Quantized Space-Time Structure: The 0-D point/twist Void co-creator of the continuum and single field

JAMES E. BEICHLER

A nagging problem has existed in the way we regard the local physical world around us and the non-local universe at large since the very beginning development of our philosophical and scientific attitudes toward the external world. That problem deals with the dualistic way in which we parse the physical world itself through geometry. Geometry can be based upon two different elements: the extension- or metric-element of Riemann and the point-element. Riemannian geometry can be fixed by expanding it to include the point-element, but even that is not enough. A further physical advance can be made by adopting the idea of the 0-D point Void, first developed intuitively by Sperry Andrews, but understanding the physical role of the 0-D point Void can only be realized by expanding that notion by adopting the physical concept of a discrete geometrical point/twist. It is only when a discrete 0-D point/twist Void replaces the simple point-element missing in the Riemannian system of differential geometry of surfaces that post-modern physics fulfills its promise. Understanding the concept of a point-element, of course, is necessary to understand how the Riemannian geometry has been used in general relativity as well as how it can be expanded to unify all of modern physics, including quantum theory, under a single geometrical paradigm. Whether a scientist is considering the discrete point-particles of the Standard Model or the existence of point singularities in relativity theory, the concerns are exactly the same, which forces the concept of an individual 0-D discrete point void to the center of the unification process. In either case, the human Mind and Consciousness are perceiving and interpreting the physical/material world that science is attempting to theoretically describe so the ultimate question of Consciousness and how it interacts with the Mind/brain as well as our commonly experienced physical reality also needs to be answered within the context of the 0-D point/twist. In other words, this is the point (no pun intended) where scientific logic and non-scientific intuition come together to give a complete theoretical structure of our commonly shared physical reality. Toward that end, the only logical scientific precedent to understand anything like the 0-D point/twist in all of the history of science is only found in the notion of a tesseract, which dates from the late nineteenth century attempts to 'realize' the concept of a hyperspace in the absence of being able to detect them through astronomical observations so that a hyperspace geometry could be used to explain nature. The end product of understanding these concepts is a greater insight into how the single field theory explains a much wider range of physical phenomena than any single previous paradigm of physics.

Keywords: Riemannian geometry, point-element, 0-D point/twist, Single Field Theory, Unified Field Theory, unification, five-dimensional space-time, Standard Model, quantized curvature, anti-symmetric tensor, Big Bang, cosmic inflation, particle creation

1. Introduction

Single Field Theory (SoFT) is a unified field theory based on Einstein and other's attempts to represent all of physics upon the basis of a unique single space-time continuum. [1,2] It utilizes a five-dimensional space-time framework consisting of a three-dimensional curved in a four-dimensional space connected to time as space-time. This framework is filled with the single field which lends to the space-time framework its substantiality from which all matter (animate and inanimate) and physical fields emerge as patterned variations in the single field density with our three-dimensional material world being the densest three-dimensional surface in the continuum. A modified and enhanced Riemannian geometry, used which posits a three-dimensional surface (space) curved in a four-dimensional manifold (space) that varies over time like a rippling sheet, is used to geometrize our experienced reality of the world.

Time and space are literally bound together point-to-moment and distance-to-duration (reflecting the dual nature of geometry and physical space) by a specific binding constant commonly called Planck's constant ($h/2\pi$ or $\hbar$). [3] But when space and time are unbound forcing an unnatural experimental condition on any given material event and considered separately, science is faced with either the Euclidean flat world of

Newtonian physics and its simple relativity in the everyday world of experience or the non-geometric picture in the world of the extremely small where Planck's constant is invoked and science is faced with the uncertainty inherent in Heisenberg's quantum mechanics.
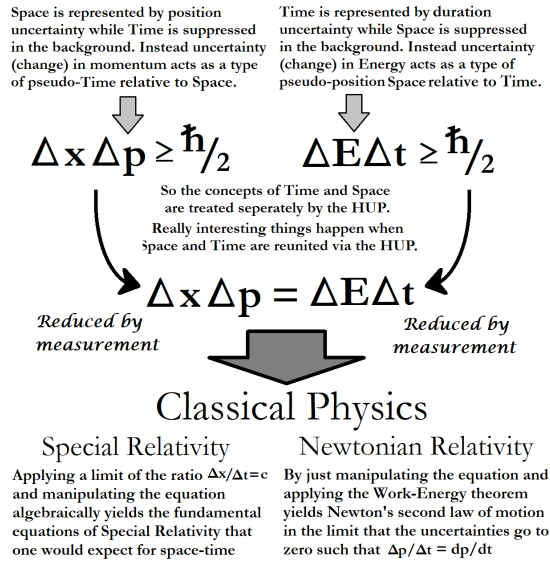

Figure 1. Reduction of the HUP to classical physics.

Otherwise, the world follows the Riemannian geometry described by a more complete picture of Einstein's original curved space-time continuum The central point, quite literally, to this unnatural unbinding of space and time is the simple fact that Riemannian geometry and the classical world picture both rely on a metric (measurable or extension) and thus relative definition of surfaces and spaces, while the quantum world relies on a non-geometry of discrete points not unlike Newton's absolute (in a non-relative sense) space and time. [4]

Riemann based his differential geometry of surfaces completely and wholly on metric-elements, reflecting a strictly limited geometric view of physical reality. He purposely ignored the idea that geometry could also be based upon points, or point-elements as he called them before dismissing them, because doing so was extremely difficult and highly problematical. He either failed to realize the fact, or at least did not act upon it, that real physical space is point/extension dualistic and this dualism must be ultimately accounted for in any scientific theory dealing with space and time in any manner whatsoever. In other words, explaining the Riemannian differential geometry of surfaces by adding in the effects of point-elements would complete Riemannian geometry with respect to the real world as

well as later generalize relativity theory. By generalizing Riemannian geometry in this manner, it can be rendered completely compatible with both electromagnetic theory by using a combination of the Einstein-Schrödinger anti-symmetric [5,6] and the Kaluza five-dimensional [7] models and the quantum (quantum mechanics as well as the Standard Model) when past philosophical interpretations and some subsequent physical misinterpretations are taken into account, if not thrown out altogether.

Doing so results in a concept of a discrete point/twist that replaces both the geometrical concept of an infinitesimal point and the quantum concept of a discrete point with one single concept which can be equated to the discrete 0-D point/twist Void within the Riemannian context. The 'twist' property of points in physical space guarantees and maintains the physical integrity of Andrews' discrete 0-D point Void [8,9] in its differentiation from the absolute Void from which it emerged as well as its discreteness from other such points later when a fully developed 'space' (Riemannian surface) has emerged. From this concept and its modification of Einstein and other's attempts to develop a unified field theory, the single field theory, which has specific applications to many of the present problems facing modern physics, has been developed. Or, as the ancient Chinese philosopher Lao Tzu said,

In the beginning there was one; One begat two;
Two begat three; And three begat all things.

One could be physically interpreted as the nothingness or 'no-thing-ness' that was the pre-creation absolute Void, two is the differentiation and primal awareness of the localized 0-D discrete point/twist Void and the not-localized absolute Void, three is space, time and the single field. From these simple beginning our whole modern universe evolved.

The single field potential is the physical manifestation of reality that emerged from the initial singularity of the Big Bang, which amounted to the rapidly expanding 'wave front' of the three-dimensional material/physical universe expanding three-dimensionally within itself as well as the physical fourth direction of space. The discrete geometrical point/twists that constitute the simple internal geometry of the expanding three-dimensional surface which is our normally perceived universe manifest gravitationally in the space-time continuum as the gravnetic vector potential field which accounts for what are mistakenly called Dark Matter and Dark Energy. In other words, Dark Matter is just an additional (non-local curvature) effect of normal

baryonic matter that causes normal (local) gravity effects.

This non-local effect can be expressed by the Heaviside equation (gravitational equivalent of the Lorentz equation) [10] in classical Newtonian physics or the anti-symmetric tensor (Einstein-Cartan-Schrödinger) [11,12] in relativity theory. Keeping this in mind, the fourth spatial dimension of the embedding space in Riemannian geometry (the fifth dimension in four-dimensional space-time) can be geometrically modified (to account for point-elements or twists) and well defined to allow the unification of gravity and electromagnetism (Kaluza-Einstein-Bergmann). [13] The resulting macro-extended embedding spatial dimension can then be quantized into fixed (quantized) groups of parallel three-dimensional surfaces which constitute sheets with an 'effective width' along the fourth spatial direction, [14] literally quantizing the space-time curvature of the continuum.

The problem of unification is not with gravity theory itself, but rather with the mentally-derived mathematical expression of physical space in which gravity acts. The space through which gravity acts is thought of as a single thing and has thus been traditionally expressed by only a simple (Euclidean) extension geometry, but it can be expressed in two different but equivalent ways as either a three-dimensional collection of extensions or metric elements (relative space) or as a three-dimensional collection of individual discrete points (an absolute space) or point-elements. Even Newton noted this difference although he expressed it differently. So if how we mathematically express space has always been the problem and its solution resulted in an extension only based geometry to only partially explain gravity, then the inherent dualism of physical space should affect both electromagnetism and gravity in a similar manner.

Since gravity is by far the weakest of the natural forces, the effects of the dual nature of space have not been so easily observed or detected, therefore our present theories of gravity (Newton and Einstein) do not take into account the effects of the point-like geometry of space. However, common Maxwellian electromagnetic theory clearly takes the dualism into account to explain the differences between the electric and magnetic fields because electromagnetic effects are so much stronger and thus the effects of the dualism are more easily observable. In other words, gravity should have two fundamental components instead of one (whether the one is Newtonian m$\mathbf{g}$ or Einsteinian $\mathbf{R}_{ik}$) just as electromagnetism (Maxwellian dualism of q$\mathbf{E}$ and m$\mathbf{v}$ cross $\mathbf{B}$) does. And just as the electric field $\mathbf{E}$ acts as an extension space (center to center) like

gravity, the secondary effects of the gravity field should act point-space-like (around a point center) just like magnetism. So the second fundamental term of gravity would yield gravnetism (the source of DE and DM) just like electricity yields magnetism.

