The zero-dimensional physical theory (III): graphing time and space

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Abstract: Here represents a description for how time relates with space graphically as a process of plotting points without assuming any dimensional scales of space or time, and without assuming spatial and temporal scales for mass or a photon of light, and thus for particles or waves. As a result of such, the fine structure constant can be derived as a zero-dimensional graphing code. Here also represents a description of how the graph basis of time and space can be scaled with the charge of the electron and speed of light to account for physical phenomena. As such, here will be described how to construct a zero-dimensional basis for the graphing of time and space to then better picture physical phenomena when that zero-dimensional number theory and associated plotting is scaled with two basic known physical values, namely the electron charge and the speed of light. Here, physical reality is not being plotted, yet a fundamental zero-dimensional basis for vector plotting derived, described, and then scaled to physical phenomena, the importance of which shall be highlighted as being instrumental to proposing new research.

1.   Introduction

In following on from the work of Temporal Mechanics[1], specifically paper 51 [51] in deriving the basic features of locality, causality, determinacy, here will be reviewed how a number theory can represent a graphic plot underlying physical reality, and how specific that plot can be in recognition of the known issues of causality, locality, and indeterminacy[2].

Here, a point is a zero-dimensional point on a graph plot. Therefore, in presuming a point on a plot as a physical entity, as a physical entity needs to be properly acknowledged as such, is the issue at hand. The proposed mistake physics makes there is in using points plotted on vector graphs to represent a physical reality that in all fact are not points, or rather a physical reality where with that physical theory employing mathematics the concept of a point in space and moment in time have not been sufficiently defined as being primarily zero-dimensional. This paper avoids that error of applying numbers directly to physical reality by first more acutely defining zero-dimensionality for time and space.

Here shall be shown that the idea of a vector graph must be a secondary feature to the definition of a point in space and moment in time, or more specifically the zero-dimensionality of time and space must take precedence to then define dimensionality. In achieving such, here shall be presented the zero-dimensional number theory pointing directly to how such can be plotted as a graph for zero-dimensional spatial points scaled with zero-dimensional time which can both then as a resultant zero-dimensional number theory and thence dimensional number theory be scaled to physical phenomena.

As such, this paper is constructed as follows:

1. Introduction
2. Traditional graphing of time and space
3. Zero-dimensional graphing of time and space
4. Zero-dimensional graphing of EM
5. The EM quasiparticle and phonon
6. Zero-dimensional graphing of the atom
7. Destructive Interference resonance (DIR)
8. Zero-dimensional graphing of mass
9. Zero-dimensional graphing of zero-point gravity
10. Emergent zero-dimensional graphing codes
11. Conclusion.

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[1][1][2][3][4][5][6][7][8][9][10][11][12][13][14][15][16][17][18][19][20][21][22][23][24][25][26][27][28][29][30][31][32][33][34][35][36][37][38][39][40][41][42][43][44][45][46][47][48][49][50][51].

[2] As outlined throughout paper 51 [51].

Indeed, how points relate to each other should define the description and underwriting of a graph. Yet in physics points are plotted to account for things like mass, shape of mass, shape of light, a quantum, and so on and so forth, such by applying numbers arbitrarily to those plots of spatial scales and temporal transitions in those spatial scales, all by assuming basic concepts such as precision of scale of mass, precision of scale of space with the scale of mass, and the precision of scale of time with the scale of space upon the scale of mass.

One of the great distortions exercised in physics is by the mere application of a 3d spatial graph of points to a particle or wave location and then mapping what such is thought to be as based on observed data, namely using the basis for a physical object as a point reference on a 3d spatial graph, and then plotting its location in time along that spatial graph as a flat spacetime description of its presumed dynamic. Although such then can be advanced upon by curving flat spacetime to account for gravitational freefall, the error of that process nonetheless remains, namely the error of arbitrating numbers to points on a graph describing physical phenomena.

In short, here the idea of a point is defined for space and time, and then a graphing system is derived for points in space as related with time to derive a "temporal wave function and associated particle feature for space". To be shown here therefore is that the correct graphing of EM from a zero-dimensional basis can then present a correct vector graphing of physical phenomena if indeed physical phenomena can be demonstrated by this process to be based primarily upon EM. Simply, here the basis for a point-plotting system is derived by acknowledging how zero-dimensional time (as a moment) can and only can relate with zero-dimensional space (as a point).

2.   Traditional graphing of time and space

In mathematics a Euclidean[3] vector (vector, geometric vector, or spatial vector) is a geometric object that has magnitude (or length) and direction. Vectors can be added to other vectors according to vector algebra (as *linear algebra*, namely vector addition and scalar multiplication as per vector calculus). A Euclidean vector is frequently represented by a directed line segment, first used by 18th century astronomers investigating planetary revolutions around the Sun. The magnitude of the vector is the distance between the two points, and the direction refers to the direction of displacement from say point A to point B, usually as a temporal event of a motion of a body in space according to a fixed reference marker 0 of 3d vector space.

Indeed therefore, vectors play an important role in physics, especially regarding their geometric and thence mathematical relationship to each other. There nonetheless the mathematical representation of a physical vector depends on the coordinate system used to describe it, specifically used to describe a physical quantity such as mass and its position in space.

In the regard of vectors relating with each other mathematically, linear equations became defined care of the work of René Descartes [52], a body of work and associated discipline termed

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[3] As per the work of Leonard Euler.

Cartesian geometry as lines and planes represented by linear equations whereby vector intersections are computed and solved. Such provided the first systematic link between Euclidean geometry and algebra. By such, geometric shapes can be described by Cartesian equations. Such has led to numerous branches of study including complex analysis, differential geometry, multivariate calculus, group theory etc. Commonly for physics, a Cartesian coordinate system for a three-dimensional space consists of an ordered triplet of lines (the *axes*) intersecting orthogonally with each other through a common point (the *origin*), each axis being a number line. By such, even today EM field symmetries of spacetime are expressed by the work of Cartesian analysis in the form of Lorentz transformations [53].

All of such most fundamentally nonetheless prescribes a process of creating a mathematical geometric system and then applying such to physical phenomena, to describe physical phenomena by those mathematical geometric mechanisms, most basically as points plotted on vector graphs, points used to express physical reality.

Indeed, vectors are excellent for plotting and thence mathematically describing location and direction of location of a proposed physical object or phenomenon under question, yet the proposal here is that in their application vectors and associated point-based plots can never precisely describe what is being plotted, usually a mass as a particle or EM as a wave function (or particle) simply because such things are not actually points in physical reality, or rather physical reality is not a point representation. Essentially, graphing physical reality with numbers as plots on vectors is still a process of abstraction and can never be assumed to represent reality per-se. Such is not foreign to mathematical physics though, as it is understood that vector descriptions break down on the quantum and thence particle scales. Despite such, vectors are used in classical mechanics to predict calculations for what is being physically measured up to a level of uncertainty.

For this reason, the physical meaning of anything in physical analysis comes down to what can be physically measured _and not_ what can be theorized. Although mathematical models can be proposed with outputs corresponding to physical measurements, ultimately the quality of the mathematical model is how well it can _best approximate_ what it is explaining.

Simply, it is understood that mathematical objects and theories used within physical theories are meaningless without the data they refer to. Vectors are nonetheless (by their application and widespread use) a common denominator for mathematical models, as a basic mathematical tool to describe dimensional point to point relationships of events in 3d space in the context of a component of time (as per representation theory and associated symmetries), hence the common notion of 3d space and 1d time as spacetime. Yet both flat spacetime and curved spacetime theory are still physical theories employing mathematical models as vectors doing what they can do to best describe what is thought to be going on with physical reality. In fact, Einstein's general relativity curved spacetime is based on an infinite series of infinitesimal flat Minkowski spacetime (linear vector) segments, a process itself that is problematic in entertaining point to point average lengths.

Any nominated space consists of arbitrarily selected mathematical objects that are treated as points, and so also consist of selected relationships between those points. The nature of the points can vary widely: for example, points can be elements of a set, functions on another space, or subspaces of another space. It is the mathematical relationship between those points, how that is defined, that

defines the nature of the space. It is quite arbitrary, if not ad-hoc, depending on the use required, if whether a given mathematical object should be considered as a geometric "space", or an algebraic "structure". In the case with physics, such a structure is a physical phenomenal entity such as a particle (with or without mass) or a wave function (with or without mass) ultimately given point status.

In short, if mathematics were like a camera taking a 3d photo of physical reality, one moment to the next, that application of mathematics in physics is currently designed on the resolution of what is considered as the smallest particle regarding light (a natural constraint of measurement). The problem there is the lack of pin-point precision, literally, as a particle or even quantum of physical reality is not a point, not a zero-dimensional entity. To resolve such, a new mathematical grid needs to be considered based on the zero-dimensional analysis of time and space as a number theory, and how then that number theory can relate as a mathematical scalar and vector grid, to then have such scaled to physical phenomena and thence offer its more precise dimensional description.

3.   Zero-dimensional graphing of time and space

With the Temporal Mechanics zero-dimensional basis proposal for graphing time and space, the idea is to consider the absolute exactness of time and space by first identifying their zero-dimensional characteristics. The next step is to determine how those zero-dimensional characteristics of each other (time and space) relate as a number theory and then a dimensional graph of plotted points for that number theory. This was specifically described in papers 43-44[4], and then reviewed in papers 48-50[5].

There, the key steps to defining the zero-dimensionality of time and space required the following idea to be upheld:

(i)   The simple and most basic solution is to accept an infinitesimal point in space (as zero-dimensional space) as the numerical value "0".

What though of zero-dimensional time? In expanding on the proposed definitions for zero-dimensional time and space in papers 43-44 and 48-50 to accommodate for a graph representing the zero-dimensional number theory, once again consider:

(ii)   A moment in time as zero-dimensional time can exist as a moment of time for any infinitesimal point.
(iii)   Ideally, time is not space.

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[4] [43][44].
[5] [48][49][50].

(iv) Therefore, the number to label zero-dimensional time should be different to that of zero-dimensional space on this level of definition, namely in using numbers as the fundamental basis for zero-dimensional analysis for space and time.

Simply therefore, a moment of time which can exist for any proposed 0 value for a zero-dimensional point in space is proposed as the value "1".

The questions to ask therefore are:

(v) Is there a way of *time* relating with *space* on this zero-dimensional level, namely how can "1" as zero-dimensional time relate with "0" as zero-dimensional space?

(vi) How thence can time be represented on a spatial vector diagram with dimensional axes associated to space around a central space=0 point value, and thus presumably to have a vector of time relate with that of space?

The proposed solution is by a new philosophical approach to numbers being applied to the dimensions [48] with a resultant number theory [49] by the introduction of two new temporal dimension ideas, namely:

(vii) *Time-before.*

(viii) *Time-after.*

Here, *time-before* and *time-after* as requirements are considered as unique from zero-dimensional *time-now*. The question is how this then allows a time=0 effect to arise to enable zero-dimensional time (labelled as 1) to be mathematically mapped with zero-dimensional space (labelled as 0).

In short, the solution for zero-dimensional time relating with zero-dimensional space, to create a number theory and associated time-space vector graph plotting system, is proposed to be achieved by:

(ix) Firstly identifying the number theory and associated vector plotting, as what can be achieved mathematically as solutions for the Riemann hypothesis [54], Goldbach conjecture [55], and Fermat's theorem [56]).

(x) And then how, when that number theory and associated vector graphing for time and space is scaled with two nominated basic phenomenal dimensional scales for time and space (such as the charge of the electron e_c and speed of light c), that scaling process describes what is measured of physical reality.

There, in introducing the ideas of *time-before* and *time-after,* zero-dimensional spatial points are shown to relate with each other according to a golden ratio (Fibonacci) equation ($t_B + 1 = t_A$), also

prescribing Euler's equation ($e^{i\pi}_{t_B} + 1_{t_N} = 0_{t_A}$), and how thence a dimensional number theory evolves by the relationship between the golden ratio equation for time and Euler's equation for space[6].

In this way, physical phenomena are not labelled with numbers and then plotted in an abstract and arbitrary way on vector graphs, yet first a zero-dimensional number theory is constructed and then abridged to a dimensional vector graph system for 3d *timespace*.

The number theory has been identified and described, together with its achievements in paper 50 [50]. What was not adequately described was the dimensional vector plotting of time with space, and how time can relate to the value of space as "0" and then how each can be plotted with one another as a dimensional vector graph representation, to be now described.

The incorporation of *time-before* (t_B) and *time-after* (t_A) lead to the time-equation as a golden ratio equation:

$$t_B + 1(t_N 1) = t_A, \text{ where } t_B^2 = t_A \tag{1}$$

To note is that the quadratic solution to equation 5 as t_B is φ and $\frac{-1}{\varphi}$, the <u>*golden ratio*</u>. These two values (φ and $\frac{-1}{\varphi}$) as the golden ratio are proposed to:

(xi)   Function as two distinct *orthogonal* dimensional scales (at right angles to each other), namely:

    a.   aligned as absolutely distracted as they can only be regarding each other (orthogonal),

    b.   together with being linked by a zero-dimensional point in space,

    c.   a zero-dimensional point in space which can thence be used to formulate *spatial dimensionality* and thus *positioning*.

(xii)   Represent a Pythagorean algebraic relationship.

(xiii)   Thence represent the concept of <u>*2d timespace*</u> and thus dimensionality.

To now work with these features, let us take two Pythagorean algebraic <u>*orthogonal*</u> vectors for t_B, one as φ the other as $\frac{-1}{\varphi}$, giving the hypotenuse as the value of $\sqrt{3}$, arriving at equation 7 (fig.2):

$$\left(\frac{-1}{\varphi}\right)^2 (t_A) + \varphi^2(t_A) \cong 3(t_N 1) \tag{2}$$

How this "3" value manifests as *spatial dimensionality* is proposed to be how space is incorporated with *time-now* ($t_N = 1$) as a dimensional entity, namely as per equation 2 and figures 1-3:

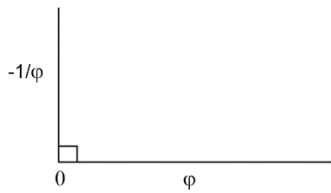[6] As described throughout papers 44 [44] and 49 [49].

