slowly, then explosively, through expansion. This expansion effectively creates new non-dilated reference frames at every position in the Universe as it expands.

A way to envision this concept is to imagine a multitude of concentric circles of the same size, each representing the positions of photons propagated from a source at the center after one Planck time unit. Though it would appear as a single circle, it would represent every single potential matter position in the future Universe. Conventionally, this would cause a collapse into a singularity, but something causes the centers of these circles to separate from each other, producing an expansion of space and thus a multitude of non-dilated frames at different positions in space, as described by General Relativity. With my approach however there remains only one non-dilated frame, centered at the center, for a period of about (Tp^1/8 tP), while there is movement of primordial substance away from the center, and from positions in space that are actually moving toward the center. This movement away from the center creates an actual, not just apparent relative velocity, and consequent time dilation relative to the center position, with rates of velocity, and consequent time dilation, determined by a position's distance from the center. (Footnote: EX-CON PHYSICS, V. Quantum Relativity, Richard Quist, copyright@2020)

In the diagram above the figure on the left dots represents the changing positions of matter as it moves from the center to the right, while the circle represents the positions of photons after 1 Planck time unit of propagation. If you notice the circle does not move with the matter positions, this being an example of the Special Relativity principle that light moves at a constant velocity in all frames. The figure on the right demonstrates the General Relativity principle of expanding space, where each position in space maintains its own non-dilated field.

In the first case, for the primordial substance based entities at the positions in space represented by the dots the distance from the center shows the velocity of that entity from the center which in turn reveals the time dilation of space-time relative to the center position. This time dilation, or velocity, can be to be caused by a type of gravitational distortion of space at those points in space and time. These gravitational distortions are caused by what is known today as dark matter, created after the initial ex-con collision. The collision creates a situation where a type of gravity produced by the initial impact feeds energy into the Universe by bending space-time such that the primordial substance is accelerated toward the original collision points, located at the periphery of the Universe, the first points of contact.

The increasing energy is reflected in an increasing actual velocity for the primordial substance located at the maximum distance from the center, at the periphery of the Universe. This continues for approximately Tp^⅛ tP, or about 2.22x10^-36 sec. At this point in time the space at the maximum distance from the center of the Universe will produce a time dilation factor for the primordial substance located there relative to the primordial substance at the center on the order of Tp^⅛, or approximately 4.11xx10^7. Thus, actual velocity, as opposed to simply apparent velocity, of positions in space relative to the center in the Universe is produced by this distorted space, with the source of the gravity distorting the space located near the periphery of the Universe, not at its center. This produces a degree of time dilation relative to the primordial substance at the center for any substance at any distance from the center of the Universe, with the degree of distortion proportional to distance from the center. The maximum velocity for any mass (or primordial substance) located at the furthest point in the Universe from the initial creation point equals [((T^2)-1)^½]/T^2.

For this size and at this stage of the development of the Universe, before inflation, relative motion based upon Hubble's law of expansion and the Lorentz-Einstein transformations can be used to describe a density distribution for this primordial substance, with the furthest points in the Universe appearing to move the fastest from the initial center point, this producing a greater relative time dilation and measured mass, thus increased measured density, for the primordial substance that is located nearer the periphery of the Universe, as measured relative to the baseline primordial substance density in the single normal time frame centered at the center of the ball. Each point in space then defines a particular time dilation. Thus, the maximum apparent velocity between two resting points is created by the contraction of the maximum distance possible between those points in space and this equals [C'-(C'/T)]/T, while the velocity of light equals [C'-(C'/T)+(C'/T)]/T, which equals C'/T. With this situation maximum apparent velocity at maximum separation produces a maximum time dilation and a maximum length contraction and a corresponding amplification in measured mass-energy. This time dilation increases until it equals a factor of approximately Tp^⅛, with a length contraction factor of 1/(Tp^⅛). This also means that the collision that created the Universe lasted for about 2.22 x 10^-36 seconds, being infused with primordial material all the while. This represents a quantum time period and a quantum length of (2.22 x 10^-36 s (c)), and a quantum frequency.

After this point in time, the circle's centers accelerate away from each other producing inflation and the space of General Relativity, this represented by the figure on the right in the diagram above. The expansion can be understood as length contracted areas of space, length contracted because of dark matter, expanding as dark matter converts to dark energy. This can be described as Special Relativity's length contraction becoming uncontracted.

Maximum red shifts are produced at this time. Red shifts that we measure today reflect the actual size of wavelengths at that time, not just stretched versions expanded by the expansion of space. Remember, after about 9,14 x10^-28 sec, the Universe is already as large as it is today, though not measured as such at the time since Planck's length is much larger. So while it is true that the rapid expansion of space during inflation is producing these redshifts, after inflation it is the contraction of space with time that produces their apparent relative growth. Apparent relative growth, since the wavelengths actually remain the same size as initially created, even though other aspects of energy and space-time that the wave represents change. This presents the possibility that redshifts currently believed to be created by spatial expansion, which requires no change in relative momentum, can also represent bodies of mass-energy that have relative momentum. Consequently, there can be two different interpretations of the redshift, with one describing greater mass-energy than the other. This then explains the mystery of dark matter. It exists as a component of space-time which amplifies mass and gravity through non-moving motion. This non-moving motion is simply an amplified expansion-contraction action that increases mass-energy and gravity without creating any actual motion relative to the General Relativity space-time metric.