The discrete versus continuity debate that has raged throughout physics for several decades is actually as misstatement or misrepresentation of the point-space versus extension-space geometrical problem and understanding the concept of the dualistic nature of physical space (point quantum versus metric curvature) resolves that problem. When this simplified view of nature is realized, the determinism versus indeterminism debate reduces to no more than 'much ado about nothing' since neither viewpoint alone represents physical reality, just human vanity with regard to physical reality.

This means that the quantum and relativity are not incompatible as has long been thought, but are in fact totally and completely compatible. So once the Einstein unified field theory has been completed by combining the anti- or non-symmetric approach of Schrödinger and Einstein (to account for DM and DE) with the higher embedding dimension approach of Kaluza (to account for a unified EM and GR), the natural dualism of space – point versus extension – leads to a full unification of quantum and relativity in the form of a quantized space-time curvature that emerges by utilizing Oscar Klein's suggestion that quantizing the embedding dimension, even though it is now macroscopically extended, quantizes the four-dimensional space-time continuum.

The whole space-time/single field structure can be summarized in a single graphic which indicates how a single six-dimensional tensor located at the single pole in five-dimensional space-time splits according to the extension/point duality (stronger force/weaker force) into two anti-symmetric tensors representing the electromagnetic and gravito-gravnetic fields in five-dimensional space-time. These split once more when reduced to their four-dimensional space-time counterparts, the electric field (extension), magnetic field (point), gravity field (extension or metric curvature) and the gravnetic field (point or what some call the torsion field). [15]
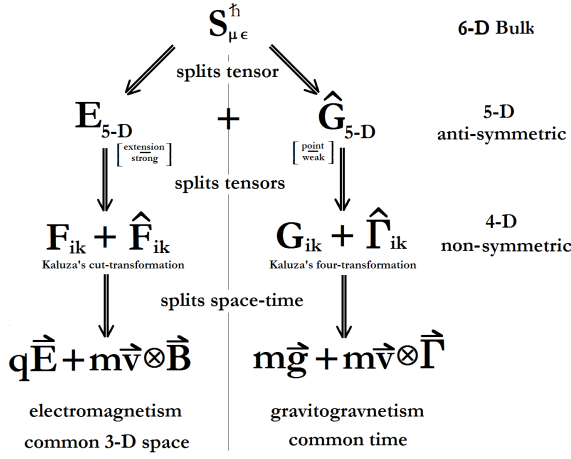
$$\mathbf{S}_{\mu\epsilon}^{\hbar}$$

6-D Bulk

splits tensor

$$\mathbf{E}_{5\text{-D}} \quad + \quad \hat{\mathbf{G}}_{5\text{-D}}$$

$\left[\begin{smallmatrix}\text{extension}\\\text{strong}\end{smallmatrix}\right]$ $\left[\begin{smallmatrix}\text{point}\\\text{weak}\end{smallmatrix}\right]$

5-D
anti-symmetric

splits tensors

$$\mathbf{F}_{ik} + \hat{\mathbf{F}}_{ik} \qquad\qquad \mathbf{G}_{ik} + \hat{\mathbf{\Gamma}}_{ik}$$

Kaluza's cut-transformation   Kaluza's four-transformation

4-D
non-symmetric

splits space-time

$$q\vec{\mathbf{E}} + m\vec{\mathbf{v}}\otimes\vec{\mathbf{B}} \qquad m\vec{\mathbf{g}} + m\vec{\mathbf{v}}\otimes\vec{\mathbf{\Gamma}}$$

electromagnetism   gravitogravnetism

common 3-D space   common time

Figure 2. Summary of Single Field Theory.

In this theoretical structure, Kaluza mathematized the split by using a cut-transformation that yielded electromagnetism (literally a fourth-dimensional cut across three-dimensional space filled by electric field stress) and the four-transformation to yield the effects of gravitational curvature (literally a three-dimensional slice across the top of a three-dimensional surface or 'sheet').

If further reduced by splitting space and time according to their classical Newtonian interpretation in terms of physical forces, the extension/point dualism is represented by the Lorentz equation for electromagnetism and the Heaviside equation for gravito-gravnetism. In the world from the sub-microscopic to infinitesimally small, the split yields the Heisenberg uncertainties whereby location in space and location in time are split into two different relationships with respect to changes in momentum and energy, respectively.

At this final fundamental level of physical reality, the point extension duality reduces to a problematical interpretation of measurement and disappears altogether at the extreme limits of measurement, thus invoking the final split between space and time and simultaneously invoking the application of Plank's constant as space and time are unbound. Only then is the possibility of a probabilistic interpretation of nature raised (or unnaturally forced on nature by experimental and mathematical intervention) in the mathematical expression of the Heisenberg uncertainty principle. It is within this perspective that the physical role that the discrete 0-D point/twist Void plays in the inner workings (explained by physics) of our perceived natural world must be interpreted.

2. The tesseract

The tesseract is the four-dimensional equivalent of a three-dimensional cube. It is considered more of a mathematical curiosity today, which belies the fact that is original intent was completely physical, so its history is more enlightening with regard to new developments in unifying physics than previously (and presently) thought. After the mid-nineteenth century, W.K. Clifford popularized the physical concept of hyperspaces in Britain through his own theoretical work and his translation (1873) of Riemann's *Habilitationsschrift* (1854, 1868) [16] which dealt with the concept of multi-dimensional surfaces curved in higher-dimensional manifolds. Clifford was attempting to develop the mathematics to understand his friend J.C. Maxwell's electromagnetic theory more fully as a four-dimensional electromagnetic effect in our physically experienced three-dimensional space.

However, Clifford died at the age of thirty-four in 1879 without completing his attempted theoretical work in either magnetism or his planned work on a new theory of matter and gravity, [17] which unfortunately ended in 1876 due to his failing health. Yet Clifford did have a lasting influence on further developments in science and mathematics before the scientific revolution in 1900, after which his theoretical work was subverted and ultimately all but forgotten except for anecdotes (some derogatory) about his anticipating Einstein's later successful use of Riemannian geometry to explain gravity. [18] At the very least, introduction and popularization of the concept of hyperspace geometry, as it was commonly called in the late 1800s, to the English speaking world made it that much easier for the world in general to accept Einstein's radical explanation of gravity as a result of space-time curvature in 1915. In particular, Clifford's work directly influenced the later work, both mathematical and physical, of Charles Howard Hinton, an Oxford geometrician. [19,20]

Hinton initially took a different view of the hyperspace concept in the 1880's. He first noted the fact that humans could not think in terms of a hyperspace but were limited to thinking in terms of a three-dimensional space with time as explained by Newtonian physics. So Hinton tried to develop a geometrical system whereby we could envision or think in terms of the hyper-dimensional space that he and others were sure represented our real physical world.

Within just a few years after Clifford's death, the concept of a real hyperspace (the Riemannian spherical curvature of space) had become so popular that astronomers were attempting to verify the positive

curvature of physical space by looking for discrepancies from flat Euclidean space in the measurements of the largest possible triangles they could determine in their search for distant stars that exhibited parallax. No such discrepancies were ever detected so all that the astronomers and scientists could determine was that the positive curvature was so small due to the vast extent of space that their best parallax measurements were very close to flat Euclidean and fell within the experimental error of their observational and measuring devices.

The inability to detect curvature on the large scale through astronomy complicated the scientific issue of the existence of hyperspaces since we cannot directly observe or directly detect any other physical influences of the suspected higher dimension, but Hinton still tried to develop a logical geometrical method to teach people how to 'realize', visualize or think in terms of the suspected higher-dimensional space. The tesseract was a part of his geometrical system of meditation, the important thing about the tesseract being that it is an imaginary geometrical object that is supposed to help people concentrating on it to create a sense or higher-state of consciousness.

The tesseract is an implied geometrical object rather than a physical/materially real object, so it is only considered a mathematical curiosity today. Scientists and people in general take little heed of either it or the higher dimension it implies since it has no 'effect' in our physical world, or at least that 'seems' to be the case. Even Einstein seriously questioned the real existence of a higher-dimensional embedding space even though he adopted and worked on unifying physics based for nearly the whole decade of the 1930s on Theodor Kaluza's theoretical model of a five-dimensional space-time continuum.

Einstein wondered how Kaluza's five-dimensional model could work so well even though it was so strictly limited when we are unable to either detect of observe any other effects (beyond the mere fact of successfully unifying gravity and electromagnetism) of the higher embedding dimension of space. Einstein (1956) even made explaining this lack of perceiving the higher dimension a condition for future science to accept a five-dimensional physical theory.

Hinton thought that meditation and intense concentration on the tesseract and other features of his geometrical system would ultimately teach a person how to 'realize' the higher-dimensionality of our shared physical reality. His methods did not catch on as far as history reports and no one has ever 'realized' the higher dimension of space using Hinton's methods, but the tesseract itself caught on and is widely known today, more than a century and a quarter after it was

initially developed by Hinton.

From the very beginning, by design, the concept of the tesseract was associated with mentally reaching a higher state of mind or consciousness that was associated with a higher embedding dimension (hyperspace) than that represented by our normally sensed three-dimensional physical/material space. Hinton merely assumed that hyperspaces were physically real (a hyperspace could refer to either a non-Euclidean spaced or a higher-dimensional embedding manifold, or both) as did a large number of scientists, other academics and commoners, so we should be able to perceive or 'realize' them with proper training. By analogy, we cannot directly perceive gravity although we feel weight when we lift an object even though we do not feel our own weight, so we know and accept the fact that gravity exists without directly perceiving it.

3. Enfolding/unfolding a 4-D object

The tesseract is the best known four-dimensional object, but it cannot exist in a real three-dimensional physical/material world. It is just a mathematical (geometrical) figure that can be 'realized' (imagined since it is not real) through analogy with other dimensioned geometrical structures, at least as a static object.
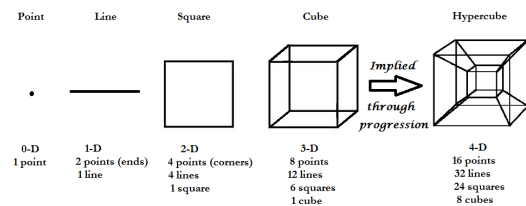

Figure 3. Dimensional progression from point to tesseract.