Figure 1: Two t_B values of time as $\frac{-1}{\varphi}$ and φ.
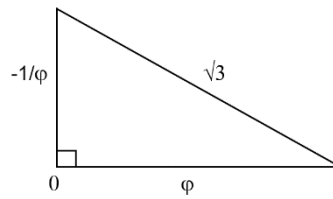
Figure 2: Two values of time, $\frac{-1}{\varphi}$ and φ, which then result in the value of $\sqrt{3}$ (Pythagorean relationship), namely as $\left(\frac{-1}{\varphi}\right)^2 (t_A) + \varphi^2(t_A) \cong 3(t_N)$
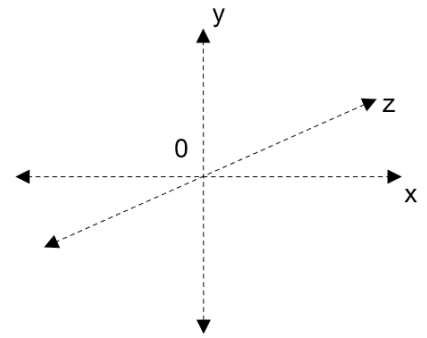
Figure 3: 3d *timespace*

Here the proposal is that the resultant "3" value of equation 2 represents:

(xiv)   The 3 dimensions of 0-space (fig.3) with an accompanying *time* component, as $3 \cdot t_N$.

(xv)   Thus, the dimensional definition of a 3d spatial position regarding $t_N = 1$.

(xvi)   How time can have a central 0 point with space as per figure 3.

(xvii) Thence the _basis_ for **_3d timespace_**.

To note is that the $\sqrt{3}$ value from figure 2 can also be expressed with $t_N 1$ (each as Pythagorean algebraic vectors) resulting in a value of 2 as the hypotenuse:

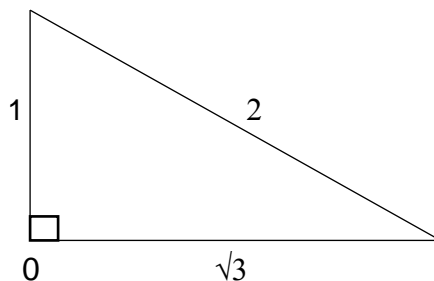**Figure 4**: The two axes of time, 1 and $\sqrt{3}$ which then result in the value of 2 (in a squared relationship).

Here, it is proposed that *time-before* (t_B) as $\sqrt{3}$, when applied in this geometric Pythagorean manner to *time-now* (t_N) as 1, results in a value of "2" (which is proposed to be integral to t_B):

(xviii) Here it is proposed that the 2 value represents a double $t_N 1$ as $2(t_N 1)$.

(xix)　Proposed therefore are two (as per the hypotenuse value of 2) $t_N 1$ applications for each of the 3 dimensions of space.

Despite there being two golden ratio values, these two values have already been factored, and so a new concept other than φ and $\frac{-1}{\varphi}$ must be considered when applying this $2(t_N 1)$ factor to 3d space from a zero-dimensional (0d) reference point.

Thus, $2(t_N 1)$ is proposed to be the two distinct 1d directions from the zero-point reference for 3d *timespace*.

Although such (xiv)-(xix) may appear contrived, yet the idea here is:

(xx)　To capture every type of number association with every type of temporal based mathematical operation that this proposal of zero-dimensional number theory *makes available for use* <u>on this level of theoretic design</u> for dimensionality.

Therefore, here regarding $2(t_N 1)$, 0-space is proposed to have:

(xxi)　3 $t_N 1$-related dimensions (3d *timespace*) incorporating 2 temporal scaled outcomes for each of the 3 $t_N 1$-related 1d *timespace* vector axes,

(xxii)　where the $2(t_N 1)$ value would represent the *dual* directions on each $t_N 1$ 1d *timespace* vector axis from the 0d reference for 3d *timespace*,

(xxiii)　such in creating a zero-dimensional spatial reference for each $t_N 1$ 1d *timespace* dimension being extended.
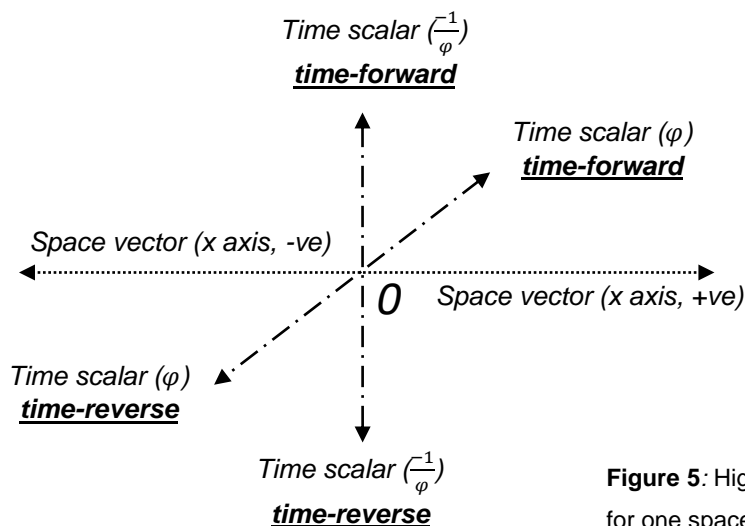
That can be explained as figure 5:

Figure 5: Highlighting the 4 key temporal scales for one space vector axis (x) with both +ve and -ve features from a 0 reference.

Here is a description for the vector x-axis of space, having two accessory orthogonal temporal components as a golden ratio scaling for space.

To note that there are three dimensions of space as the x-y-z axes (as per figure 3), and each of those axes would have time-scalar values for φ and $\frac{-1}{\varphi}$ orthogonal to each of the spatial axes they relate to (x, y, and z), namely with components of *time-forward* and *time-reverse* for φ and $\frac{-1}{\varphi}$.

To note therefore are 4 unique temporal components for each spatial vector axis:

(xxiv) Time scalar ($\frac{-1}{\varphi}$) *time-forward*.

(xxv) Time scalar ($\frac{-1}{\varphi}$) *time-reverse*.

(xxvi) Time scalar (φ) *time-forward*.

(xxvii) Time scalar (φ) *time-reverse*.

Essentially, there are proposed to be two basic temporal scales for each axis of space, one as $\frac{-1}{\varphi}$, and the other as φ, the two values of the golden ratio, each though with two temporal directions, *time-forward* and *time-reverse*[7]. Such is 1d *timespace*, namely a vector spatial axis (+ve and -ve components) with 4 components of time. 3d *timespace* is therefore 3 vector spatial axes with each spatial vector axis having 4 *components* of time.

To be described now though is the relationship between φ, $\frac{-1}{\varphi}$, and a spatial vector.

There, the first step to note is that in this process both t_B and t_A as non-localities (non-$t_N 1$) are used together according to Pythagorean algebra to set a zero-dimensional (0d) reference for 3d space. Although the values of the golden ratio are irrational number values, they are defined as being *non-local* in not being as $t_N 1$, yet together via Pythagorean algebra they instruct the spatial locality for *time-now* ($t_N 1$) as 3d *timespace* for a zero-dimensional point reference 0. Thus, the idea of spatial locality for zero-dimensionality comes by the golden ratio Pythagorean relationship via the time-equation $t_B + 1 = t_A$.

The second step to note is that the product of golden ratio values can be considered as a "plane" (2d *timespace*) value which when added to $t_N 1$ results in 0, and thus by default a 0-dimensional *spatial* reference of focus:

$$\varphi \cdot \frac{-1}{\varphi}(t_B) + 1(t_N 1) = 0(t_A) \tag{3}$$

This ($\varphi \cdot \frac{-1}{\varphi}$) 2d plane value is:

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[7] Noting that *time-reverse* is forbidden, as shall be described in section 4.

(xxviii)   A negative (-) value as the value of -1.

(xxix)   Proposed to represent a plane distinct from a *space* plane and thus <u>a natural complex number *plane*</u> for 2d *timespace.*

As a complex number plane, the work of Leonard Euler [57] has shown that:

(xxx) $e^{i\pi} = -1.$

(xxxi)   Namely, $e^{ix} = \cos x + i \sin x$ where $x = \pi.$

It therefore follows that $e^{i\pi}$ also would represent a complex plane of the same value of $\varphi \cdot \frac{-1}{\varphi}$. Thus:

$$\varphi \cdot \frac{-1}{\varphi} = e^{i\pi} \tag{4}$$

Thus, equation 3 becomes:

$$e^{i\pi}(t_B) + 1(t_N 1) = 0(t_A) \tag{5}$$

The suggestions here therefore are:

(xxxii)   The time-equation and its two golden ratio results of φ and $\frac{-1}{\varphi}$ represent the basis for a natural complex number 2d *timespace* plane *instructed* by $e^{i\pi}$.

(xxxiii)   Each of the values of the golden ratio when expressed together result in a $0(t_A)$ (eq.5) result.

(xxxiv)   Therefore, for a non-zero result (and thence presumably physical phenomenal result in physical phenomena not being $0(t_A)$) each of the values of the golden ration must be expressed exclusive from one another as a temporal function in space, *somehow*.

Thus:

(xxxv)   On the one hand, the time-equation proposes its *own/natural* 3d *timespace* grid as per $t_B + 1 = t_A$.

(xxxvi)   On the other hand, there also exists an equally valid 2d *complex* number *timespace* plane awaiting fulfilment and description with the varying complex plane features of $e^{i\pi}$ as per $e^{i\pi}_{t_B} + 1_{t_N} = 0_{t_A}$.

The next question therefore is, "how do the 1d, 2d, and 3d natural and complex *timespace* grids *work together*?"

4.   Zero-dimensional graphing of EM (Θ)

The case is now presented for how the 1d, 2d, and 3d *timespace* number theory and associated graphs work together.

The simplest consideration for descriptive purposes was to consider the time-equation and how that would adapt to the space-equation, namely how the features of the time-equation would conform to the idea of π, of a circle, as what the idea of $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ prescribes, namely $t_B = e^{i\pi}$ as a golden ratio value of $\dfrac{-1}{\varphi}$ or φ.

It would be simple to say that in "multiplying" each time result for t_B, namely φ and $\dfrac{-1}{\varphi}$, the value of "-1" results as per $\varphi \cdot \dfrac{-1}{\varphi} = -1$. Yet to be noted *primarily* is that $\varphi - \dfrac{1}{\varphi} = 1$.

Here, in applying one t_B time value to another, it is proposed <u>*at this level of theoretic modelling*</u> that those two values for time would be separated by a gross value of "1" as t_N. Consider figure 6, the z-axis being the spatial axis there.
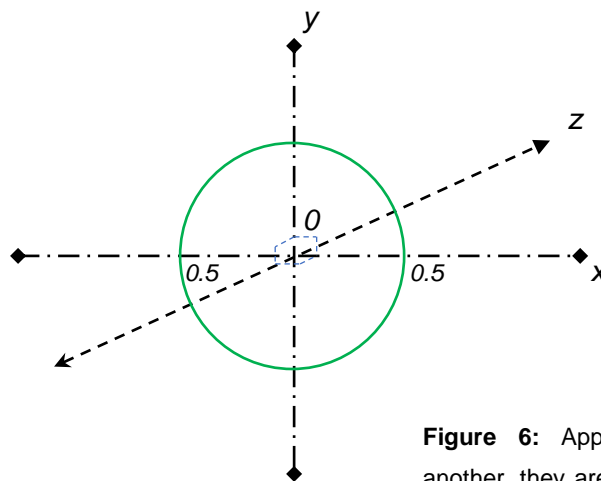

Figure 6: Applying a time value to another, they are separated by a value of "1" circumscribing a circle around the z axis with a 0-scalar spatial central reference.

In therefore assuming any orientation of axes, a <u>spherical time front</u> is required if indeed time moves in two directions along each axis according to the same "flow" rate[8] c, in that <u>for each axis</u> would be traced a circle around each associated axis, namely as the value of π as what $e^{i\pi}$ proposes. Consider figure 7.

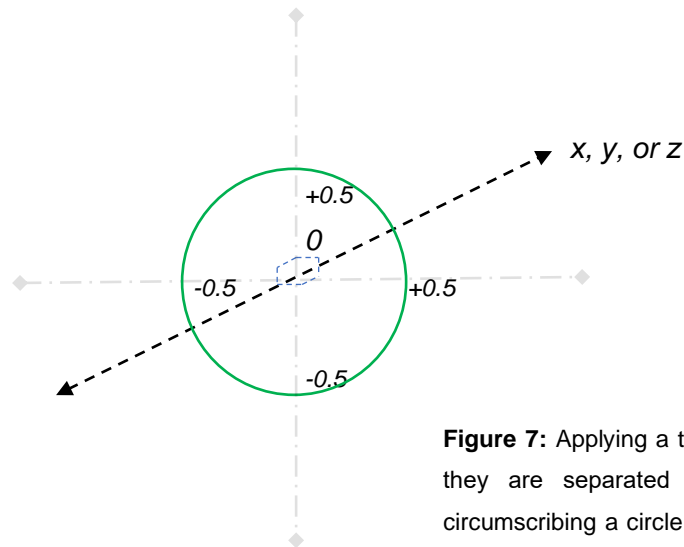[8] As derived in paper 2 ([2]: p15-17) and paper 45 ([45]: p12-27).

Figure 7: Applying a time value to another, they are separated by a value of "1" circumscribing a circle around the x, y, or z axis.

Simply, both time points ($\frac{-1}{\varphi}$, φ) are separated by a value of 1 and thus could exist anywhere spherically around that 3d 0-scalar dual directional 3-axis spatial grid as for a required uniform time progression (as t_N, as the value of $t_N = 1$ dictates).

Note that the value of 1 is being transferred into a spatial consideration as per equation 1 and figure 4, namely that $\sqrt{3}$ is being applied to $t_N = 1$ to get $\underline{2}$ results for time, which brings inclusivity of "$t_N = 1$" as a value into spatial consideration relevant to a value of 0.

Thus, the distance between one temporal point to the next for a nominated axis would form the trace of the circumference of a circle with a diameter of $t_N = 1$ giving the value of π, as per a spatial application of time.

To further note is that the way that time is being applied as a φ or $\frac{-1}{\varphi}$ entity as t_B to space is of course with the factor of $\sqrt{3}$, and a factor of $\underline{2}$. Not only this, but the result is also "negative" regarding space (-1), it must be, as much as the two values of the golden ratio (φ, $\frac{-1}{\varphi}$) when applied to each other on a vector (as $\varphi + \frac{-1}{\varphi}$) is the value of $\underline{-1}$, simply because that is how such is being applied to space, namely two values considered equally proportional to space (xxvii)-(xxxi).

Thus, applying φ and $\frac{-1}{\varphi}$ as t_B then the value of $-2\sqrt{3}$ needs to be factored, namely a factor of the three conditions of $\sqrt{3}$, 2, and -1.

Thus, the equation arrived at for time's flow calculated in space in using an analogue of the time-equation $t_B + 1 = t_A$ as $e^{i\pi}_{t_B} + 1_{t_N} = 0_{t_A}$, namely (xxviii)-(xxxvi), would aim for the following, somehow:

$$(t_B \cdot -2\sqrt{3}) + 1 = \pi \tag{6}$$

It is not as simple as this though.

Time in being applied to space according to the time-equation $t_B + 1 = t_A$ has conditions, so figure 7 is not the exact topography that would be likely to unfold.