We cannot picture the four-dimensional cube as it really exists in four-dimensional space in our mind, at least statically, because our mind is three-dimensional fixated due to a lifetime of observation and directly experiencing only three- or lesser-dimensional objects and events in our material world. Yet the idea of a higher-dimensional embedding manifold or space has proven quite useful and extremely convenient in modern theoretical physics, enough so that modern physics actually implies its physical although not material reality.

The only way that this could be possible would be if some type of a tesseract-like object were to exist in our three-dimensional world of reality and if such an object did exist then it would need to be constantly

enfolding into itself from moment-to-moment from our three-dimensional perspective because our perception of a physically real higher dimension cannot be attained through observing or measuring extensions in the higher-dimensional space. They can only come through experiencing (directly sensing) the higher space on a geometrical point-by-point basis, which is materially impossible although not necessarily physically impossible. Were a person to actually become aware of objects and interactions within the fourth dimension of space, the person would be unable to use common language to describe the witnessed events simply because our language and conceptual background are all three-dimensionally biased and limited.

On the other hand, we can logically simulate a 'sense' of the four-dimensional world by manipulating the tesseract through an unfolding/enfolding process. We can imagine unfolding the four-dimensional tesseract into its three-dimensional component cubes, and then enfolding those same three-dimensional cubes back into the four-dimensional tesseract.
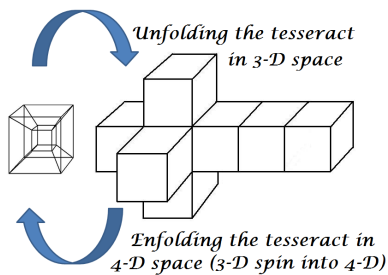

Figure 4. Enfolding/unfolding the tesseract.

The unfolded tesseract yields equal three-dimensional cubes, so the enfolded tesseract would have six equal three-dimensional cubes folded into a seventh cube to create an eighth cube in the higher fourth dimension.

Each section of the tesseract, no matter its shape in a two- or three-dimensional rendering, is still an equally-sized cube. The central cube only appears smaller because it is just further away in the higher dimension (by visual perspective from three-dimensional space) into which the cube is being enfolded (and thus pushed further back into the higher dimension). A better mental image of this can be formed if the enfolding is continued constantly through time as in a continuing video of the enfolding/unfolding process. [21] The time dimension merely simulates the higher fourth dimension of space making 'realization' easier. So from the common three-dimensional perspective, a static tesseract, one that is not changing in any matter over time, would merely exhibit a 'propensity' or 'desire' and thus a 'tendency'

to enfold its three-dimensional aspect into its four-dimensional reality that we cannot directly sense by our three-dimensional sensations, brain or mind.

4. Sphere, discrete and singularity

Keeping the analogy of the tesseract in mind as well as the mental difficulty in imagining or visualizing the tesseract generates, the next step would be to imagine four-dimensional spheres (spherical surfaces) as three-dimensional spheres enfolding/unfolding in themselves since this situation would mimic the case of 0-D discrete point Voids, more commonly called singularities in mathematics, in three-dimensional space. We are here talking about a real physical space rather than just a logical mathematical system with a new degree of freedom.

Within this context, the case of a common sphere of radius 'R' is more useful for scientific understanding since a 0-D point in space is just a three-dimensional sphere shrunken to zero dimensions, much as a distance 'S' is shrunk to zero (a point) in the case of analyzing the curvature of a surface at a point in Riemannian geometry.

Even trying to visualize a four-dimensional sphere as three-dimensional spheres enfolding/unfolding into itself, like the tesseract, has a real physical purpose or goal in mind, in this case understanding the Big Bang and ultimately other physical singularities. Our three-dimensional universe is thought to have expanded equally in all three of its dimensions from an initial (0-D point) singularity (the Big Bang) in the Void approximately 13.5 billion years ago. This model of the origin of our universe, although implied by both theory (general relativity 1915-23) and observation (Edwin Hubble's work in 1928/29), raises numerous questions, not the least of which is how something could emerge from the nothing of the Void.

So science needs to pass from the mathematical concept of a discrete singular point or singularity to the concept of a 0-D point/twist Void to logically model how the physical universe (something) emerged or evolved from nothing. In this matter, the enfolding/unfolding of a tesseract only goes so far since our universe is constructed of geometrical points and extensions, not cubes, which alone can model the simple physical attribute that space is isotropic (equal in every direction).

Our universe is thought to be a three-dimensional expanding spherical surface (Riemannian double-polar) embedded in a higher-dimensional manifold. The observed expansion alone should automatically imply the reality of a higher embedding dimension of space,

since no one really understands how such an expansion could take place unless the three-dimensional expanding spherical surface of our universe were expanding in a higher embedding dimension. Quite simply, our universe must be expanding into something from the nothing of the singularity (or no-thing of the absolute Void), so it is more convenient and easier to apply the concept of enfolding/unfolding to 0-D spheres than tesseracts, even though the tesseract was originally invented to visualize such higher spaces.

A distinction is being made here between the unthinkable singularity of a no-thing (the absolute Void) divided by nothing (0/0) and the thinkable but infinitesimally small 0-D point Void which can be thought of as a three-dimensional sphere whereby the radius is thinkable but approaching or all but zero in extension and dimension. Unfortunately, the basic notion of spheres enfolding into spheres to create a higher-dimensional spherical surface is much harder to mentally picture than the cube to tesseract analogy above, so it is better to think of spheres enfolding into a sphere as the three-dimensional inward 'spin' of a sphere toward its point center from all points on its surface.

No real extended three-dimensional 'object' could act in this manner except for an individual discrete 0-D (zero-dimensional and thus having no extension by which to determine dimensions) geometrical point. The only 'thing' in our universe that is capable of 'spinning' simultaneously in all three-dimensions of space and thus into itself (imploding or collapsing) is the geometrical point since any and all geometrical points in the universe are capable of becoming or acting as point/centers of rotation or circular motion for extended objects, a property of points termed 'twist' by W.K. Clifford. [21] A 'twist' of this nature would appear as a virtual 'stress' at each discrete point in three-dimensional space that would cause a virtual-torsional 'strain' in the surrounding continuous space.

In other words, the higher embedding dimension would literally be within (or accessible through) every discrete geometrical point (a 0-D point/twist Void in a physical sense) in our three-dimensional space of experience while the only way that the concept of 'twist' could be understood is if each and every discrete geometrical point in the whole of three-dimensional space was enfolding back into itself (back into the Void from which it emerged physically) and consequently emerging into the fourth dimension of space. Yet our stable physical reality (and logic) would dictate that such a 0-D point/twist could only be and therefore must represent an individual state of stable equilibrium (since our space, which is made of such

points, does not 'collapse' but remains constant) to exist.

Therefore the 0-D discrete point/twist Void must be a dynamical object, *i.e.*, a stable object whose stability depends upon a dynamic equilibrium. This means that each geometrical point would be constantly and continuously trying to enfold into itself–more-or-less like an object spinning three-dimensionally toward its center point in three-dimensional space–while an equal and opposite attempt to unfold outward (centrifugally) occurs to stabilize it.

A three-dimensional 'spin' of this type is not real in itself, but the 'twist' or tendency to 'spin' inward in this manner is real. Each point exhibits a real static tendency or potential to 'twist', which has important consequences for the physical nature of our reality. Without such a 'twist', our experienced three-dimensional space could neither support nor sustain real circular/rotational motions of any type. So such a 'twist' is necessary, even though it is missing from nearly all previous science dealing with the properties of space and time. Moreover, the existence of 'twist' results in other special unsuspected physical features of our universe. In order to understand these features, the 'twist' must be likened to the normal spin of an ideal object.

Normal three-dimensional bodies or objects can only spin two-dimensionally about a one-dimensional axis in three-dimensional space, but three-dimensional objects in a three-dimensional surface curved in an embedding fourth dimension of space can spin three-dimensionally around a two-dimensional axial plane in four-dimensional space, which in three-dimensional space would appear as a static 'twist'. This concept easily explains what is normally called the half-spin of fundamental particles such as protons and electrons.

The enfolding exhibited by a 'twist' in three-dimensional space could be abstractly described, by analogy, with a circular wheel spinning in two-dimensional space that produces a torque through or out of the wheel's one-dimensional axle in three-dimensional space. We could say that the two-dimensional space of the so-called 'spin' (a dynamical motion rather than a static situation) is embedded in the three-dimensional space corresponding to the complete mechanical system being described.
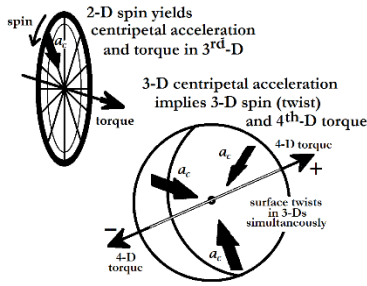
Figure 5. Centripetal acceleration of 2-D spin implies 3-D spin or 'twist' for imploding sphere.

The wheel itself is approximately a two-dimensional surface (flat disk) and the spin is two-dimensional, yet the torque (a resultant force of the spinning motion) is in the third dimension (the embedding dimension of the two-dimensional wheel) of space.

By analogy, we could say that the 'tendency' or 'propensity' of a sphere enfold or 'spin' into itself would produce a sphere spinning simultaneously in all three-dimensions toward a point at its center whose axle is a virtual torque perpendicular to the three-dimensional spin (enfolding) into a four-dimensional space. This enfolding could also be characterized as a virtual centripetal acceleration along the spherical surface of the point acting inward toward the center of the point.

A discrete 0-D point/twist can thus be approximated or pictured in the same way as a three-dimensional object in three-dimensional space spinning or 'twisting' inward toward its center, in so far as it can be imagined as a dimensionless point-sphere in three-dimensional space of (or approaching) zero radius (analogous to the concept of metric extensions $\Delta S \rightarrow 0$ in Riemannian metric geometry). In other words, we can logically determine the physical properties of a discrete geometrical point by assuming it is an infinitesimal sphere and decreasing the radius (measure of its extension ΔR in the three-dimensions of space) to zero (a dimensionless point). Doing so gets rid of the extension in space but not the spin, leaving the dimensionless point with the physical property of 'twist'.