What is required to satisfy the time-equation conditions is for time[9] to seek to be a circle along each spatial axis in each of the two directions around a central 0-scalar spatial reference.

In therefore time needing to trace a value of π in space along each axis direction, figure 8 holds true for the x-axis (here, for descriptive purposes of simplicity, in only considering the x-axis for space):
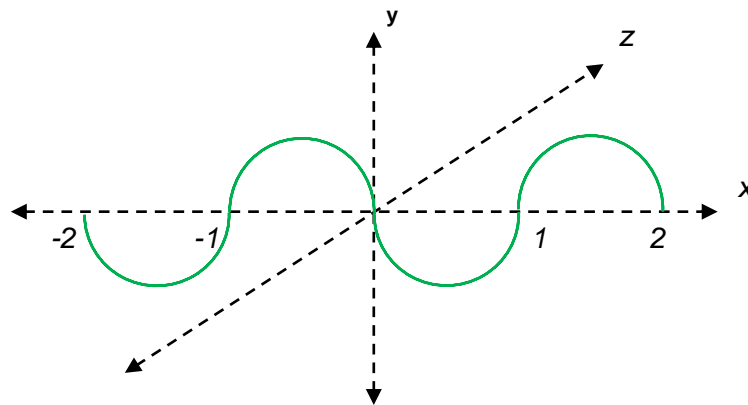

Figure 8: The trace value of $\frac{-1}{\varphi}$ would reach a value of π in each direction of the x-axis, here as the value of "2" in each direction of the x-axis. The overall trace length for this sinusoidal wave would represent a value of 2π in factoring in the dual directions (+ve and -ve) along the x-axis from the 0 reference, π along each direction symbolised as "2" semicircular diameters.

Now note the following five key points:

(xxxvii) The two possible wave function outcomes for the x-axis in space (the x-axis being nominated here as the spatial axis) represent the two directions the resultant temporal wave function would move along each axis in space, one needing to be the opposite direction of the other in space, and thus inverse wave-sign value (y-axis -ve, and y-axis +ve) at the 0-point of the x-axis and y-axis in recognition of this basis.

(xxxviii) Therefore, along those two directions of space (along the x-axis) for this wave function would represent two temporal phase alignments, one positive (y-axis +ve), the other negative (y-axis -ve), suggesting a type of paradoxical condition of time-forward and time-reverse for the wave function moving along each direction of the x-axis from 0.

(xxxix) Paradoxically therefore, this wave function, having both positive and negative temporal features, would appear to have time stand-still, not pass, as a condition of _time=0_, as it

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[9] Namely, its representation with space in the context of the time-equation $t_B + 1 = t_A$.

travels along the x-axis in either direction from 0, despite it presumably representing a speed of transmission along the x-axis from 0 as an overall time-equation in space[10].

(xl) Along each directional x-axis from 0 each wave function step traversing along each directional vector axis (here the x-axis) the value of π as a *timespace* "unit" wave function length needs to be satisfied.

(xli) The question to ask is how well this wave function can prescribe the value of π based on how π is mathematically defined from the temporal realm and associated time-equation $t_B + 1 = t_A$ in its application to space as $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ (here as the x-axis).
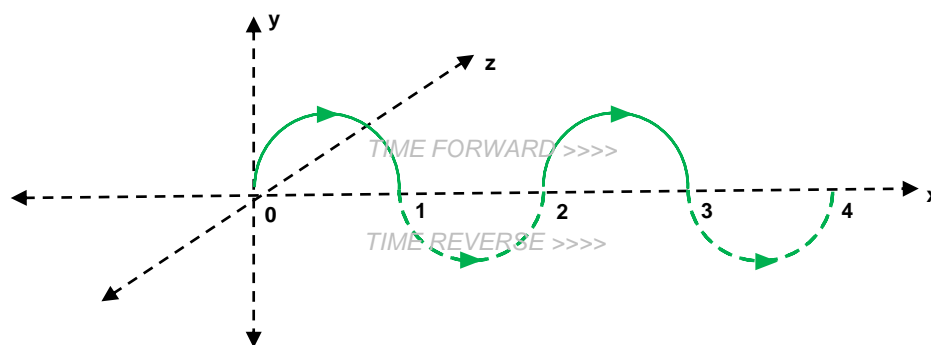
On simple observation, developed here is a sinusoidal temporal wave function along a spatial axis given that time must move a value of π in each directional axis from the 0-scalar spatial reference point 0. Yet is such a standard sinusoidal wave as mathematics/physics knows it? No, it is not. The important features to note here are that:

(xlii) This is **not** a simple linear sinusoidal wave in space.

(xliii) This is a <u>temporal wave function</u> in space with both positive and negative temporal features.

(xliv) The implication here is that *time-forward* is positive (y-axis) and *time-reverse* is negative (y-axis), both along each direction of the x-axis from the central 0 reference.

Although the direction in space may appear to be positive or negative in terms of a reference from "0" on a mathematical grid, space here is space, it is not considered positive or negative, and yet what to note here with this temporal wave function is that the temporal function itself of the vertical y-axis in regard to the spatial x-axis is the temporal feature of the wave having both positive or negative values, as *time-forward* and *time-reverse* respectively.

This feature will ultimately play a key role in explaining the particle nature of light and how at c time does not pass[11]. Consider nonetheless an adaptation of figure 8, here as figures 9a and 9b:
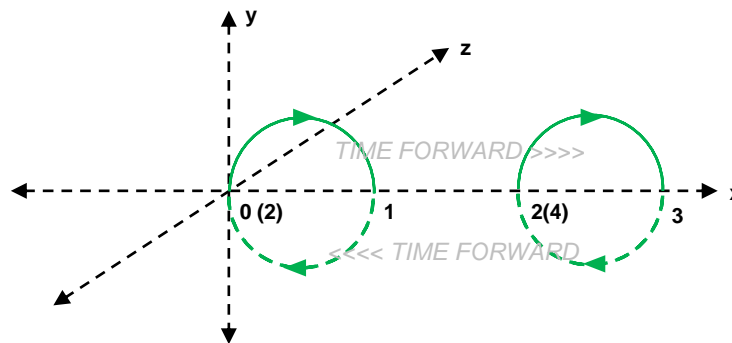
Figure 9a

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[10] As derived in paper 45 ([45]: p12-27).

[11] See paper 45 [45].

Figure 9b

Figures 9a-9b: Note the primary temporal wave function as figure 9a, and the secondary time-circle "*quasiparticle*" effect of that wave function as figure 9b, both wave functions demonstrating the idea of time being an overall loop (not passing) paradoxically as the progression of the temporal wave function.

Note the time-circles (proposed as *quasiparticles*) in figure 9b, how the negative region of the y-axis as *time-reverse* brings that part of the x-axis wave function back a step (in being *time-reverse*), twisted backwards, creating a time-circle as a type of *time-now* virtual particle-ring, giving this temporal wave function (to be shown to be EM) an almost <u>particle-hopping</u> nature as it would progress along either direction of the x-axis from 0, almost like the temporal wave function particle-ring is <u>tunnelling</u> as it trains along each direction of the x-axis from 0.

This particle feature though is a <u>secondary</u> effect of temporal wave function and as such is <u>not considered part of the primary focus of examining the temporal wave function.</u>

In short, the focus primarily here is how well this temporal wave operates from first principles, and subsequently here how it must deliver π, a consistent theme throughout the work of Temporal Mechanics, namely focussing on the primary temporal wave function and not its secondary apparent particle effects, which without understanding the fundamental processes at play would be a misleading investigation.

Indeed therefore, the issue with π is the question of, "*why assume this temporal wave function would move through the axes of space continually as though beyond the length of π, extending outwards to infinity from 0, as opposed to just going back and forth along a "0.5" and "-0.5" x-axis grid presuming to trace π?*".

Note therefore the following:

(xlv)   The primary consideration is how time has been installed into space using the time-equation[12].

---

[12] See (i)-(xx).

(xlvi) Yet installing time into space requires the time-equation $t_B + 1 = t_A$ to be modified, adapted, given space as $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ is a different creature to time[13].

(xlvii) To note is that t_N cannot be modified, only how time as φ or a $\frac{-1}{\varphi}$ zero-point derivative labels are applied to space as an "after" and "now" event.

(xlviii) t_A must aim (as a mechanism of a spherical wavefront in time, a future placement of the wave function, a *time-after* event) to ultimately most basically for each axis (here the x-axis) *equal the value of π*, the length in space the temporal wave function has **_traced_** along an axis (as per equation 6).

To most fundamentally note is that this is not a standard linear-time wave function expressed according to standard wave function mathematics, as the problem here is that time is both forward *and reverse* (<u>a violation</u> *that is corrected in reversing the spatial direction of that time-reverse feature of the temporal wave function*) with an overall arrow of time feature, and thus three functions in one, and thus <u>*cannot be described according to standard wave function nomenclature*</u>. The time equation ($e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$) applied to the space equation ($t_B + 1 = t_A$) is still a wave function nonetheless, a *temporal* wave function, with specific conditions preventing it from being labelled in the same way as conventional linear-time wave functions.

Contemporary physics defines a wave function mathematically as follows:

$$i\hbar \frac{\partial}{\partial t} \Psi(x,t) = \left[-\frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} + V(x,t) \right] \Psi(x,t)$$

The problem there is "time", namely that in that expression time is linear (x,t). With Temporal Mechanics though the run of time *is already an equation ($t_B + 1 = t_A$)* and so can only be expressed *as a geometry*, a geometry of time $(t_B + 1 = t_A)$ being applied to space $(e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A})$. Thus, the mathematical description of the temporal wave function is to explain the actual <u>scalar</u> and <u>vector</u> representation of the temporal wave function (*there expressed only in one x-axis direction for simplicity*), as per this chapter.

5.   The EM Quasiparticle and Phonon

In taking figures 9a-9b, consider figure 10 highlighting the quasiparticles A and B.
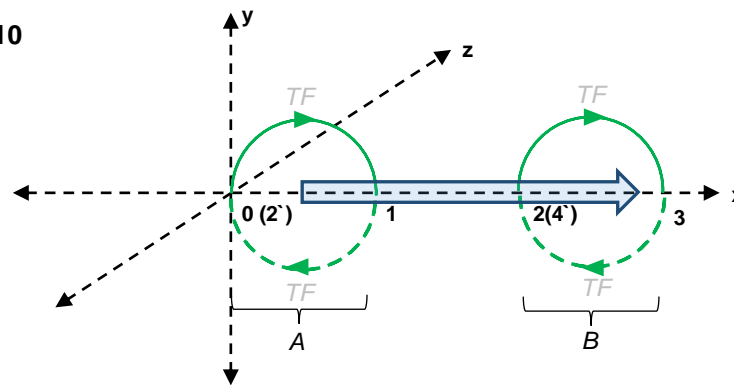
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[13] See (xxi)-(xxxiv).

Figure 10: The two quasiparticles A and B of the temporal wave function in this temporal description along the x-axis with the blue-arrow showing the general direction of movement of the temporal wave function (TF=*time-forward*, TR=*time-reverse*), leading to a type of quasiparticle hopping effect in the direction of the blue-arrow.

Once again to note here is that only *time-forward* (TF) is allowed, that *time-reverse* (TR) as <u>*anti-time*</u> **<u>is not allowed</u>**, considered a violation of time and space; to resolve the *time-reverse* violation, to uphold the arrow of time, *time-reverse* must be flipped in the temporal wave function to make it *time-forward*. In doing such, when the *time-forward* $+ve$ y-axis and $-ve$ y-axis combine, they form $time = 0$. Here Temporal Mechanics considers this time-loop construct of the temporal wave function as a "**quasiparticle**", proposed by Temporal Mechanics to be the particle nature of light, how light is given a type of "virtual" particle effect where at c time does not pass, a "**quasiparticle**" effect. Here in this temporal frame of consideration (time-0>time-4) it is proposed there are the two quasiparticles of A and B.

Contemporary inertial physics understands a **quasiparticle** as an emergent phenomenon that occurs when a microscopically complicated system such as a solid behaves as if it contained different weakly interacting particles in vacuum. Those weakly interacting particles, as Temporal Mechanics considers, are the EM quasiparticles, the EM field, the longitudinal temporal wave features of the basic temporal wave function, made more pronounced in a sold crystalline network of atoms.

Here, the temporal wave function (EM) **quasiparticle** (say, an EMQ), as a **partial** *quasiparticle field*, (like a kangaroo hop) can accommodate for both the particle nature of light and how that relates with actual particles themselves, as shall be shown ahead. This also is a type of longitudinal *Kangaroo hop* wave function, much like how sound travels through air (air molecules). As such, one would consider that light would have a type of *longitudinal wave effect*. Does it? Indeed, it does, namely as a "*phonon*". What is a "phonon"? A phonon is considered by quantum mechanics as EM quantized sound waves, like *photons as quantized light waves*. Here the principle is no different, yet here though as a longitudinal temporal wave mechanism, considered to be the primary mechanism in play, a primary

mechanism of itself as a quasiparticle and a resultant excitation in a periodic elastic arrangement of atoms (or molecules) in condensed matter.

This run of time, this Kangaroo hop longitudinal wave, was derived in paper 37, page 14 ([36]: p14), in presenting the case of the *microstate* status of the temporal wave function and its relationship to the idea of entropy:

The issue here with this temporal wave function proposal is that the temporal wave function as presented in figures 8a-8b of paper 2 ([2]: p8, fig8a-8b) are technically <u>static waves </u>in that they could move in either a time-forward direction or a time-reverse direction. Such is the key problem of quantum mechanics also, namely not delivering a reason for the run of quantum mechanical systems along the line of thermodynamical temporal runs.

Yet, <u>the reason why</u> it is considered that the run of the time-equation as equation $t_B + 1 = t_A$ where $t_A = t_B^2$ <u>is a time-before>time-after event</u> owes itself to the non-local time-before time-point realm and its association with the time-equation in that $t_A = t_B^2$, and thus there is an <u>enhancement</u> of the t_B <u>microstate</u> from t_B to t_B^2, if indeed a time-before (t_B) time-point can be considered as a theoretic microstate. To demonstrate this, and how the time-equation is related to the idea of entropy, a description of entropy is now in order.

To note therefore are 6 key ideas (scalar and vector) to be aware of with figure 10:

(xlix)   Naming of the axes:
   a. y (+) as time forward (TF) for the electric feature/polarization of the temporal wave function.
   b. y (-) as time reverse (TR) for the electric feature/polarization of the temporal wave function.
   c. x (+) as the considered spatial direction of the temporal wave function progression.
   d. x (-) not considered here in this frame of reference discussion.
   e. z (+ and -) not considered here, although would be the magnetic polarization feature of the temporal wave function to be described in the next section.

(l)   Temporal direction:
   a.   The two components of temporal direction for the y-axis (as above).
   b.   The overall temporal direction (blue-arrow).

(li)   Temporal polarization:
   a. y-axis (+ and -).

(lii)   Spatial direction:
   a. x-axis (+).

(liii)   Spatial polarization:

a. Electric polarization transverse wave as the *primary* feature.

(liv) Resultant temporal wave function particle locale (photon):

a. The reversed x-axis temporal features of time-2` and time-4` from time-2 and time-4 respectively.

b. Quasiparticles A and B.

In all, this results in a type of *Kangaroo hop* longitudinal wave progression of the basic transverse temporal wave function from A to B, and so on and so forth. Yet there is a clear stand-out feature here of this *Kangaroo hop* **quasiparticle** temporal wave function, namely its universal reference in space as a wave function. In other words, if there is an ultimate "0" reference for space, given space is being defined as a pure vacuum, a veritable nothing, only though given dimensions by the application of the time-equation to the idea of Pythagorean space, as constructed in paper 2 ([2]: p3-7), and if at $c\ time = 0$, as derived in paper 2 ([2]: p16, eq10), and re-demonstrated here, and $time = space$, as derived in paper 36 ([35]: p22-29), when therefore time exists as "0" with space *then a specific condition must applied* namely *a universal timespace reference* such that c is always conserved *despite the relative motion of objects in space*.

Here, it is shown with this graphing process for time and space that the relative motion of objects is inconsequential to the speed of light, simply because at $c\ time = 0$ anyway, and motion though of an object infers time, yet at $c\ time = 0$.

Thus, the question of, "how is the universal *timespace* (or even Einstein's spacetime) reference measured, namely is there a collective flow of reality, a type of aether wind in play perhaps?" The Temporal Mechanics proposal there is that everything becomes calibrated, all motion calibrated, to the feature of $time = 0$ at c, and thus upholding the idea that there is no particle aether or aether wind.

6. Zero-dimensional graphing of the atom

The graphing of time and space as the temporal wave function now requires the inclusion of both values of the golden ratio solution to the time-equation $t_B + 1 = t_A$. For instance, if each value for the golden ratio is factored in for t_B of equation 6, equations 7-8 result.

$$(\frac{-1}{\varphi} \cdot -2\sqrt{3}) + 1 = \ 3.140919 \tag{7}$$

$$(\varphi \cdot -2\sqrt{3}) + 1 = \ -4.605020 \tag{8}$$

Although the calculation of equation 7 for $\frac{-1}{\varphi}$ as t_B appears remarkably close to what the mathematics of time for space proposes, namely the condition of equation 6 as $(t_B \cdot -2\sqrt{3}) + 1 = \pi$, the results of these two equations appear anomalous for the **_exact_** value of π, noting only the value for

$\frac{-1}{\varphi}$ appears close to the value of π (0.021% error). Yet <u>are</u> these results anomalous? Or can they be further utilised; namely, do these equations point to something far more intricate and relevant to π? To answer such is to further investigate how the two golden ratio results for equation 7 can develop as a wave function.

In addressing such, for the value of $\frac{-1}{\varphi}$ an approximate value of π would be reached in each direction of the x-axis from 0 as per figure 8. Yet for the value for φ is reached -4.6050202 as per figure 11 noting here the use of space as the x-axis once again, yet the temporal axis here is the z-axis:
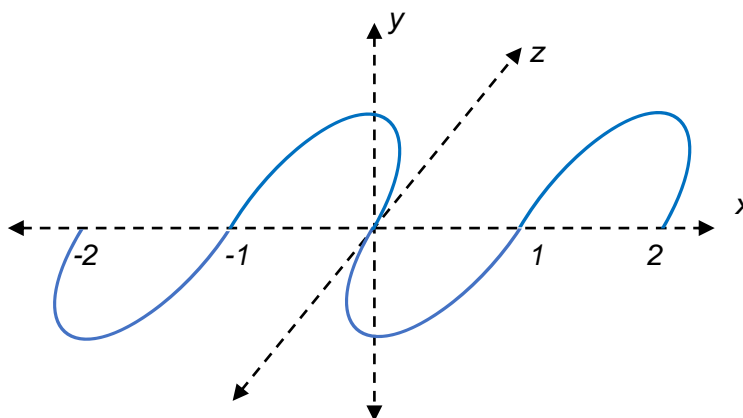

Figure 11: For the trace value of φ a value of ~ 4.6 would be reached in each direction of the axis, the overall trace length for this sinusoidal wave would represent a value of ~ 9.2 in factoring in the dual directions along the x-axis from the 0 reference.

<u>Just to get a clear mental picture of what is being proposed here and its relevance to physical phenomena</u>, let it be suggested that the result for $\frac{-1}{\varphi}$ is the electric component (temporal axis being the y-axis) and the result for φ is the magnetic component (temporal axis being the z-axis). Why? As is evident the value for φ when plugged into equation 2 graph as an ellipse, namely that it has a greater circumference than an ideally perfect circle, and thus has a dual pole centre of circumscription, as an ellipse does, and indeed magnetism is noted for being a dipole phenomenon. Consider therefore figure 12 in considering φ as the magnetic component of the temporal wave function, and $\frac{-1}{\varphi}$ as the electric component of the wave function (value for π tracing a circle) as analogous to figure 6:

Figure 12: The circle $(\frac{-1}{\varphi})$ as the electric component (green) is a circumferential value of π, the ellipse (φ) as the magnetic component (blue) is a circumferential value of ~4.6.

The new proposal is that the golden ratio components of the temporal wave function are not by definition expressed with each other, yet function as unique temporal wave functions, one for φ, and the other for $\frac{-1}{\varphi}$. This then requires a phase mismatch between the temporal wave function for φ (magnetic feature) and the temporal wave function for $\frac{-1}{\varphi}$, *and thus out of phase when expressed graphically.*

In now putting this as a wave function as per figures 8-11, in factoring the electric component $(\frac{-1}{\varphi})$ as out of phase with the magnetic component (φ), consider figure 13.

Figure 13: Green line electric component (x, y), blue line magnetic component (x, z), both waves out of phase with each other and perpendicular to each other.

Thus:

(lv)   The <u>magnetic</u> component (φ) exists as a <u>dipole</u>.

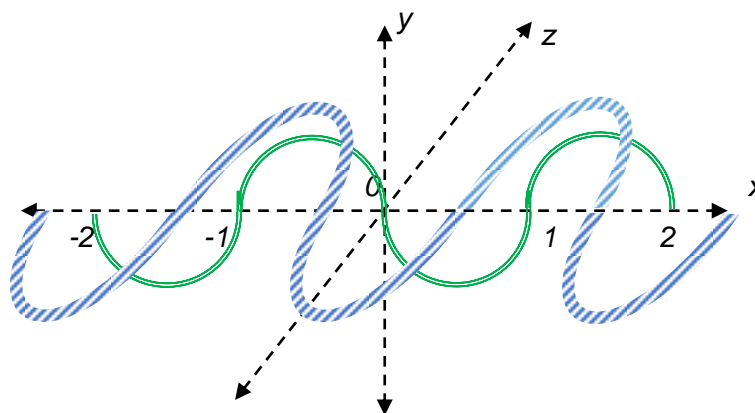(lvi)   The <u>electric</u> component ($\frac{-1}{\varphi}$) exists as a <u>monopole</u>.

Note also that this graph would apply not just to the dual direction timeline of the x-axis yet would also need to be applied to any potential directional vector axis (x, y, or z) for 3d space.

To also note is that this fluctuating electric and magnetic feature of the temporal wave function for space keeps the wave function travelling in a straight line from a point of origin (as per the Pythagorean mathematical constraints for the x-y-z axes). The constraints and limitations of that travelling process were further outlined in paper 47 [47] deriving Fermat's principle, the stationary-action principle, and the principle of inertia.

The next question to ask is how does a temporal wave function reach a proper value of π as a t_A result for $\frac{-1}{\varphi}$ as t_B^2, given $t_B^2 = t_A$ is a condition for applying time to space?

If it is considered that $t_B^2 = t_A$ (in ignoring the value of π as t_A for the moment) then the following results for the golden ratio equation:

$$(\frac{-1}{\varphi} \cdot -2\sqrt{3})^2 \;=\; 4.583533 \tag{9}$$

$$(\varphi \cdot -2\sqrt{3})^2 \;=\; 31.416253 \tag{10}$$

Note the squared value for $\frac{-1}{\varphi}$ (electric component, equation 9) is roughly the negative of the value of time for φ (magnetic component, equation 8), suggesting an embedded "negative" connection between the electric and magnetic components of the wave function in this networked t_A time-looping structure; basically, when the electric component ($\frac{-1}{\varphi}$) is used as t_B^2 (as a t_A expression) then the result should be roughly a value of 4.6 as what the magnetic component per equation 8 proposes except with equation 9 as a positive value. The thinking here is that such is an underlying feature of the interlaced temporal sinusoidal wave going from a positive temporal curve/direction to a negative curve/direction divining the concept of both a fluctuating EM field and associated EM induction features, such as based on the time-equation $t_B + 1 = t_A$ adapting to the space-equation $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ as the resultant described temporal wave function.

To be noted is the squared value for φ (31.416253) for equation 10, namely an approximate value for <u>10π</u> in considering equation 7, the electric component step, closer than the initial equation 7 process for $\pi's$ formulation.

To be also noted is that t_B is the feature of the temporal wave function as a time-equation process that can be only considered here, given the spatial equation mandate of $e^{i\pi}$ as expressed in a time-equation form ($t_B + 1 = t_A$) of $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$.

It can therefore be proposed that the value for φ in the context of equation 10 offers a closer value for π as the idea of a recalibrated "10" π electric component step process of equation 6 provided that value is annexed by t_B as the derived π feature for the $\frac{-1}{\varphi}$ value, and thus what would appear to be the almost exact value for 10π. Such is proposed <u>as the more correct scale to be put in play</u>, as a required compromise given the electric and magnetic components are intricately linked as the golden ratio temporal wave function time-looping feature.

What happens to the electric component of the temporal wave function in this instance though, namely in the instance of 10 π temporal wave function steps as a required expression of t_B for $\frac{-1}{\varphi}$?

In considering using 10π as the <u>*magnetic*</u> t_A step yet as an "<u>electric</u>" $(\frac{-1}{\varphi})$ t_B wave function step process (as must be the case, namely using a t_B process step), such on a spatial grid would represent how that electric wave function component would align with <u>*the primary magnetic wave function component*</u>, and thus here as 10 full magnetic wave function steps, as per figure 14.

Figure 14: Green line electric component (x, y), blue line magnetic component (x, z), both waves out of phase with each other and perpendicular to each other, magnetic wave used as the 0 start point extending 10 wavelengths ahead. Note the red line area though regarding the electric component, and only 9 full electric wavelengths have been completed, leaving another two partial wavelengths.

As figure 14 highlights, at the start of the magnetic feature of the temporal wave function there is a partial electric component, and so too at the end of the magnetic wave feature (see the red shaded line figure 14). Yet the π requirement of the spatial equation $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ mandates a full $e^{i\pi}$ expression for t_B. Thus, what is required is annexing full π-steps and not partial π-steps. This then requires 11 π electric steps (as in figure 15) and not 9 (as in figure 14).

Thus, in regarding the electric component for light as the true representation for π, figure 15 is in order:

Figure 15: Note the completion of the electric components of the wave function toward the 0` and 22` markers.

Thus, the idea here is to:

(lvii)   Grant equation 10 as $(\varphi \cdot -2\sqrt{3})^2 = 31.416253$ as the nominated value for a factor of π.

(lviii)   To achieve this value (31.416253) it needs to be re-interpreted into both a π and thence a $\frac{-1}{\varphi}$ feature.

(lix)   To do this requires scaling such as 10π steps as a $t_A = t_B{}^2$ magnetic agenda, namely in giving precedence to the magnetic feature of the temporal wave function.

(lx)   Yet in giving precedence to the magnetic wave function feature, components of the electric wave function feature are compromised.

(lxi)   This thence warrants the addition of electric wave function components to complete the electric wave function π-requirement component for each of its wave function steps.

The real question is how the electric component resolves with the magnetic component as a wave function per se, not drawn here (figure 15) according to any scale yet a proposal of the π-condition for the electric component of the wave function. Here therefore (lvii)-(lxi) is a look at the hierarchy of mandates involved in constructing the temporal wave function for space, noting the

requirement of two equations, namely $t_B + 1 = t_A$ and $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$. A subsequent paper shall aim to address this electric and magnetic wave function scaling issue more clearly.

The next thing to note is that given the progression of the temporal wave function in space is in "two" directions (as per figure 10), namely along each direction of the x-axis from 0, then 11 ***full*** $\frac{-1}{\varphi}$ wavelengths (a value of 22 if the diameter of the π-step is the value of 1) on each side of the x-axis 0 reference are required for the two values of the golden ratio (φ, $\frac{-1}{\varphi}$) reaching π along the x-axis for space. Simply, there are two results (as the two directions) for the golden ratio for $\frac{-1}{\varphi}$ extending a π length (eq. 6) along the x-axis from 0, two results on the x-axis (extending diametrically opposed to each other from 0) for 11 electric temporal wave function steps.

Note that the electric step is being employed here as this is considered to be the only way for the wave function to satisfy its requirement to trace π, for the time-equation $t_B + 1 = t_A$ to satisfy the space-equation $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$. The fact the two solutions applied factors of φ and $\frac{-1}{\varphi}$ for equations 7-8 are not true to π time means they must be superseded, find a more correct outcome, and thus the π-wave continues until it satisfies its π condition, as per ~11 $\frac{-1}{\varphi}$ steps along each axis away from the $\frac{-1}{\varphi}$ new 0-point.

Such (lvii)-(lxi) is proposed to form the basis for scaling an atomic locale. The constituents of the atomic locale (particles) are then to be derived mathematically[14].

Once again, to be mindful is that an understated feature here is why the x-axis is being used as a graphical capture for a resultant flow of time in space. There, fundamentally, the π condition for space as $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ needs to be fulfilled by time, and this occurs per the time-equation $t_B + 1 = t_A$.

Note that the term "point source" is used here to describe the reference point of 0 for the spatial axes. A "source" though suggests a temporal beginning, which then ultimately implies a "common beginning", which technically is not the case here. Here, the time-equation is a constant loop. Instead of "point *source*" therefore the 0 axial reference is really a point "*reference*" as an abstraction emerging dimensionality for time and space.

Thus, from a 0-point reference in space (which could be potentially anywhere) the temporal wave function that develops is the fundamental spatial transformation code, much in the same way of the Lorentz transformation [53], yet here in accommodating for the time-equation and those peculiarities for time (xxiv)-(xxvii) for each spatial axis.

Simply, here the transformation mathematics starts with the time-equation which is then applied to the idea of Pythagorean algebraic space which then forms a temporal wave function to then present the case for an *atomic locale* under the condition of π, more precisely as the time-equation $t_B + 1 = t_A$ adapting to the space-equation $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$.