So a 0-D point/twist Void can be characterized as a sphere whose radius has been reduced to or approaches its infinitesimal limits of zero simultaneously in each of the sphere's three dimensions, yet the three-dimensional spin/twist would still result into the 0-D point's enfolding into itself along the lines of virtual centripetal acceleration creating a virtual torque projected into both directions of the fourth dimension of space. This virtual torque in the fourth embedding direction of our real physical space is thus a product of

the 'twist' portion of every 0-D point/twist Void, but it also creates a virtual 'torsion' in the three-dimensional space surrounding each and every 0-D point/twist Void.

All the discrete geometrical points that constitute our real perceived space-time continuum are actually physically discrete 0-D point/twists of Void attempting to collapse back into the original absolute Void, but they are prevented from doing so since they are maintained or stabilized in a dynamic equilibrium by their 'twist'.

5. Cosmic inflation and space

The virtual torque corresponds to an equivalent amount of expansion into the higher (perpendicular) embedding dimension that would be proportional to the amount of time passed. The 0-D point/twist is relatively but not absolutely dimensionless. Thus it is discrete relative to the three-dimensional space, but still not collapsed back into the absolute Void (where it would become absolutely dimensionless) because the new element of time has emerged during which the completely spatial process of expansion take place. Technically it is a single moment of time that separates the 0-D point/twist Void's relative dimensionless-ness from the absolute Void's dimensionless-ness. The 'twist' maintains the integrity of successive moments of time while maintaining the spatial integrity of contiguity between neighboring geometrical 0-D points to create the continuity across extensions in all four dimensions of space and the continuous duration of time.

The passage of time forward continues in exact proportion to expansion/torque into the higher embedding dimension, but it is never zero because time still passes within each and every 0-D point/twist independent of other such 0-D point/twists in the three-dimensional space from which individual discrete geometrical points emerged. This is analogous to the calculus concept of the limit of speed = ($\Delta x/\Delta t$) as $\Delta t \rightarrow 0$. In other words, this is the point (no pun intended) where the calculus of motion and the differential geometry of surfaces (where the point is defined and approximated as the limit as $\Delta s \rightarrow 0$) meet and combine. This means that as along as time continues the 0-D discrete point/twist Void cannot completely collapse (it all but collapses in spatial, but not temporal dimension) back into the total absolute pre-existing absolute Void out of which it emerged.

However, the same amount of time passes for normal three-dimensional space outward from the center of the discrete point/twist which is geometrical

(and arithmetical/mathematical along a number line of moments) as opposed to the 0-D point/twist Void which is physical. The discrete 0-D point could not increase in size to compensate, as it expands equally in each of the three dimensions in the three-dimensional space, so it creates new discrete 0-D point/twists in each of the three directions of three-dimensional space. Each newly created discrete 0-D point/twist Void does likewise each and every moment of time that passes. Expansion would thus be equivalent to time and effectively become time itself in a manner of speaking.

In so far as this process of expansion occurs in three-dimensional space by the creation of new 0-D point/twists in our three-dimensional experiential space, it rapidly reaches an explosive state of expansion after the initial singularity (0-D discrete point/twist Void) is formed that could be called 'cosmic inflation'. Each individual discrete 0-D point/twist Void in three-dimensional space would thus form a dynamic equilibrium state creating equivalent new discrete point/twist Voids in three-dimensional space as both three-dimensional and the fourth dimension of space expand from an initial singularity (the original unique 0-D point/twist Void) into our commonly experienced and fully extended continuous space with time or equivalently the three-dimensional space-time continuum described as a three-dimensional surface embedded in a fourth dimension by the Riemannian metric geometry.

Just as time and space are directly related and connected to one another through expansion, physically rather than just mathematically bound together, the binding constant for our particular physical/geometric space could only be Planck's constant, which could only be determined by physical rather than mathematical means. Under these circumstances, our physical space-time continuum could be perceived as a constant co-creation of something-ness out of the Void of no-thing-ness from an initial singularity, which is itself a 0-D point/twist Void although not discrete from other such points because they have not yet emerged or been created.

Since the expansion is continuing unabated over time, space must be re-establishing itself on a moment-to-moment or point/twist-to-point/twist basis just to remain physically viable and stable. In each 0-D discrete point/twist in three-dimensional space (moment of space) is recreating physical space over time (moment-by-moment) from the absolute Void. This co-creation from moment-to-moment establishes a dynamic equilibrium between expansions of the fourth dimension of space and three-dimensional space, as well as within each 0-D point/twist Void itself. In yet another sense, this dynamic equilibrium of the discrete

0-D point/twist Voids creates the necessary continuity exhibited by the space-time continuum that we perceive, interpret and model as logical systems of geometry as used in physics.

In other words, there is a moment-to-moment (temporal equivalent of spatial point-to-point) 'desire', propensity, potential, tendency or necessity for the discrete 0-D point/twist Voids in three-dimensional space to collapse (enfold) into its point/twist 'self' and return to the formless and thus pointless absolute Void from which they emerged. However, this 'tendency' causes the physical moment of each three-dimensional 0-D point/twist Void to create the expansion vector along its fourth direction of space, thus establishing the dynamic equilibrium of each and every discrete 0-D point/twist Void so all of space cannot collapse back into the absolute Void. In turn, according to action/reaction or Newton's third law, this expansion vector (and the associated virtual torque in the fourth direction of space) co-creates (with the enfolding) an equivalent expansion (unfolding) of three-dimensional space.
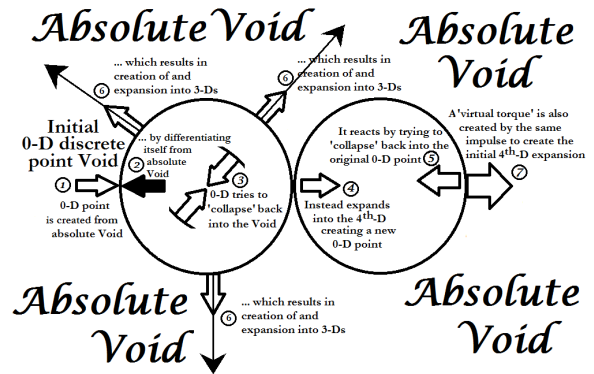

Figure 6. The co-creative dynamic equilibrium of the 0-D point/twist Void and its expansive physical results.

In this model of a physical reality that emerges from nothing, all things being considered equal (such that each action balances with another equal and opposite reaction which balances the whole to nothing), the discrete 0-D point/twist Voids are created in equal amounts and configuration in both directions in the fourth dimension of the developing space-time continuum although this diagram only depicts creation of the 'virtual torque' half. A second 'negative virtual torque' is also created in the opposite direction of the fourth dimension. Both are simultaneously created from the 'twist' of the original discrete 0-D point/twist Void.

Both then react to their creation by rebounding the creation impulse back into the original 0-D discrete

point/twist Void which in turn reacts by expanding and thus creating new such entities in the three-dimensional space-time continuum that is emerging from the creative process.   The various 'virtual torques' correspond to pure 'potential' and thus form the beginning of the single field that corresponds to the geometrically structured space-time continuum. So they are expansions of potential (tendencies), not energy or matter themselves, but the potential to later form matter and energy given the quantum and geometric restrictions of the space-time continuum and single field by which matter/energy and other physical fields are defined. By comparison, a real physical torque is a force, not an energy or matter itself, although that force can be alternately interpreted as the cause of a change in energy carried by a material body.

In essence this physical process not only co-creates new three-dimensional exact duplicates of the three-dimensional discrete 0-D point/twist Voids, but they co-create the single field itself which fills (inhabits) all of four-dimensional space. These points are thus continuous (extended) with each other even while they remain discrete in metric or measurably extended space.

The expansion vector potentials (equivalent to the virtual torques) in the fourth dimension of space are physically interpreted in the real physical world as Dark Energy points in free-space and as inertial mass points (analogous and equivalent to the Standard Model's Higgs particles) under the metric curvature that defines material particles and objects in general relativity. Since space and time, or rather space-time, obviously does not naturally collapse back into the absolute Void from which it emerged during the Big Bang (or some other primal pre-physical process), each and every 0-D point/twist Void must be constantly re-co-creating itself each and every moment that passes in time to form the stable equilibrium of geometrical 0-D discrete point/twists that we experience as the spatial extension of our three-dimensional double-polar spherical universe, but also that we experience as different density configurations in the single field that gives substantial (material) reality to our world.

The physical situation for 0-D point/twists within three-dimensional matter is obviously different from 0-D point/twist Voids in empty (devoid of matter or external to existing material particles) three-dimensional space. Matter in the form of material particles equates to a maximum three-dimensional surface curvature that has 'congealed' (or 'coalesced') into a different physical state than space due to the restrictions of the quantum.

This is another way of saying that some event must have occurred whereby some portions of extended space with a greater density of 0-D point/twist Voids collapsed into particles rather than Void. In this case two possibilities exist: (1) the space inside material particles is expanding at the same rate as empty three-dimensional space. This expansion goes completely unnoticed because particles are so small relative to the vastness of empty space that their internal expansion goes unnoticed over the short periods of time covered by scientific observation and experimentation; or (2) enfolding and unfolding within material point/twists is potential instead of actual since material 0-D point/twists, although still discrete Void, result in measurably distinguishable extended four-dimensional single field densities (interpreted as three-dimensional curvature in the embedding dimension).

6. The driving 'force' behind inflation

The moment-to-moment temporal 'tendency' of the discrete 0-D point Void to 'collapse' into itself creates a 'twist' or virtual three-dimensional spin as described above. That 0-D point/twist that results creates a virtual torque as well as an expansion in the fourth dimension of space. The 'twist' associated with each and every geometrical point also guarantees its discreteness from other neighboring discrete 0-D point/twists even while the individual geometrical points or point-elements taken together form the continuous extension or metric-element that is the basis of a Riemannian n-dimensional surface embedded in the $n+1$-dimensional manifold that is used in general relativity to describe our universe.