Consider therefore how figure 15 is proposed to relate as a 0-point reference for the atomic radius r as $r = a^0$ (Bohr radius), here as figure 16a, and how that then relates to the scale of the atom as figure 16b.

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[14] See section 9.

Figure 16a

"22" temporal wave function units; atomic radius $r = a^0$

"11" temporal wave function units (22 x-axis units) | "11" temporal wave function units (22 x-axis units)

0-reference for proposed atomic radius $r = a^0$

Figure 16b

"44" temporal wave function units; atomic diameter $d =$

"22" temporal wave function units; atomic radius $r = a^0$ | "22" temporal wave function units; atomic radius $r = a^0$
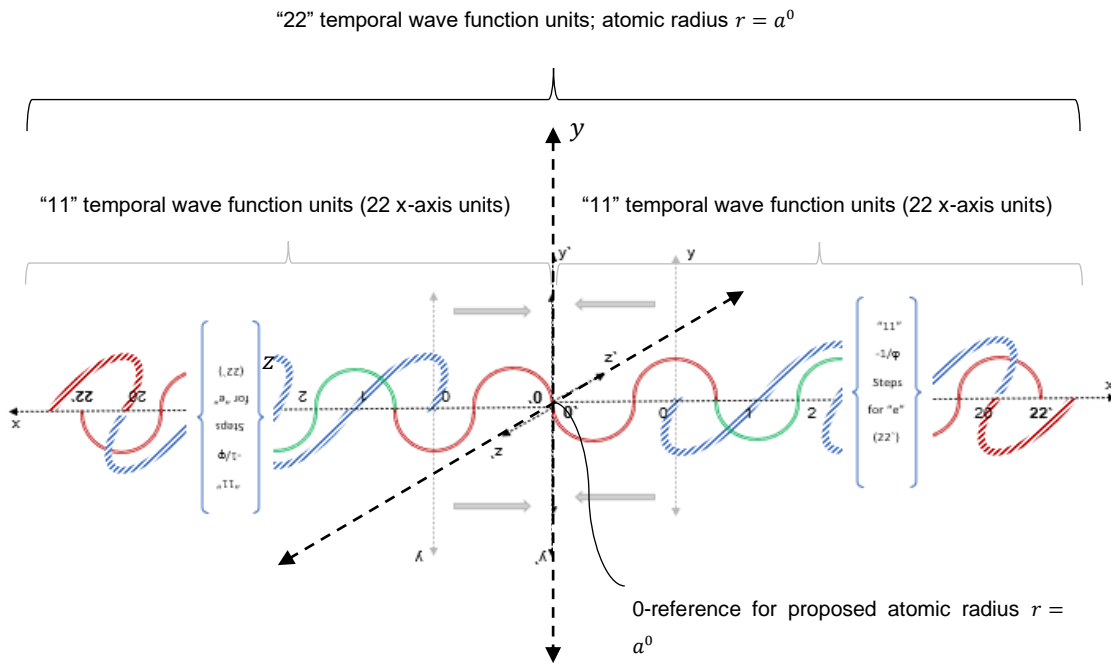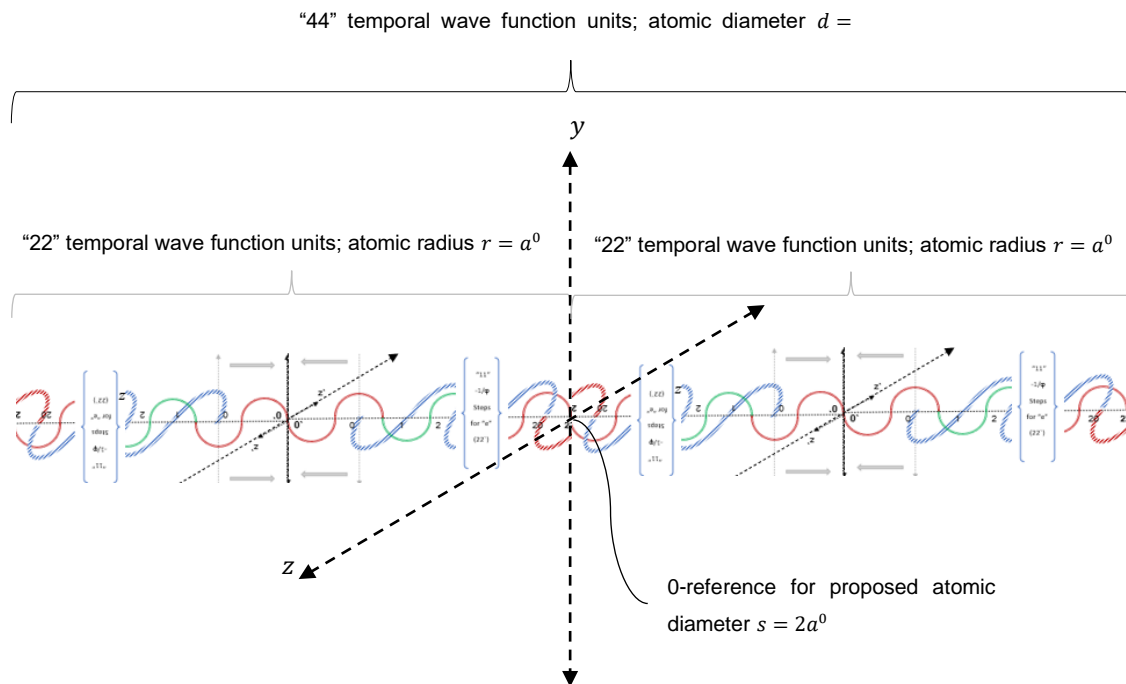
0-reference for proposed atomic diameter $s = 2a^0$

Figures 16a-16b: from figure 15, scaling the temporal wave function graph to an atomic radius scale (16a) and then to the atomic scale (16b).

To be noted is that in then scaling this with the charge of the electron e_c and speed of light c very good approximations are reached for the Bohr radius a^0 and the fine structure constant value α ([2]: p15-16, eq7-11), thence for Planck's constant h ([3]: p3-4, eq1). Those approximations though were not sufficient and so it was thought that the actual manifestation of mass effects those approximations to their true known values[15].

One feature to note by the graphic description of the temporal wave function is its "plane" (2d) nature with space, namely the spatial and temporal axes as a 2d plane[16]. In looking at the actual binding strength of that spatial and temporal 2d plane, regardless of the need to have a full electric wave function unit expression[17], yet the basic 10π condition as prescribed by equation 10, consider figure 17 as an adaptation of figure 14 and figure 16a, figure 17 highlighting two temporal wave function 2d planes, each as a "10-plane" illustrated as a circle, mathematically as a plane as the surface of each circle.

Figure 17: A temporal wave function *10-plane*, namely "10" temporal wave function units as the basic temporal wave function scale in addressing the basic π-requirement of equation 10.

temporal wave function fine structure platform: 20 wave function steps

Proposed here is a basic plane of influence for a basic "20" value (10 wave function steps for each x-axis vector direction) x-axis calibration, such for "10" temporal wave function units from a 0-reference as each *10-plane* circle. Such is proposed to represent a basic *uncalibrated* range and *__not__* calibrated to 22 wave function steps, as per figure 17; here is not a true atomic radius per se, yet this new temporal wave function plane accounting for equations 9 and 10 graphically.

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[15] See section 9. figure 27.

[16] as per equation 3, namely $\varphi \cdot \frac{-1}{\varphi}(t_B) + 1(t_N 1) = 0(t_A)$

[17] As per points (lvii)-(lxi).

The proposal now is that it is possible to derive a temporal wave function *fine structure 10-plane (2d) platform* with the values of equations 9 and 10 while addressing this basic temporal wave function *10-plane* of influence.

The *10-plane* of influence for each direction of the x-axis from 0 (as described in figures 16a and 16b) is proposed to represent the basis for π, as it is the number of wave function steps (units) that the derivation of space (from the time-equation) finds most closely matching the true value for π, as per equation 10, namely $(\varphi \cdot -2\sqrt{3})^2 = 31.416253$ as the electric component of the temporal wave function. The associated *magnetic* component of the temporal wave function there is as per equation 9, namely as $(\frac{-1}{\varphi} \cdot -2\sqrt{3})^2 = 4.583533$. Let this value be considered as μ, *the magnetic factor* of the temporal wave function.

Thus, the proposal here is that the electric component for the temporal wave function is associated to the value of π (as 3.1416253), and the magnetic component for the temporal wave function is associated to the value of μ (as 4.583533).

Thus, the ratio of π and μ, as $\frac{\pi}{\mu}$, represents the value of 0.68541566.

The next proposal is to consider this ratio as a temporal wave function *scale* that can be translated as a 2d temporal wave function plane for the 10-scaled temporal wave function for each direction of the vector x-axis from 0 (see figure 17). A plane is considered here given that the temporal wave function is being considered as a 2d plane of time-space inter-activity.

The value proposed in considering the two directions of the x-axis vector (comprising the proposed radius of an atomic locale) is the value for double the plane-area in question, namely $2\pi r^2$, yet here not as $2\pi r^2$, yet $2\frac{\pi}{\mu}r^2$, the value for r here being "10" for each *10-plane* of influence, noting that a full temporal wave function unit is a value of "2", and thus an overall *10-plane* an actual value of 20, and thus a radius of 10 as r. Thus, the following equation value becomes apparent:

$$2\frac{\pi}{\mu}r^2 = 137.08313 \tag{11}$$

$$137.08313 \cong \frac{1}{\alpha} \tag{12}$$

The proposal here therefore is that the temporal wave function *fine structure platform* as a basic *10-plane* scale represents the blueprint for what becomes the fine structure constant value of α, the actual value there being $\frac{1}{137.035999}$, here being as equation 13's $\frac{1}{137.08313}$. To note also is that α (by definition) represents the electric binding strength of the atom. Such was derived in paper 39 ([39]: p46-52), with all the required descriptions of the electric binding strength. Here though the proposal is for a more fundamental fine structure value, here say as α_X (X being symbolic for the roman numeral 10, here in reference to the *10-sphere*), as a temporal wave function *fine structure platform*, as equation 13:

$$\alpha_X = \frac{\mu}{2\pi r^2} = \frac{1}{137.08313} \tag{13}$$

Essentially, α_X represents the magnetic component of the *10-plane* **_per_** the electric surface area component of the *10-plane*, forming the basis for the actual fine structure constant value α as derived in paper 39 ([39]: p46-52) according to the descriptive definition of the fine structure constant, α namely as a measure of the basic and primary electric feature of the atom quantifying the strength of the electromagnetic interaction between elementary charged particles as related to the elementary charge e, namely denoting the strength of the coupling of an elementary charged particle with the EM field of the atomic locale.

Such (α_X) is not the actual known fine structure constant value, for the actual atomic value for α had to be calculated in first calculating the actual electrostatic forces of the atom, as per paper 39 ([39]: p46-52). Yet here is proposed to be a baseline fine structure constant factor, α_X the proposed fundamental blueprint for the fine structure constant α, here as that which defines a ratio between the proposed *electric* and *magnetic* features of the temporal wave function according to the π condition, a quantum of light, _a most fundamental_ constant, a value closely matching the known value of $\frac{1}{137.035999}$, yet here as α_X being <u>symbolic of the actual binding strength of the temporal wave function.</u>

How then this value is more or less maintained for an atom of atomic radius of ~22 electric wave function steps is how mass and charge thence become related to the atom itself, as described throughout paper 39 [39], thence arriving at the known value for α, yet not just α, yet Planck's constant h and the known Bohr radius a^0.

Once again, to note is how Temporal Mechanics presents the basic platform for physical phenomena to manifest, that number theory and associated graphing blueprint. The aim is to describe this number theory blueprint and associated graphing in a way consistent with what is observed of reality, with all physical phenomena. Thus far, nonetheless, described here in this section has been:

(lxii)   The zero-dimensional basis for time and space.

(lxiii)   How zero-dimensional time relates with zero-dimensional space as a number theory.

(lxiv)   How that number theory then translates to a graph.

What therefore becomes apparent is how the number theory can then be used as the basis for an ecosystem of derived equations that can automatically be graphed. By such it is possible to visualize the number theory virtual reality for time and space being proposed, and to then compare such to known physical phenomena data. The real question now is, "what *determines* the **physical manifestation** of mass, namely how do the subatomic and elementary particles come into effect at the scales they do, and why at the scales they do, according to the number theory equations, and how does that process then describe the values for the Bohr radius a^0, fine structure constant α, and Planck's constant h?"

Here nonetheless thus far, importantly, is a derivation of a temporal wave function in space with precursory electric and magnetic features that when scaled with e_c and c demonstrates itself to be analogous to an EM wave function, termed as a *temporal wave function* symbolized as Θ. The next step here though is to understand how that EM (Θ) temporal wave function interacts with itself and

what the conditions of its existence are there by its various self-interactions, and whether those interactions have anything to do with mass and thence gravity. Thus, the next step to propose here is how the EM (Θ) field can interfere with itself.

7. EM destructive interference resonance (DIR)

One question to ask in discussing how the temporal wave function can interfere with itself is "*what happens when the temporal wave function reflects at a wall, say wall "W"?*". Consider that wall as the atomic wall containing the temporal wave function, for instance, and that perhaps by certain harmonic mechanisms it can coagulate mass which thence brings the atom into its known alignment (Bohr radius a^0, fine structure constant α, and Planck's constant h).

Indeed therefore, how can the temporal wave function reflect, what type of wall enables the temporal wave function to reflect, and what exactly reflects a temporal wave function?
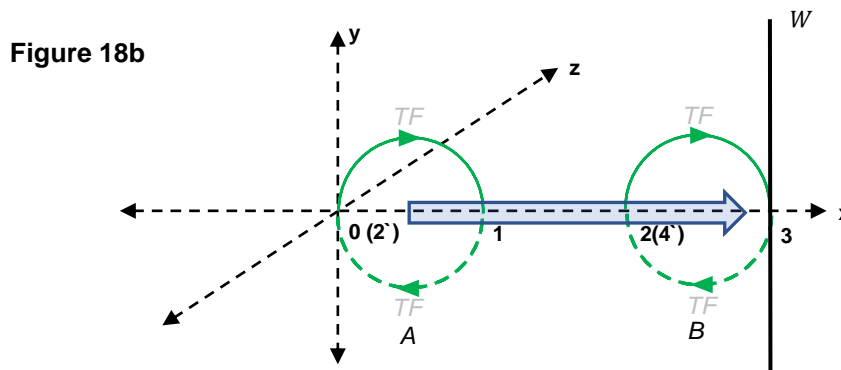
In understanding the construction of the temporal wave function, a partial or full temporal wave function reflection can be discussed. There, the reflection of a *temporal wave function* has several mechanisms occurring not according to a standard linear-time temporal wave function, and all these features need to be investigated.