In a sense we can say that the 0-D point/twist Void in three-dimensional space is a localization against (or in comparison to) the lack of localization or not-localization of the absolute Void. However, this property of not-localization of the absolute Void is not to be confounded and confused with the physical concept of non-localization, which refers to positional location (or place) of particles, events and material objects within three-dimensional space because there is no position or place within the absolute Void of 'no-thing-ness'.

While the 0-D discrete point/twist Void has no finite or measurable spatial extension in itself, the fact is that it does have an infinitesimal extension that is non-zero, all but zero but not exactly zero. So the mere fact that it exists physically gives it a virtual 'moment' relative to its center that creates the 'twist'. In an extended rotating object, the 'moment' or the average positon of the rotating matter (the moment of inertia) relative to the center of rotation (or axle) coincides with the extended position of the momentum of the

rotation of the object only as it rotates. The expansion vector and the virtual torque in the fourth direction of space are both products of that virtual 'moment' that are realized (made real) from the 0-D point/twist's 'tendency' to collapse into itself to return to the absolute Void.

The expansion vector and the virtual torque are both directed into the fourth direction (what becomes the dimension) of space and are equivalent (overlap) to each other. The virtual torque becomes potential and with the expansion vector co-creates an equivalent expansion (thrust) in three dimensions through the 0-D point center that stabilizes the discrete 0-D point/twist Void so it cannot collapse, thus giving the 0-D point/twist Void a sense of dynamic equilibrium as well as stability. The 'twist' is the essential feature of the geometric dimensionless point that guarantees it cannot collapse back into the absolute Void. The absolute Void is itself a not-localizable 'no-thing-ness', so the 'twist' is what keeps the 0-D point/twist Void separate from the absolute Void, rendering it discrete within itself and distinguishable from the absolute Void as well as discrete from other such points as the expansion continues in all four dimensions of space with the passage of time.

The simple fact that the original 0-D discrete point/twist Void is distinguishable from the absolute Void follows a process of differentiation between the two which implies that there exists some form of primal awareness, something like a mutual reciprocation beyond a normal physical action/reaction process, between the two for each other. This mutual awareness, whether primal or not, is important because it is the precursor to the emergence of a virtual and thus semi-physical pre-consciousness field that guarantees the development of life, mind and consciousness in the later expanded universe. It could also be interpreted as either a potential for the later development (emergence) of consciousness or some undifferentiated type of virtual consciousness itself. Consciousness in living organisms is thus the evolutionary product of an internal awareness of the universe as a whole for its 'self' as well as an external awareness in everything sensed or otherwise interacted within the material world that has evolved from its elementary 0-D point/twist Void parts.

However, just as the outward expansion of the 0-D point/twist creates the dynamic equilibrium that prevents the 0-D point/twist from collapsing, the expansion also extends further in all four directions that become the dimensions of space (up/down, right/left, in/out, inward toward the center/outward from the center) to duplicate itself. In this manner, there is a dualistic spherical expansion that creates the

universe itself. This process is commonly and popularly known as the Big Bang. Even though the individual 0-D discrete point/twists are themselves dimensionless, they also form relative dimensional directions that are necessary as parts of the greater whole since the greater whole is itself spherical relative to the original center of the original discrete 0-D point void. This process is difficult to picture, but it can be imagined with the help of a simple diagram.
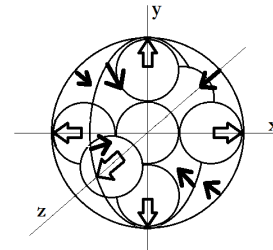

Figure 7. First round or moment of expansion of 0-D point/twist establishes an equilibrium state in 3-D space.

This diagram depicts smaller spheres representing the original 0-D point and the first expansion 0-D points in three-dimensional space. They are encased within a larger sphere which corresponds to the advancing 'front' of expansion as a whole. Each virtual (imaginary) point on the hypothetical 0-D point/twist Void acts like a keystone that keeps the sphere from collapsing inward at an actual zero point (nothing) as $\Delta r \to 0$ in a Riemannian fashion. The hypothetical 0-D point/twist sphere is literally a nothing trying to collapse into a 'no-thing' of its 'self' in an absolute Void.

The individual 0-D point/twist Voids within the sphere and the spherical front of the whole represent the combined point/extension duality of space and time. So just as the individual 0-D point/twist Voids exist in a state of dynamic equilibrium, the spherical front that is expanding outward from moment-to-moment also has a 'desire' or 'tendency' to collapse back into the individual 0-D point/twist Voids and the absolute Void as a whole as shown by arrows in the diagram. This arrangement yields a space that is isotropic (the same in all directions) with no specific measurable or discoverable center along the expanding three-dimensional surface of the whole.

However accurate this diagram is, it is also misleading. It depicts three-dimensional objects inside a three-dimensional sphere with a two-dimensional surface curved in the higher three dimensions of space, but it actually represents three-dimensional objects that are a part of a three-dimensional surface that is curved and expanding in the higher embedding fourth

dimension of space. So it is at the same time as misleading as it is informative and another diagram that depicts this particular aspect of the 0-D point-twist Void contribution to the overall expansion of the surface is in order.
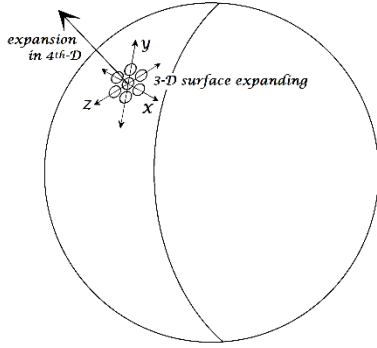

Figure 8. 3-D surface of the 4-D Riemannian sphere is expanding intrinsically and extrinsically.

In this case, the original 0-D point is surrounded by its derivative 0-D point/twist Voids in three-dimensional space, which are expanding the three-dimensional surface itself, represented by the surface of the larger four-dimensional sphere, while also indicating the corresponding expansion of the sphere surface in the higher embedding fourth dimension.

This picture is less misleading, but still incomplete as are all attempts to depict things and events in four dimensions within our lower three-dimensional space, let alone on a two-dimensional sheet of paper. This diagram better shows that (1) the original 0-D point/twist Void cannot be distinguished from other such 0-D point/twist Voids within the overall surface, *i.e.*, the universe technically has no center in three-dimensional space, (2) the surface is isotropic, *i.e.*, the same in each direction although the same is not necessarily true of the matter content of the universe, *i.e.*, when material bodies, represented by local variations in the overall curvature in the surface, are placed in various positions on the surface, and (3) the universe is closed with respect to the three dimensions of our normally perceived space which renders our universe unbounded (because it could possibly expand forever growing ever larger) yet finite. These three physical characteristics fit the observational data that no matter which direction we look in, the vast majority of stars and galaxies are receding (moving away) from us at equal speeds at equal distances as observed by Edwin Hubble in 1929.

Each 0-D discrete point/twist Void that is created during this expansion process has its own center relative to all other such 0-D geometrical points and thus sees itself as equivalent to the original discrete 0-D geometrical point. This relativity is necessary to guarantee that the discrete geometrical points that constitute the universe are continuous with one another while remaining discrete relative to other such points. The process thus depends on the necessity that fourth spatial dimension is closed and finite in extent rather than open, unending and thus infinite in extent. This last dualistic characteristic of expansion–discrete versus continuous (the quantum perspective) or more fundamentally point versus extension (the geometric perspective)–guarantees the emergence of a physically oriented three-dimensional space that must be embedded in a higher four-dimensional manifold that emerged from the absolute Void as a three-dimensional reaction to the quantized action of virtual torque directed in the fourth dimension of space.

7. Physicality of space and matter

Perhaps the strangest thing about our universe is how matter and energy came from the suspected Void of 'no-thing-ness'. The dominance of matter and energy in the universe seems to break all kinds of symmetry laws (there is missing anti-matter). This fact implies that something in nature is out of balance with itself since it seems that equal amounts of anti-matter and/or negative energy are necessary to balance out the equations of nature, but this view is not necessarily correct. While time and expansion have been equally accounted for in the discrete 0-D point/twist Void model as the sources for our space-time continuum, the virtual torque In the fourth dimension of space should be thought of as the source of a single potential field from which all matter, energy, and everything of a physical nature that we have ever observed or even will observe in our commonly perceived universe.

The twist portion of every discrete 0-D point/twist Void is a static property of the geometrical points or Riemannian point-elements of space-time, but since the universe is both dynamical and expanding the static twist is rendered dynamic by the production of the virtual torque that it 'creates' in the embedding fourth dimension of space. That torque creates a single field of potential in its collective form as the fourth dimension of space expands outward in conjunction with the three-dimensional spherical surface expansion.
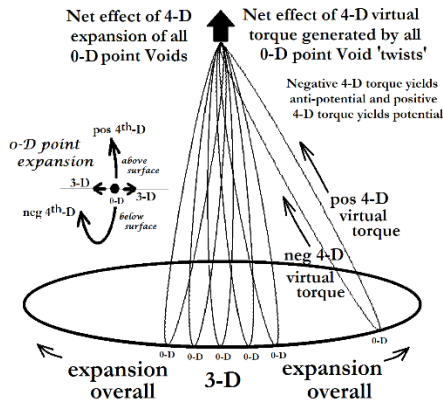
Figure 9. 0-D point/twists in 3-D surface (common space) are all connected via the single-pole in the 4th-D.

While the net virtual torque increases exponentially for any given surface each and every moment as time advances forward, the whole amount of virtual torque would be internalized point-by-point as potential which manifests physically as the single field in the fourth dimension of space. Since the fourth dimension expands in two directions (above and below) the original primary three-dimensional spherical surface, but the two directions are connected by closure (they form a four-dimensional single-polar spherical surface of their own), the expansion would seem or appear from our three-dimensional perspective to be a push from inside the three-dimensional surface that we perceive as our whole universe on the single 0-D point/twist (the single-polar position in four-dimensional space) where the outermost 0-D point/twist Voids come together for closure.

All geometrical discrete points in the three-dimensional surface of our universe are directly (causally) connected to one another since their four-dimensional projections come together with each other at or through this single-pole 0-D point/twist without the intervention of other points (through some measurable distance) extended across the three-dimensional surface, *i.e.* there is no three-dimensional type of distance between different 0-D point/twists in three-dimensional space via the fourth dimension because physical distance is a term defined as relative to the various material objects that occupy only the three-dimensional surface of our material universe.

Distance is itself a purely three-dimensional concept or perceived construct and thus does not apply to the fourth direction of physical space. So the seemingly instantaneous signal or communication between distant points or places in three-dimensional space that is called 'quantum entanglement' is merely communication passing between three-dimensionally

separated distant points through the single-pole in the embedding dimension of space where all three-dimensional 0-D point/twist Voids meet.

Having said that, the role of the single-pole and the collective virtual torque of individual 0-D point/twists acting on or through it (as expansion continues) needs further clarification, especially in its role in the emergence of material particles. A single-polar surface extended in the fourth direction of space from a single discrete geometrical point in the three-dimensional surface of our universe would look and act more-or-less like a Möbius strip, or better yet the collection of all such geometrical points in our three-dimensional material surface curved in the fourth dimension would yield a four-dimensional Klein bottle-like structure.
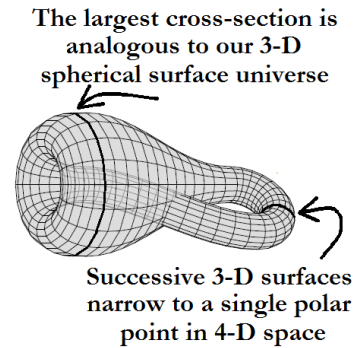

Figure 10. A 2-D embedded Klein bottle analogy to our 3-D embedded space.

In other words, if you could travel completely around the fourth dimension from the three-dimensional surface upwards through the single-pole and return to the surface from below, you could not tell the difference except for the fact that very part of your body would be exchanged right for left. In the case of individual 0-D point/twist Voids, this reversal appears as a half-spin, so when real material particles emerged at the end of the eras of cosmic inflation they had a virtual half-spin. Elementary particles are not really spinning in any sense of the word, they just have an intrinsic property of virtual half-spin due to the geometry of the space-time continuum.

All real material particles must have a half-spin, either positive or negative, but it must and can only be a half-spin to be in full accord with the geometry of the universe. All of the other temporary energy resonances, single field patterns that do not quite meet the full complement of geometric and quantum requirements of the universe to be a real particle, that are presently deemed point-particles with spins of 0 or 1 by the vast majority of theoretical physicists are just pseudo- or temporary-particles. These point-like pseudo-particles,

which are quite common in the Standard Model of the quantum where they are mistakenly dubbed as real particles, very rapidly decay to either real particles (with half-spin) with/or without energy in the form of kinetic energy carried by the real particles, gamma photons, or both. In fact, these single field resonance patterns or pseudo-particles decay so rapidly simply because they do not conform to the full complement of geometrical and quantum requirements to even 'exist' as real 'things' in our universe, let alone as real material particles.

Each subsequent 0-D point/twist Void that is created during the expansion process must be somehow connected to the next discrete 0-D point/twist Void while remaining discrete itself, therefore each geometric point is connected to its neighbor by a physical binding constant. Electric permittivity can be interpreted as the binding constant between points in three-dimensional space is the, between each 0-D point/twists in three-dimensional space while the magnetic permeability can be interpreted as the corresponding binding constant between neighboring 0-D point/twists in the fourth direction of space.

This leaves Planck's constant for the binding constant between the moments of time and all of the 0-D point/twists that constitute all four dimensions of physical space. In other words, time only began to progress forward when it became bound to space by Planck's constant since and the original 0-D point/twist Void differentiated itself from the overall absolute Void. Therefore, Planck's constant is subdued or hidden (invisibly from observation) within each and every 0-D point/twist Void or geometrical discrete point in physical space and time independent of any overall geometrical features of the universe as long as space and time are considered to act in tandem.

This suppression of time within each and every discrete geometrical point of space (or their physical equivalents in the discrete 0-D point/twist Voids) is re-expressed and comes out of hiding in the various equations of the Heisenberg uncertainty principle since these equations attempt to separate space from time while 'change' is occurring in some semi-related manner, *i.e.*, through the uncertainties in momentum and/or energy normally associated with 'change' in the physical status or material particles. These binding constants, in conjunction with the overall geometry of the universe determine which single field resonance patterns will become real particles or which will become pseudo-particles meant to decay into real particles as expressed by the Standard Model, within the limits established by how particles are philosophically and mathematically defined as opposed to how they actually represent themselves materially in the universe.

From the beginning of time and expansion, there has been a physical differentiation between the two directions in the fourth dimension since the expansion process moves in two directions in every dimension, including the fourth dimension. One direction (above the three-dimensional surface) yields a positive virtual torque from each 0-D discrete point/twist center as duplication and expansion occurs, while the other direction (corresponding to below the three-dimensional surface) creates a negative virtual torque. However, collectively these become a potential (from positive virtual torques) and an anti-potential (from the negative virtual torques) whose mathematical absolute value, 0-D point/twist by 0-D point/twist, becomes the pure potential of the single field.

These potentials together form the single field which give the universe its substantiality beyond the normal space-time continuum, which is described by the geometrical discrete point and their extension/metric equivalents. Since the anti-potential and potential are oppositely directed, they occur in equal amounts and were the universe ever to collapse back into the absolute Void, all substantiality (matter/energy and fields in three-dimensional space) would not necessarily cancel each other back into the nothing or nothingness of the absolute Void, although it might. Other than that there is no other reason for anti-matter and/or negative energy to exist, although anti-matter does exist, at least naturally in the form of anti-particles.

Anti-particles are merely equivalent particles that emerge from the anti-potential below or on the bottom side of the positively curved three-dimensional surface that we call our universe in equal numbers to their counterpart particles by pair production only after the initial rapid inflationary rate has decreased significantly to its slower expansion counterpart and through the occasional decay process of pseudo-particles. Since they exist as local metric curvatures in surface below or on the underside of the three-dimensional surface, they can mutually decay into photons by mutual annihilation only when they meet their counterpart positive particles that appear as small regions of localized metric curvature above the surface. In this case, the two localized regions of equal curvature above and below the three-dimensional surface just cancel each other out to a nearly flat local curvature around a single point in space, which amounts to a massless (non-curved point localization in space) photon or photons, containing an amount of energy equal to the mass of the original two particles according to the equation $E = mc^2$.

No energy exists or is created until matter itself is created by the cosmic inflation ending event since energy is a measure of the motion of matter relative to other bits of matter, except for the case of the photon which is another matter altogether. In this context, there is no such thing as an absolutely negative energy (nor is there even any need for the concept) and energy is always positive according to the relative scale of measurement. Any reference to negative energy could only indicate that any energy associated with a material body is moving in a negative direction in three-dimensional space relative to another material body's positive direction. In systems of material bodies, energy can be either added to (gained by) or removed from (lost to) the overall energy of the material systems which would also indicate positive (added) or negative (lost) energy relative to the overall energy of the material systems at any given time, but still no such thing as absolute negative or anti-energy exists.

Both the anti-potential and potential of the single field in the fourth dimension can only create energy, but that energy can be directed in the opposite directions in three-dimensional space. Furthermore, this means that it is useless to talk about energy in the universe or the universe having energy and thus a temperature before material particles are created at the end of the cosmic inflationary period of the universe's history. Before that moment in time, there is only the four-dimensional single field potential (anti-potential and potential), and that is a potential to create matter, energy and physical fields in three-dimensional space.

As such, space, whether three-dimensional or four-dimensional is being considered, is dualistic and all that is in space, *i.e.* physically real, must conform to that dualism, including common physical fields. In physics before the twentieth century that dualism was expressed in Newton's concepts of absolute space (point-based geometry) and relative space (extension based geometry) and did not play any role in either Newton's geometrical interpretations of the world or in his physics other than implying the real unverifiable existence of his absolute space. Newton's classical gravity theory uses a simple form of relativity and is thus distance/measurement-based (or metric). Therefore Newtonian gravity theory is not complete in the same sense as Maxwell's electromagnetic theory, which accounts for the dualism of space in the form of the electric field (extensive) and the magnetic field (point based).

The geometric dualism of electromagnetism is thus expressed by the Lorentz electromagnetic force equation $F = qE + qv \_ B$, while it is not expressed in the Newtonian gravity equation $F = mg$. However, in 1893 Oliver Heaviside did express the dualism of space

without calling it that, he was just working by analogy to electromagnetism, when he wrote and explained the gravitational equation $F = mg + mv \_ S$. He explained the second term in his gravity force equation as a true centrifugal force of gravity, which is true, based on the attraction of the rest of matter in the universe.

In twentieth century modern physics that very same duality vexes and confounds science as the quantum theory (discrete point-based non-geometry) and general relativity (extension-based or metric geometry). However, the fundamental notion of that dualism and what it really means has been lost in the modern fallacy (a phallacy of fysics) that the quantum and relativity are mutually incompatible. They are actually perfectly if not absolutely compatible, but this cannot and will not be understood until the discrete versus continuous debate as well as the determinism versus indeterminism historical propaganda biases are completely discarded as purely philosophical (and thus distinguished from physical) gibberish that they are in favor of the more fundamental, realistic and physical dualism of point-versus extension-based geometry (what Riemann termed point-elements and metric-elements).

The dualism will only loose its mystery and negative retarding influence over physics and science, which has prevented true unification, when it is recognized as just that by its proper identification and analysis as a real difference between point and extension. Only then can the quantum and relativity be demonstrated and accepted as compatible within the Riemannian context of a three-dimensional spatial geometry embedded in a fourth-dimensional single-polar spherical geometry.

8. Big Bang begat the Big Blowout

The term 'Big Bang' was originally meant as a derogatory yet descriptive appellation (Fred Hoyle, 1949) for a specific characteristic of the early expansion – the extremely rapid and thus explosive-like expansion of the early universe from nothing to a very large something. The term cosmic inflation or inflationary period came much later (Alan Guth, 1979) to denote an even more rapidly expansive but very short-lived period of time in the early universe that generated a large part of the volume of the space of our present physical universe. The cosmic inflationary period is thought to have started at 10^{-36} seconds after the Big Bang and ended abruptly at about 10^{-33} or 10^{-32} seconds.