Firstly, *what can make a temporal wave function **reflect**?*

If it can be assumed that the Temporal Mechanics temporal wave function is an EM (Θ) wave function, then it would be logical to consider that the reflection of this wave function would abide by the same conditions as a standard reflection for a wave function, the same protocols of transverse polarization reflection, as the mathematics of the wave function would hold, here more especially though in considering how the temporal wave function must reflect as a spatial direction in time, which needs particular note, namely how the temporal wave function would reflect as an x-axis in regard to the y-axis, both as spatial vector and temporal scalar principles of play.

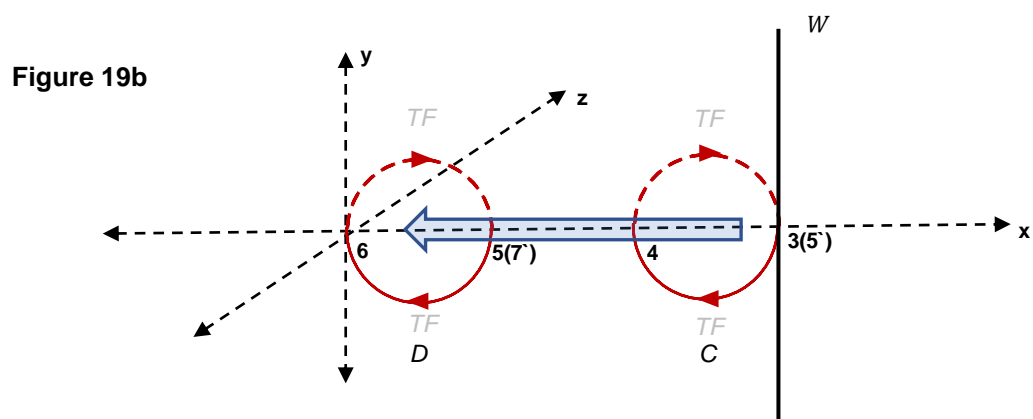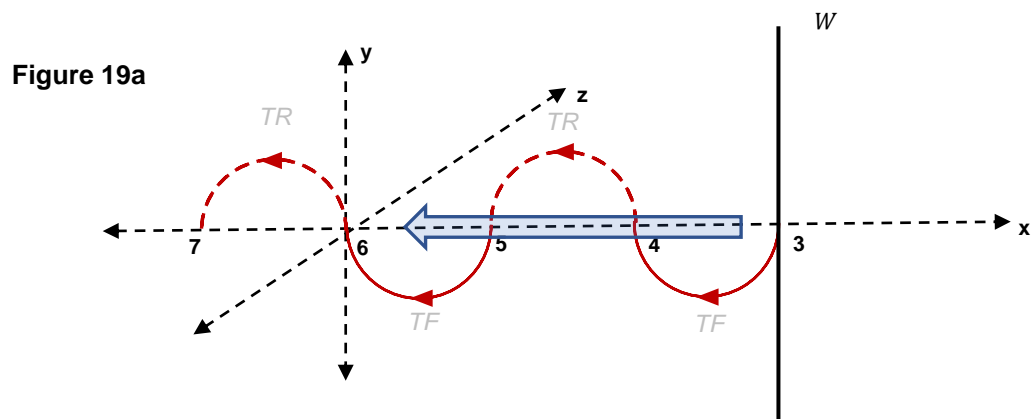Consider therefore figures 18a and 18b now facing wall W:

Figure 18a

Figure 18b

Figures 18a-18b: The x-axis transverse temporal wave function from time-0 to time-4 in noting it is necessary to repair *time-reverse* with a *time-forward* aspect.

To be considered in figures 18a-18b is how there is a portion of the wave function that is proposed to positions/tunnel ahead, as the region beyond W from time-3 to time-4 on the x-axis. Such is something like "*quantum tunnelling*", namely the quantum mechanical phenomenon where a quantum wave function can propagate through a potential barrier. This was explained in paper 2 along with the other associated features of this model for light, specifically "particle uncertainty" and "quantum entanglement" ([2]: p20-21). There it was found that the success of quantum tunnelling depends on the barrier thickness as a particle-phenomenon reflecting the *quasiparticle* features of the temporal wave function according to Fermat's principle, the stationary-action principle, and the principle of inertia [47].

Here nonetheless, for the purpose of mandating a reflection for the temporal wave function, presumably for instance in an EM resonance chamber, it can be assumed that quantum tunnelling is not in effect here at wall W, here that wall W is greater than ½ the wavelength of the temporal wave function.

Now consider the proposed reflection from wall W as a new y-axis yet the spatial direction now heading in a -ve x-axis direction, as *time-forward* nonetheless, and thus considering that the y-axis has also reflected with its functionality with time, namely that the $-ve$ region of the y-axis is now ti*me-forward* (TF) and the $+ve$ region is *time-reverse* (TR), as figures 19a-19b:

Figure 19a

Figure 19b

Figures 19a-19b: The x-axis transverse temporal wave function from time-3 to time-7 in noting it is once again necessary to repair *time-reverse* with a *time-forward* aspect.

Therefore, to note here are the new conditions for this reflection process proposal:

(lxv) Naming of the axes:

    a. y (+) as *time forward* (TF) for the electric feature/polarization of the temporal wave function.

    b. y (-) as *time reverse* (TR) for the electric feature/polarization of the temporal wave function.

    c. x (+) as the considered spatial direction of the temporal wave function progression.

    d. x (-) not considered here in this frame of reference discussion.

    e. z (+ and -) not considered here, although would be the magnetic polarization feature of the temporal wave function.

(lxvi) Temporal direction:

    a.   The two components of temporal direction for the y-axis (as above).

    b.   The overall temporal direction as the blue-arrow.

(lxvii)   Temporal polarization:

    a. y-axis (+ and -).

(lxviii) Spatial direction:

    a. x-axis (+).

(lxix)   Spatial polarization:

    a.   *electric* (not magnetic) polarization transverse wave as the *primary* feature.

(lxx)   Resultant temporal wave function particle locale (photon):

    a.   the reversed x-axis temporal features of time-5` and time-7` from time-5 and time-7 respectively.

    b.   *quasiparticles* (standard temporal wave function particles/time-loops) C and D.

What therefore happens to the scalar and vector components of the temporal wave function when both the temporal wave functions are combined, of the x-axis *forward* temporal wave function (figures 18a-18b, *quasiparticles* A and B) with the x-axis *reflected* temporal wave function (figures 19a-19b, *quasiparticles* C and D)?

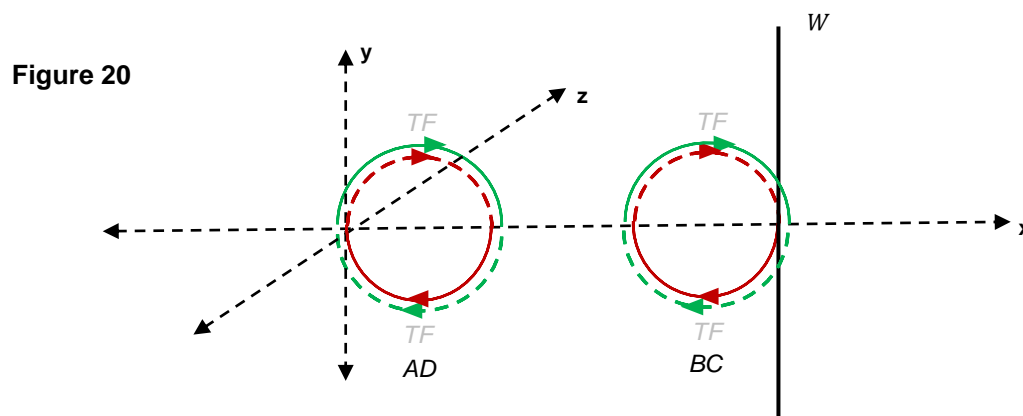Consider figure 20 as an amalgamation of figures 18b and 19b:

Figure 20: The x-axis transverse temporal wave function from time-3 to time-7 in noting it is once again necessary to repair time-reverse with a time-forward aspect.

Here is demonstrated two sets of time-loops, a continuous-line (red-green) loop and a broken-line (red-green) loop for both AD and BC, each proposed to be a *particle pair* as a *particle and antiparticle* pair, namely for both AD and BC, each particle having the same spin as the other (given by the direction of the arrows). The derived description of particle pair production in paper 42 ([42]: 29-56) also includes the accompanying feature of baryon asymmetry. What can be done now though is a finer look at the *timespace* graphing of the particle pair production process, and thence a *timespace* graphing of gravity.

8.   Zero-dimensional graphing of mass (Θ_φ)

Associated graphs/figures can be found in the relevant paper links

In describing particle existence, the following was expedited:

(lxxi)   The atomic locale description as the process of the theoretic development of Temporal Mechanics in the subsequent works/papers [3-37], namely:

    a.   To define the conditions that need to exist for the atomic locale for not only particles to manifest, yet how separate atomic locales and particles *link* with other atomic locales and particles *as per the field forces associated to particle manifestation*, all of which was required to be derived and assembled (see points (lxxxvi)-(lxxxix) ahead).

    b.   Such a number theory and associated plotting therefore forms the basis for the description of the temporal wave function from paper 2 [2] onwards, then leading to a description basis for the atomic locale and associated particle constitution, as from papers 3 to 37 [3-37].

(lxxii)   Paper 38 ([38]: p17-21) then mathematically described the particle pair production process and how EM can destructively interfere with itself in that process: <u>Temporal Mechanics, and EM-DIR "particle pair production".</u>

(lxxiii)   Paper 39 ([39]: p30-67) then sought the limits of mass formation and those associated scales: <u>Temporal Mechanics, and the derivation of an electron degeneracy neutrino, Gravity constant (G), Fine structure constant (α), Planck constant (h), and the phenomenal values of Sol.</u>

Such a process was a mathematical derivation of the particles, both subatomic and elementary.

The next step required a provisional graphic mapping of the mass field effect as a partial destructive interference resonance (DIR) phenomenon, as the EM^{DIR} (Θ_φ) field.

There, it was found that the temporal wave function can interact in two ways:

(lxxiv) A _partial_ EM destructive interference resonance (DIR) revealing itself as mass (EM^{DIR}), symbolized as Θ_φ.

(lxxv) A _full_ EM destructive interference resonance (DIR) revealing itself as what is understood of gravity as a zero-point energy level (EM_X^{DIR}) of execution, symbolized as Θ_Φ.

As a mathematical underwriting for that graphical mapping, the following was discovered for the derivation of mass (EM^{DIR}, Θ_φ):
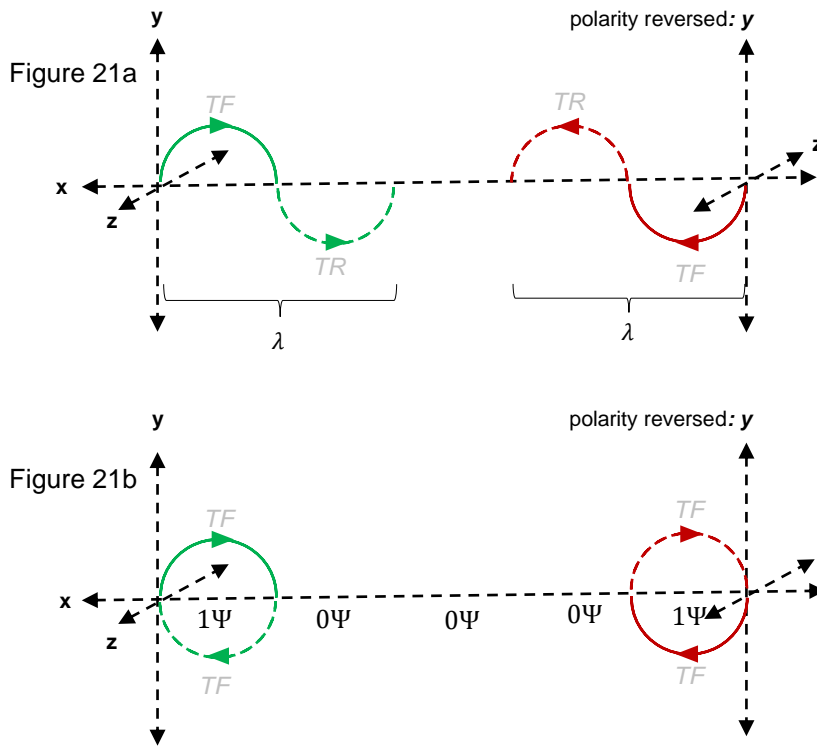
(lxxvi) There is a minimum mass value as the mass of the neutrino (m_{ex}).
   i. ([25]: p51, eq10).
   ii. ([35]: p28, eq2).
   iii. ([39]: p41-46, eq9-21).

(lxxvii) The lightest neutrino mass m_{ex} is a result of a specific baseline prime number sequence for 3d space factored with the Planck length lP:
   i. ([35]: p27-28).

(lxxviii) Derived from the neutrino mass m_{ex} is the value for the gravitational constant G:
   i. ([35]: p28-29, eq3).

(lxxix) Intrinsic to that value of the gravitational constant G is the electric permittivity ε_0 and magnetic permeability μ_0 of space:
   i. ([42]: p14, eq14).

(lxxx) The neutrino mass m_{ex} can be derived from an electron charge e_c becoming degenerate collapsing the mass of the electron to a set of neutrino mass values:
   i. ([39]: p41-46).

(lxxxi) The electron mass m_e and charge e_c becoming degenerate details a particular quantum phenomenon as much as an electron jumping an atomic energy shell releases a quantum of energy:
   i. ([42]: p7-16).

(lxxxii) A maximum mass (M_X) value for the entire _timespace_ system can be derived in knowing both a minimum mass value (neutrino) m_{ex} and a _timespace_ gravitational breaking point for the atom:
   i. ([36]: p22-29).
   ii. ([39]: p32-37).

A model for that maximum mass value (M_X) was thence derived detailing:

(lxxxiii) The mass of the solar system.

(lxxxiv) The mass of the sun and associated phenomenal values (radius, temperature, corona).

(lxxxv) Thence from (lxx) and (lxxi) the requirement of the planets was proposed to accommodate for the mass gap between the maximum system mass (extending to the Oort cloud) and mass of the sun.

(lxxxvi) The known firmaments of the solar system and their distance from the sun:
   a. Oort cloud
      i. ([13]: p9-11, eq1-8).
      ii. ([36]: p26-29).
   b. Heliopause and Hydrogen wall:
      i. ([32]: p15, eq1-5).

(lxxxvii) The astrophysical phenomena associated to those firmaments, including the various features of the stars, particularly the description of the redshift effect:
      i. [32][33][34][35].