These might seem like very precisely measured and very short time periods compared to our present perception of time, but given the time scale of the early

universe as measured in infinitesimal moments of time even this short a period of time was quite long. After the inflationary period ended, the rate of expansion slowed to about what it is today with some small occasional variations. The big theoretical question then became 'what ended the inflationary period', yet very few scientists have ventured to speculate on either an answer to the cause of inflation or how it ended, let alone offer a valid and logical theoretical model of these events and occurrences. On the other hand, the single field theory presents a clear model that answers both of these cosmological questions.

The key to this answer is again understanding the concept of a discrete 0-D point-twist Void. How the simple expansion of the universe occurred as a byproduct of the dynamic equilibrium of the 0-D point/twist has already been explained, but how that became an explosive rate of expansion and how that explosive rate of inflation ended is still subject to further elaboration. A simple calculation of the first few moments after the singularity became a 0-D point/twist Void easily demonstrates how rapidly the initial cosmic inflation evolved/emerged from nothing.

Rapid rate of Inflation

# of moments	1	2	3	4	5	6	7	8	9
0-D points in each D	1	3	9	27	81	243	729	2187	6561
0-D points in all 3-Ds	1	7	42	252	1512	9072	54132	326592	...

Rate increases even more rapidly when doubling of parallel surfaces (above and below) in the 4th dimension is added to these numbers

Figure 11. Rapid rate of inflation in first few moments after the Big Bang.

With respect to our three-dimensional space, every infinitesimal moment saw the individual three dimensions expand at an exponential rate of three to the n-power, where n = 0, I, 2, … for succeeding moments of time, but the overall rate of collective expansion in the combined three dimensions of space was much greater as shown in the table above. After only eight infinitesimal moments, physical space had expanded to a total of 326,592 discrete 0-D point/twists.

Looking at the inflation problem in this way easily demonstrates the explosive nature of early expansion, but it must be remembered that this was all occurring before either the duration of time or extensions in space even became measurable quantities, although still infinitesimally small. Given the fact that an infinite number of infinitesimal geometrical point/twists make up any extended line, area or in this case three-

dimensional volume, the time of 10^{-36} seconds after the initial Big Bang must have been enough time for number of geometrical point/twists per moment to reach an infinite number and only then did our relative measurable universe even begin.

To further complicate the situation and render the inflation period even more 'explosive', with each new moment a new three-dimensional surface of 0-D point-twists is added above and below the primary three-dimensional surface that is our perceived universe (the other surfaces being imperceptible). Each moment after that the primary surface not only expands three-dimensionally and adds new parallel surfaces above and below it in the fourth dimension of space, but each of the surfaces above and below it do the same and thus triple the rate of expansion of three-dimensional space across the whole of the fourth dimension.

During this whole process of inflation the universe was expanding not only three-dimensionally but also four-dimensionally. This expansion was accompanied by the creation of virtual torque in each direction (above and below) the three-dimensional surface which is our common space. The collective nature of the virtual torque above and below rendered an amount of substantiality to the space-time continuum that later manifested as the single field. In other words, after each infinitesimally small moment of time passed the total volume of the three-dimensional surface that is our universe not only tripled, but that tripling also doubled.

While there is a collective virtual torque element (torque is a vector and thus additive in both magnitude and direction) that corresponds to the overall expansion in the fourth direction of space, the individual virtual torques corresponding to the individual 0-D point/twists that constitute the successive parallel surfaces that occupy the fourth direction of space. Collectively, the 0-D point/twist associated virtual torques in the fourth direction of space constituted a real physical potential above the primary surface and an anti-potential below the primary surface.
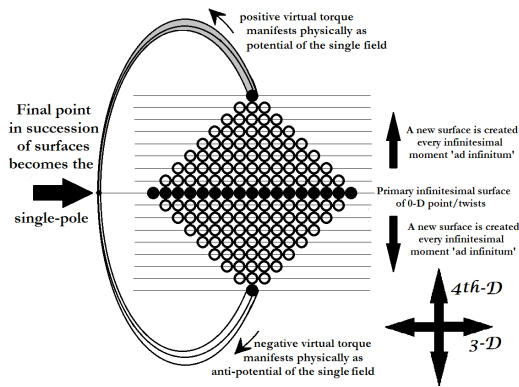
Figure 12. Each successive 3-D surface in 4-D space is smaller until the single-pole point is reached.

Together, the potential and anti-potential form the physically real single potential field that is the precursor to all matter, energy and three-dimensional potential fields in the universe.

Moreover, the tripling effect of each three-dimensional parallel surface reproducing itself both above and below every infinitesimal moment more-or-less concentrates the virtual torques within the three-dimensional surfaces and rendering the primary three-dimensional surface denser with respect to the single field than other surfaces. Each successive surface above and below the primary surface is less dense with respect to internal virtual torque and thus potential than the surface that preceded it in creation. The single field that is derived from or caused by the collective nature of the virtual torques associated with each and every 0-D point/twist Void thus gets less dense exponentially as the distance in the fourth direction of space from the primary surface increases.

This structure yields not only our common space-time continuum, but also the single field which gives us matter and energy, all of which cancels out to nothing if the individual 0-D discrete point/twist Voids were to collapse back into the absolute Void that existed before the first 0-D point Void and the subsequent Big Bang. This process thus explains how everything in our universe of 'somethings' can be created from the 'no-thingness' of the absolute Void.

9. The Big Blowout

At some point or moment in time determined by the geometrical restrictions and quantum limitations of the space-time continuum and universe as it then stood, quantum fluctuations constituting weaknesses in the surface emerged. These weaknesses caused a 'blowout' in the direction of the expansion (above the surface) in

the fourth dimension of space. This blowout occurred at random points in the three-dimensional surface to create the very first material particles.
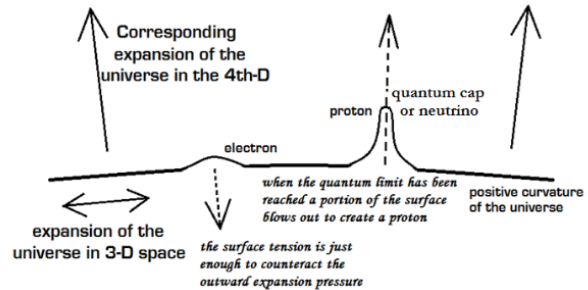

Figure 13. No anti-particles are created when inflation ends.

In other words, when the single field density of the surface reached a specific minimum value determined by the quantum and speed of light, individual 0-D point/twists in three-dimensional space would have erupted four-dimensionally outward (blown out not in) along the favored direction of expansion, creating three-dimensional protons in the surface that appeared four-dimensionally as exponential curves in the surface leaking potential into the fourth dimension.

The leakage stopped when the three-dimensional inner diameter of the particles reached a crucial quantum limit, determining the four-dimensional 'thickness' of a quantum measurement of infinitesimally thin three-dimensional surfaces that formed a sheaf or 'sheet'. [22]
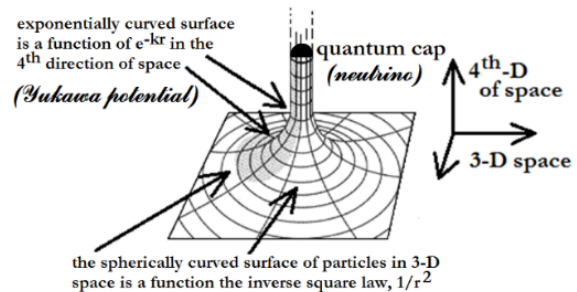

Figure 14. The exponential curvature of a particle in 4th-D.

At this point in time, a quantum cap formed on top of the exponential curves in the surface that ended the blowout and created the very first protons. The quantum cap stabilized the blowout in three-dimensional space and the fourth dimension as well as smoothed out the singularity at the center of the curvature predicted by general relativity at the particle's mass center, thus guaranteeing that

mathematical singularities (infinities) could not form or even exist theoretically in real physical space-time.

During this initial inflation-ending event, no anti-particles could have been created because anti-particles would have curved inward toward the non-existent spherical center of the expanding bubble (or below the primary three-dimensional surface) and thus against the 'momentum' of the outward direction of the expanding universe. Anti-particles display the same curvature, footprint (in the three-dimensional surface) and characteristics in three-dimensional space except for the single fact that their curvature is away from the expansion of the universe on the opposite side of the three-dimensional 'sheet', which gives them their characteristic opposite electrical charge.
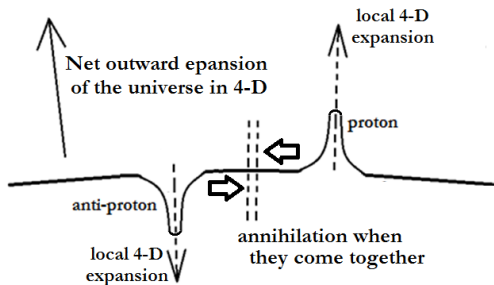

Figure 15. Mutual annihilation of a proton and anti-proton.

Anti-particles are inherently unstable in our universe because of their charge and oppositely directed internal stress (due to expansion in the fourth direction pulling on their quantum cap), but they cannot decay until they come into contact with their oppositely curved particles because something cannot collapse into nothing even though they do not decay into 'nothing' but equivalently with respect to matter/energy into other somethings. Furthermore, the mass of the anti-particles would be ever so slightly less (an asymmetry formed) than that of the counterpart particles because of their curvature on the underside of the curved surface and 'sheet'.

When any particle and its corresponding anti-particle make physical contact (their metric curves in the surface touch and overlap) and come together, occupying the same position in three-dimensional space even though their locations in four-dimensional are not the same, they annihilate their three-dimensional geometrical aspects by cancelling each other's geometrical curves. The interaction of merely touching or coming together at the same 'place' in three-dimensional space (which is actually a different 'place' in four dimensions) results in quantum cancellation due to the geometrical conditions which defined them as individual three-dimensional particles

and thus completely annihilates the particle/anti-particle pair or curvatures that defined them.