(lxxxviii) Where mass, particularly electrons, are derived to break down, giving rise to the typical astrophysical phenomenal landscape:
      i. ([39]: p30-67).
      ii. ([42]: 7-56).

(lxxxix) What that electron degeneracy phenomena would detail in association with the derived firmaments:
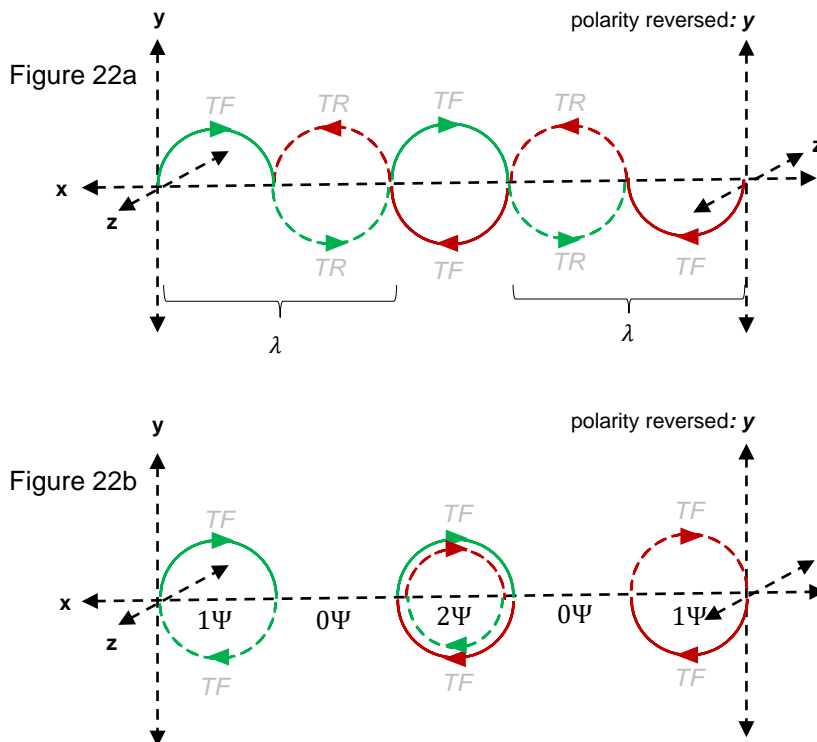   i. ([42]: p7-56).

In considering all of such, the key to creating a partial *destructive interference field* (DIR), namely the proposed *timespace* graph of mass formation, is to consider EM (θ) fields facing off *out of phase* in a resonance scale that itself is also *out of phase (any factor of λ plus ½λ)*. Note that this *out of phase* dynamic is achieved by reversing the polarity of the y-axis, here as phase-1 (noting here as phase-1 only 1 temporal wave function step is being considered), figures 21a-21b:

Figure 21a

Figure 21b

Figures 21a-21b: Temporal "phase-1" as the green and red *quasiparticles* forming from their basic *time-forward* (TF) and *time-reverse* (TR) wave function (Ψ) components (21a) to their *time-forward* (TF) adjusted wave function (Ψ) components (21b).
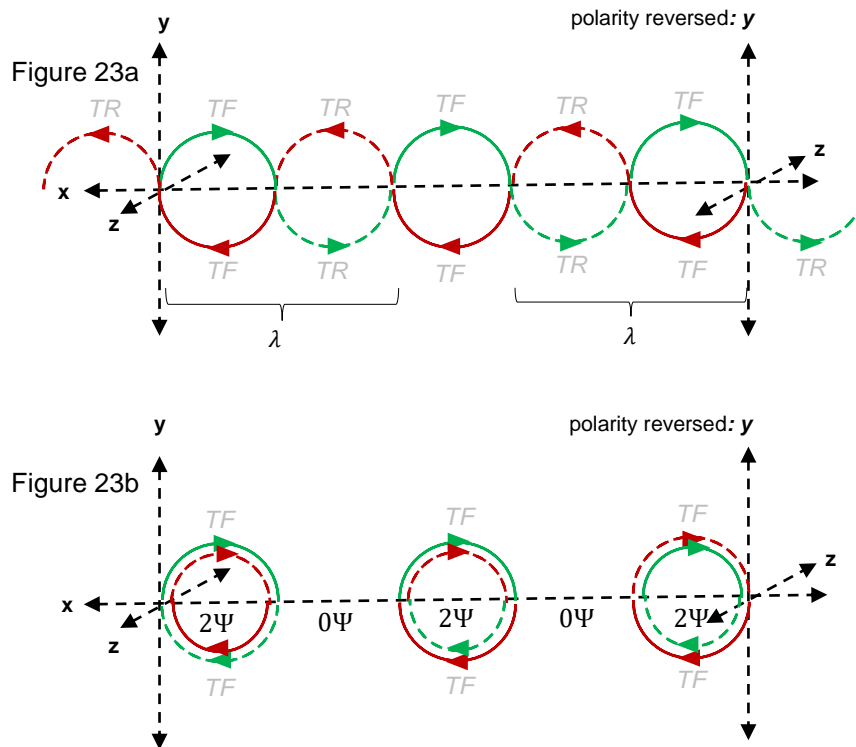
To note here is how the y-axis is inverted to attain the out of phase requirement.

Now consider phase-2 (the second temporal wave function step) with a continuation of the temporal wave function from the x-y-z source at either end of the x-axis, figures 22a-22b:

Figure 22a

Figure 22b

Figures 22a-22b: Temporal "phase-2" as the green and red *quasiparticles* forming from their basic *time-forward* (TF) and *time-reverse* (TR) wave function (Ψ) components (22a) to their *time-forward* (TF) adjusted wave function (Ψ) components (22b).

Now consider phase-3 (a third temporal wave function step) as figures 23a-23b:

Figure 23a

polarity reversed: *y*

Figure 23b

polarity reversed: *y*

Figures 23a-23b:
Temporal "phase-3" as the green and red quasiparticles forming from their basic *time-forward* (TF) and *time-reverse* (TR) wave function (Ψ) components (23a) to their time-forward (TF) adjusted wave function (Ψ) components (23b).

And such would continue. This is the proposed *particle-antiparticle pair production* process of paper 38 ([38]: p17-21, fig4-6), here as a 2Ψ mass field (EM^{DIR}, Θ_{φ}).

9.   Zero-dimensional graphing of zero-point gravity (Θ_{Φ})

Associated graphs/figures can be found in the relevant paper links

The derivation of zero-point gravity (EM_X^{DIR}, Θ_{Φ}) as an absolute (X) destructive interference resonance (DIR) of EM abided by the following derived key equations:

(xc) $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ (thence emerging gravitational free fall and mass-mass attractivity):

      i.   ([15]: p11, eq6).

      ii.   ([40]: p16, eq3).

(xci) $G_{AB<NEWTONS>} = \dfrac{M_C M_A M_B}{t_{AB} t_{BA}}$ $(kg^3 t^{-2})$, $G_{AB<NEWTONS>} = \dfrac{M_C c^2 M_A M_B}{d^2}$ $(kg^3 t^{-2})$:

      i.   (1: p10, eq10-12).

(xcii) $F_{m_1 m_2} = \frac{m_1 m_2 v^2 c^2}{d^2}$:

       i.   ([40]: p20, eq4-10).

(xciii) $G = M_C c^2$ (where $M_C = \frac{2M_{C1+C2}}{3^2}$):

       i.   ([1]: p8-10, eq10-12).

(xciv) $G = 12 \cdot (\frac{2}{3})^2 \cdot (\frac{21.8}{22})^2 \cdot \pi \cdot c^3 \cdot M_{MG} = 6.67355 \cdot 10^{-11} \, kg \, m^3 \, s^{-3}$:

       i.   ([35]: p29, eq3).

(xcv) $G = 1.39 \cdot c \cdot e_c$:

       i.   ([39]: p42, eq14).

(xcvi) $G = 1.39 \cdot e_c \cdot \varepsilon_0 \cdot \mu_0 \cdot c^3$:

       i.   ([39]: p44, eq19).

(xcvii) $G = \frac{33 \, M_{MG} \, c^3}{2} = 6.6743 \cdot 10^{-11} \, kg \, m^3 \, s^{-3}$:

       i.   ([39]: p44, eq20).

(xcviii) $F_{m_1 m_2} = \frac{m_1 m_2 v^2 c^2}{d^2}$:

       i.   ([40]: p20, eq4-9).

(xcix) $G = v^2 c^2$:

       i.   ([40]: p21, eq10).

(c) $G = T_G \cdot e_c \cdot \varepsilon_0 \cdot \mu_0 \cdot c^3$:

       i.   ([42]: p14, eq14).

(ci) $G = T_G \cdot a_e^0$:

       i.   ([42]: p19, eq21).

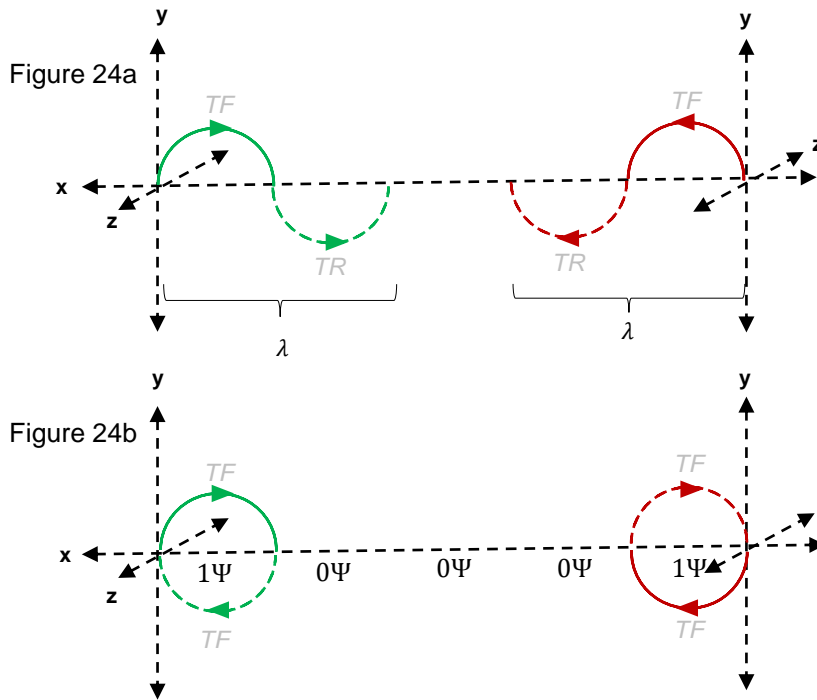As the (xc)-(ci) equations highlight, gravity is revealed to be:

(cii)   A *pan-phenomenon*.

(ciii)   Primarily, a *specific destructive interference resonance DIR* of the temporal wave function and the associated incursion event for electron mass [39].

(civ)   A fundamental prime number generator equation of proposed zero-point $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ and thence the derivation of the prime-number function feature of the lightest elementary particle ([35]: p27-28, eq1-2), as equations 1 ($S_0 = \frac{2^3 + 3^3 + 5^3}{3} = 53.\dot{3}$) and 2 ($\frac{lP}{S_0} = 3.03048 \cdot 10^{-37} \, kg$) of paper 35.

A list of the references for the temporal nature of the gravitational field force can be tracked as a zero-dimensional mathematical epistemology as follows:

(cv) EM and G temporal analogue equations of force:

       i.   ([1]: p9-14).

(cvi)   Provisional gravity constant G for the gravitational force equation:
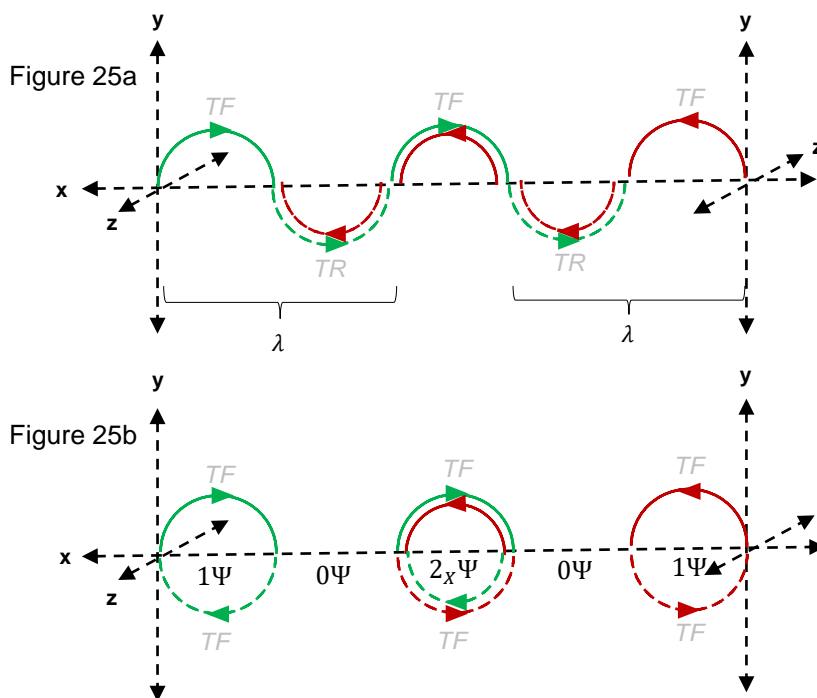
Now consider (as an adaptation of figures 21-23) how these EM fields would face off *in phase* as the mapping of the EM_X^{DIR} (Θ_Φ) field, here as phase-1 (once again, one temporal wave function step), figures 24a-24b:

Figure 24a

Figure 24b

Figures 24a-24b:
Temporal "phase-1" as the green and red *quasiparticles* forming from their basic *time-forward* (TF) and *time-reverse* (TR) wave function (Ψ) components (12a) to their *time-forward* (TF) adjusted wave function (Ψ) components (12b).