However, their four-dimensional aspects or physical characteristics still remain, *i.e.* their single field potential, which manifests in three-dimensional space as gamma photons equivalent in energy to the previous proton's material content by the prevailing physical conditions of $E = mc^2$ (a three-dimensional restriction) and $E = hf$ (a four-dimensional restriction). The potential that was packaged within their curvature (in the form of point mass-inertia that becomes point Dark Energy when the metric curvature is annihilated) cannot be annihilated, so it is lost as gamma rays that have no curvature but still have energy content.

The extremely rapid rate of inflationary expansion in the early universe slowed drastically with the initial blowout during the creation of protons–like wind going out of a balloon–beginning to end the inflationary period. The newly formed protons act like excessive drag to a moving vehicle or a boat's anchor to quickly slow the overall inflation of the surface. However, the production of protons alone would not be enough to completely stop or sufficiently slow the rate of expansion. The 'virtual momentum' of the expanding bubble was still too great and a second almost-blowout occurred.

This second event would not have had enough local potential at any given geometrical 0-D point/twist Void in the three-dimensional surface to create more protons because the surface tension of the three-dimensional 'sheet' of three-dimensional surfaces would enough to counteract the blowouts, point-by-point, leaving smaller bumps in the surface – electrons. So electrons are curves or little 'hills' in the overall curvature of the surface/universe equivalent to the maximum amount of curvature up to the moment blowout or rupture of the overall surface to form protons.

This second slowing process of expansion all but ended the period of cosmic inflation by very nearly equalizing the overall expansion in all four dimensions of space, above and below the primary three-dimensional surface except for the amount of expansion favored (above) due to the positive curvature of the three-dimensional surface. The actual rupture or blowout at the three-dimensional location of the electrons did not become a complete rupture (and thus form a proton) because a 'surface tension' of the three-dimensional surface resulting from the opposing directed virtual torque (below the curved surface) held the three-dimensional surface intact.
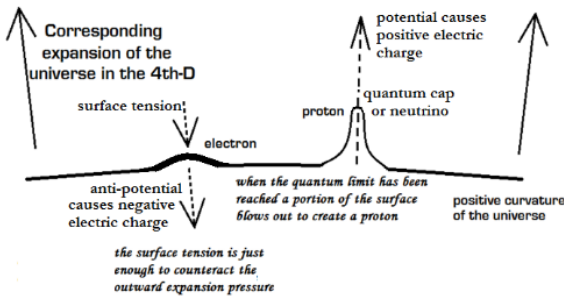
Figure 16. Creation of electrons in the inflation ending event.

In this case, the net effect was a downward tug (in the direction below the three-dimensional surface) or downward push by the 'surface tension' that gave the electron a negative electric charge as opposed to the proton which has a positive electric charge because the prevailing potential or virtual torque pulls upward (above) on the quantum cap that closed the three-dimensional curved surface that is the proton.

Any further quantum fluctuations in the single field that rose to the levels set by the quantum and geometrical conditions would have only caused excess 'burble' (point-centered turbulence) or small puckers of curvature in the three-dimensional surface in the form of neutrinos. So neutrinos represent the minimum amount of local curvature in the three-dimensional surface that can be distinguished as an individual particle from the overall positive (non-local) curvature of the three-dimensional surface, and thus their quantum 'width' would be equal to the 'effective thickness' of a 'sheet' of three-dimensional surfaces. They would not have any electrical charge because the potential and anti-potential of the four-dimensional single field would be equal and opposite along the minimal three-dimensional curvature.

The period of cosmic inflation would certainly have slowed sufficiently by the time any neutrinos were created and no anti-particles would or could have been created since the motion of the universe expanding outward (the favored direction of expansion due to the positive curvature of the sphere) created only the outward protrusions of curvature that are protons, electrons and neutrinos. Thus ended the inflationary period with the production of protons, electrons and some neutrinos, as observed in nature today, but without any production of anti-particles as required and predicted by the Standard Model of the quantum.

10. Conclusion

Given this process of particle creation, protons are not made of quarks as is claimed in the Standard Model of quantum theory. In fact, quarks are not particles at all and they only exist as a misleading description of the internal three-dimensional structure of protons, neutrons and some temporary pseudo-particles. Quarks have only been detected and misinterpreted as individual but not independent particles during high energy collisions because specific geometric and quantum conditions have been reached for their detection, but they are not real extended material particles in any sense of the word 'particle'.

Nor is there any need for intermediary particles such as gluons which do no more than fill a logical and/or mathematically driven need for completion of a theoretical model that is more false than true, rather than a physical necessity. Such particles were invented merely to make mathematical sense of a seriously flawed physical paradigm and maintain the scientific status quo. In fact, many of the particles of the Standard Model zoo are nothing more than machinations to prove and thus justify the mathematics rather than real measurable and thus verifiable physical entities, as for example gravitons, gravitinos, axions, super-symmetric particles, wimps, and many others.

Many other particles within the quantum zoo are no more than pseudo-particles which are just temporary intermediate energy resonance patterns of and within the single field that fulfill at least one and as many as several of the conditions for real extended material particle creation, but not quite all of the conditions necessary for true stable particle creation. Therefore they destabilize rapidly and decay into real particles with or without kinetic energy and/or gamma rays. In other words, pseudo-particles are just intermediate potential states of single field density resonances that occur during real particle (proton, electron and/or neutrino) creation.

Yet many portions of the Standard Model and its predictions as well as the quantum theory's overall physical features are still perfectly valid and correct, so all that is really needed for unification is a change in the interpretation of the fundamental concepts of the quantum theory that would allow its better portions to be incorporated into the single field theoretical model and its subsequent validation as a major contributor to a unified field theory such as the single field theory. The coming together and merging of the two paradigms–relativity and quantum–in this manner is necessary for physics and the scientific understanding of both the external world of matter and fields as well as the internal mind/consciousness that perceives and interprets our world.

Several facts, or rather physical truths, have become apparent with the adoption of the single field model of reality that originates with 0-D discrete point/twists of Void which are the physical correlates of purely geometrical discrete points. The quantum theory as it stands within the present paradigm is, was and will always be incomplete which has led to the discrepancies between portions of the Standard Model which are correct and those which are merely speculative conjecture, but the general theory of relativity, as presently interpreted as a four-dimensional space-time continuum with intrinsic curvature, whatever 'intrinsic curvature' means, is also incomplete.

Relativity theory has previously defied unification in any form because it has either ignored or misinterpreted the fundamental problem of the space-time continuum as defined by the point/extension duality. When this duality and its physical consequences are taken into consideration, general relativity, quantum theory in both its modern (Standard Model) and classical (quantum and wave mechanics) configurations, Maxwell's electromagnetic theory and classical Newtonian mechanics can be unified into a single generalized geometrical model of the space-time continuum.

The Riemannian geometry that expresses the unification starts with the discrete 0-D point/twist Void which creates our commonly experienced three-dimensional physical space as well as the embedding fourth dimension of space upon expansion in all four dimensions. While this geometry accounts for and describes the creation of the four-dimensional space-time continuum it also accounts for the dynamical substantiality of our world from the creation of world.

The twist portion of the three-dimensional 0-D point/twist void maintains the discreteness and integrity of this basic unit of co-creation while itself creating the 'virtual torques' (pre-force) in both directions of the fourth dimension which are collectively the precursors for the potential and anti-potential of the single field.
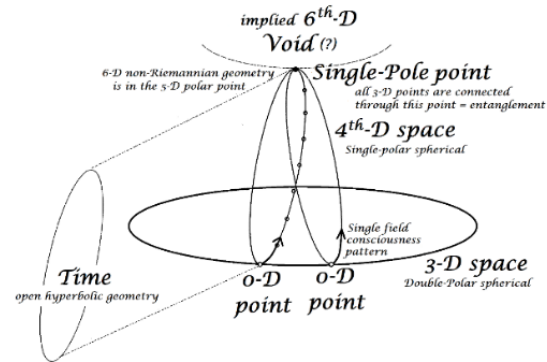

Figure 17. A 6th-D is implied by the physics of the 4th-D space.

The discrete nature of the individual 0-D point/twists of Void allows the quantum field to be rendered in terms of Riemannian geometry while quantum and wave mechanics can be adequately explained as physical characteristics of the geometrical point/twists (discrete quantum field centers) within the context of the single field (which is equivalent to Bohm's quantum potential field as well as the superposition of all possible Schrödinger wave functions for all possible quantum events).

The single field is the precursor to classical three-dimensional fields such as gravity, electricity and magnetism, while matter/energy, life and consciousness are accounted for as the various single field density patterns in five-dimensional space which appear as extrinsic four-dimensional space-time curvature in the overall five-dimensional continuum. Scientists and non-scientists alike mentally perceive local curvature and the time variation of local curvature of the three-dimensional surface curved extrinsically in the higher embedding dimension as the solid material bodies that constitute relative three-dimensional space and one-dimensional time with our three-dimensional brains and the sensations of our five normal senses (which are three-dimensionally biased). We collectively interpret these sensations against the context of our minds and within our universal sense of consciousness.

What we perceive or detect as Dark Matter is merely the interaction of local curvature with the overall positive curvature (non-local) of the universe, or rather the interactions of local matter with the rest of the matter (non-local) of the universe as local material bodies orbit or move relative to a more massive central material body. This interpretation of mater and motion strictly embodies Mach's principle and offers a solution to the three- or more-body gravitational problem that has vexed physics for centuries.

These gravitational concepts are accompanied by the electric and magnetic fields as perceived by us as well as the emergence of life, mind and consciousness through the evolutionary process as special complexities of matter/energy, electric and magnetic fields. The evolution of life and consciousness itself has been influenced by and proceeded from a primordial or primal awareness based on the reciprocal relationship between the absolute Void of nothingness that preceded the Big Bang and the 0-D discrete point/twist Void that emerged from that absolute Void as the original singularity. The 0-D discrete point/twist Void thus introduces a way to explain how the 'some-thingness' of our perceived physical/material universe emerged and evolved from the 'no-thingness' of an assumed absolute Void (with no physical properties) that existed before the Big Bang.

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