Now consider phase-2 (as the second temporal wave function step) as figures 25a-25b:

Figure 25a

Figure 25b

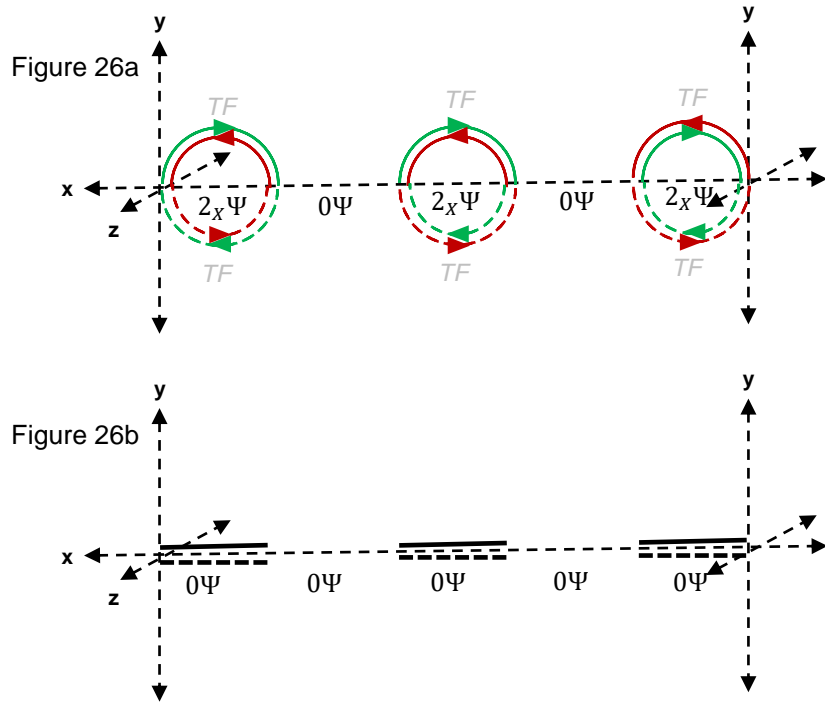**Figures 25a-25b:**
Temporal "phase-2" as the green and red *quasiparticles* forming from their basic *time-forward* (TF) and *time-reverse* (TR) wave function (Ψ) components (13a) to their *time-forward* (TF) adjusted wave function (Ψ) components 13b).

Phase-3 (the third temporal wave function step) as similar to figure 23b as 26a, and then considering the logical result as figure 26b:

Figures 26a-26b: Temporal "phase-3" as the green and red $2_X\Psi$ (TF) particles (14b) as a flatline EM_X^{DIR} particle-field (14b).

Here (26a-26b) is proposed to be the *flatline (EM_X^{DIR}, Θ_Φ) destructive interference resonance (DIR) effect*, here described as a $2_X\Psi$ (EM_X^{DIR}, Θ_Φ) wave function (field) as two *quasiparticles* of opposing spin cancelling each other out, a violation, and not a particle pair production (figures 23a-23b) scenario given particle pairs (particle and antiparticle) have _the same spin_, and thus same fundamental/basic temporal dynamic in space as each other (and thus spin).

Clearly, as there is no standard EM (Θ*, quasiparticle)* or particle (Θ_φ) existence of a *flatline* temporal wave function (field) representation as a EM_X^{DIR} (Θ_Φ) field, proposed here is the case of demonstrating how two EM (Θ) fields *in phase* levelled at (opposing) each other, a resonance scale being calibrated as a factor of their equal wavelengths and then half wavelength (an *out of phase* scale length) would present a EM_X^{DIR} (Θ_Φ) resonance field and not a partial or full *quasiparticle* field as EM (Θ), nor partial particle field as EM^{DIR} (Θ_φ), here as a *flatline EM_X^{DIR}* (Θ_Φ) field, different to the process involved in EM^{DIR} (Θ_φ) particle pair (particle-antiparticle) production.

Paper 42 [42] essentially went a step beyond the particle pair production proposal (EM^{DIR}) to establish the _basic underlying zero-point nature of gravity_. There, as with here, paper 42 ([42]: p29-56) proposed how EM can interfere with itself in a variety of ways, including an absolute (X) destructive interference resonance (DIR) effect of EM (Θ) as zero-point gravity (EM_X^{DIR}, Θ_Φ), importantly though deriving how that field force effect would shape-mould particles (Θ_φ) into reality ([42]: p47-56) and emerge the known features of gravity with mass; it was found there that the effect of zero-point gravity (Θ_Φ) on mass (Θ_φ) is one of repulsion, and that this zero-point gravity field (Θ_Φ) as based on the space-equation of $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ (in being immediate and ever-present) crushes the EM^{DIR} (Θ_Φ) mass-field of particles into the sizes they are derived correctly to represent (lxxvi)-(lxxxix) while thence emerging the

known features of gravity limited at c. This was further supported by the derivations of paper 47 ([47] regarding Fermat's principle, the stationary-action principle, and the principle of inertia. This was then further described in paper 51 ([51]: p5-15) accounting for the effect of the zero-point energy field (Θ_Φ) on a mass's (Θ_φ) locality thence emerging the known features of gravity.

Consider therefore figure 27 and the effect of zero-point gravity (Θ_Φ) ([39]: p58, fig12) instantaneously crushing particles (Θ_φ) to their mathematically derived scales of mass-weight and radius and thence reaching the known atomic Bohr radius a^0, fine structure constant (α), and Planck (h) scales for the atom:

Figure 27 ([39]: p58, fig12)

$r_e = 2.8136983 \cdot 10^{-15} \, m$ $r_p = 0.8752728 \cdot 10^{-15} \, m$

$a^0 = 5.2917721 \cdot 10^{-11} m = 21.8 \, EQU \, (a^T)$

Bohr a^T scaling: $a^T > a^{T\Lambda}$

([39]: p50, fig9)

$r_e = 2.8136983 \cdot 10^{-15} \, m$ $r_p = 0.8752728 \cdot 10^{-15} \, m$

$a^{T\Lambda} = 5.291403203 \cdot 10^{-11} m = 21.79848029$

$a^0 = 5.2917721 \cdot 10^{-11} m = 21.8 \, EQU \, (a^T)$

α h

"A"   "B"

([39]: p51, fig10)   ([39]: p54, fig11)

$r_e = 2.8136983 \cdot 10^{-15} \, m$

$a^{I\Lambda} = 5.29205346983 \cdot 10^{-11} m = 21.833$

$a^0 = 5.2917721 \cdot 10^{-11} m = 21.831840642 \, EQU \, (a^I)$

$r_e = 2.8136983 \cdot 10^{-15} \, m$ $r_p = 0.8752728 \cdot 10^{-15} \, m$

$a^h = 5.29205346983 \cdot 10^{-11} m = 21.833362$

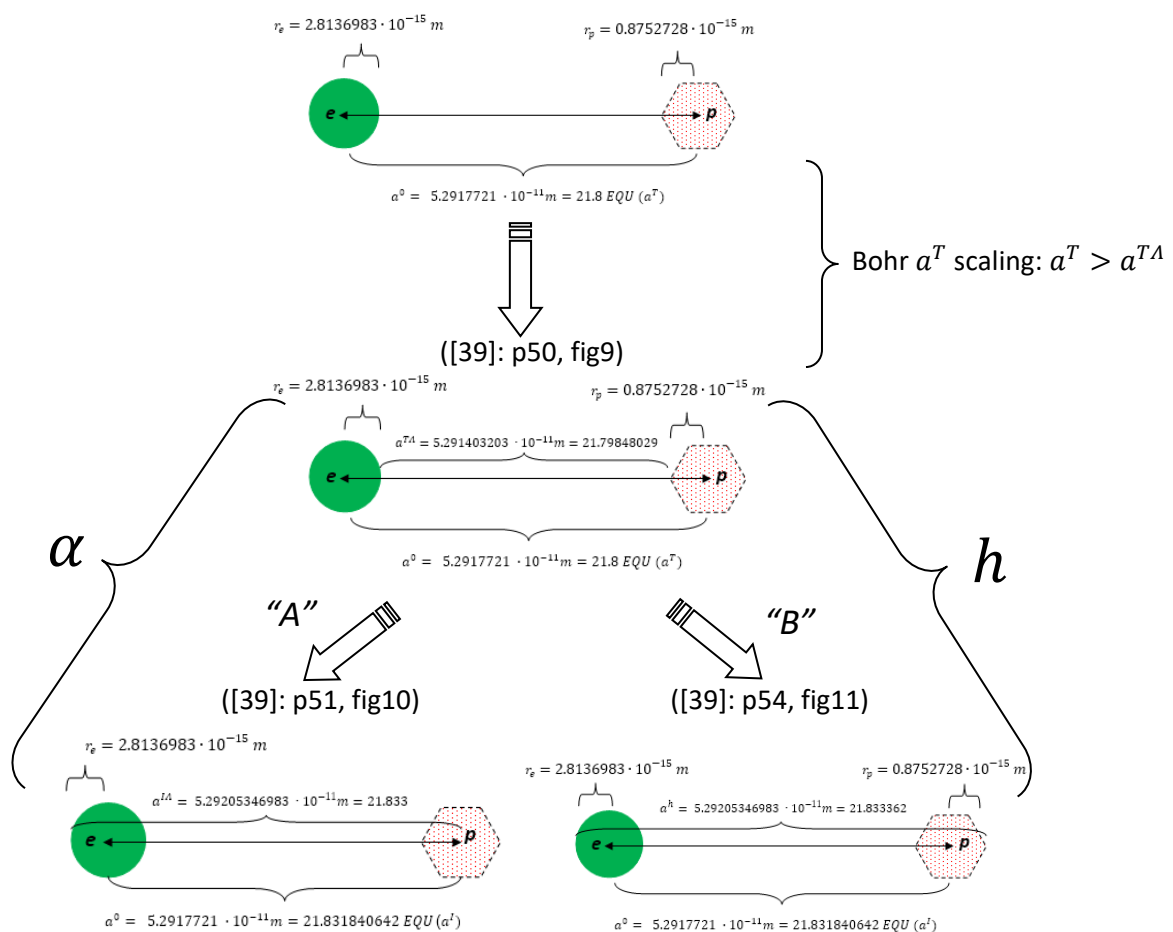$a^0 = 5.2917721 \cdot 10^{-11} m = 21.831840642 \, EQU \, (a^I)$

Figure 27: an updated version of figure 8 in paper 39 [39] highlighting the effect of the zero-point energy realm on particle and atomic scales.

Such now reveals the crux of the problem in physics in graphing mass and mass location, even wave functions, as points, namely jumping to the conclusion that particles and/or waves can be graphed as points directly from physical phenomena, when in fact far more detail to physical reality is

being missed in assuming physical phenomena *as points* <u>that can be mapped</u>. Conversely, the zero-dimensional number theory derives how mass is formed as a process of particle pair production, and graphs such in a way that accounts for locality, causality, and indeterminacy, as presented throughout paper 51 [51].

10.   Emergent zero-dimensional graphing codes

Associated graphs/figures can be found in the relevant paper links

The resultant map of that vector representation for EM (Θ), mass (Θ_φ), and zero-point gravity (Θ_Φ) all working as one thence began taking shape. There, it was found:

(cxix)   Physical phenomena streams as a temporal wave function equation $(t_B + 1 = t_A)$ governed by Euler's equation $(e^{i\pi}_{t_B} + 1_{t_N} = 0_{t_A})$, and thence the Fibonacci equation seeking to perfect itself with the value of π.

(cxx)   In seeking to describe π, the atomic locale is forged, there with:

  a.   The fine structure constant α in describing the basic electromagnetic coupling strength:
     i.   ([2]: p15).
     ii.   ([39]: p46-52).
     iii.   ([41]: p16-35).

  b.   The Planck constant h:
     i.   ([39]: p52-59).

  c.   The associated electron and proton scales:
     i.   ([38]: p31-35).
     ii.   ([38]: p35-43).
     iii.   ([40]: p19-25).

  d.   The underlying elementary particle world:
     i.   ([25]: p38-52).
     ii.   ([35]: p24-28).
     iii.   ([39]: p41-46).

The general graph of reality thence became apparent with the following zero-dimensional absolute (maximum and minimum) derived scales:

(cxxi)   Minimum mass scale:
     i.   ([39]: p37-41).

(cxxii)   Maximum mass scale:

        i.   ([39]: p32-37).

(cxxiii)   Minimum quantum length:

        i.   ([39]: p46-59).

(cxxiv)   Maximum distance of travel for a quantum:

        i.   ([13]: p5-11).

        ii.   ([45]: p24-28).

        iii. ([50]: p16-17).

The interaction of $t_B + 1 = t_A$ and $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ therefore is considered as a *time=space causality condition*, as that which is derived to involve an entire ecosystem of number and equation types by their (those equations) *time=space* relationship. The next step was to then understand the most fundamental field interactions, namely between EM (Θ), EM^{DIR} (mass, Θ_φ) and EM_X^{DIR} (zero-point gravity, Θ_Φ) fields. It was by that process of analysis where several key concepts became apparent, notably there being five features to mass (Θ_φ) in space as per the zero-point energy *immediate*[18] effect of the zero-point gravity (Θ_Φ) field, as presented in paper 51 ([51]: p9-11):

(cxxi)   Indeterminacy.

(cxxii)   Fermat's principle.

(cxxiii) Stationary action principle.

(cxxiv) Principle of inertia.

(cxxv)   <u>Mass-field waves, as Θ_Φ waves limited at c, as emergent (***not*** zero-point) gravity.</u>

There ([51]: p12-13, eq1-4), reality is proposed to play out as vast conglomerations of temporal wave function interactions and resonances in a context of (in all appearance) the proposed logistic map equation as an amalgamation of the $t_B + 1 = t_A$ time-equation and $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ space-equation instructing physical phenomena (mass) in the manner of $x_{(t_B+1)} = k \cdot x_{t_B}(1 - x_{t_B})$.

Such demonstrated mathematically that from an exact use of numbers (0 and 1) for zero-dimensional time and zero-dimensional space can be derived a zero-dimensional number theory that when scaled with the values of e_c and c results in a description of physical phenomena that clearly states that labelling numbers otherwise directly to physical phenomena will <u>*always*</u> result in errors due to the derived fundamental issues of locality and indeterminacy regarding EM (Θ) ad mass (Θ_φ) fields in the context of the proposed zero-point gravitational (Θ_Φ) field.

To therefore get a general primary bearing of the <u>*dynamics*</u> at play in the graphing process is to determine:

(cxxvi)   The zero-dimensional absolutes at play.

(cxxvii) How such can be organized as a number theory.

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[18] The 0_{t_A} effect of equation $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$.

(cxxviii)   What then that number theory derives, particularly the solutions for:

    a.   The Riemann hypothesis.

    b.   Goldbach's conjecture

    c.   Fermat's theorem.

(cxxix)   How that number theory can then be scaled to physical reality:

    a.   The charge of the electron e_c

    b.   The speed of light c.

(cxxx)   Deriving from the number theory the equations for and interdisciplinary to:

    a. EM (Θ).

    b.   Mass and associated emergent gravity (Θ_φ).

    c.   Zero-point gravity (Θ_Φ),

(cxxxi)   What the derived constraints are there for Θ-Θ_φ-Θ_Φ, and thence how these three basic fields relate and interact and can thence be graphically mapped.

A core achievement there in that process was being able to map the phenomenal features of the sun (central to the maximum mass formulation), as per figure 28 (from paper 39, figure 14)[19]. There, the scales of the sun are proposed through this *ab initio* zero-dimensional number theory and associated scaling derivation. Key to deriving the values of the sun was to rely on the temporal wave function scale in play for those dimensional phenomenal events, whether the Planck scale a^P for radius and associated photosphere temperature ([39]: p61-63, eq38-40) or the energy-release scale $a^{T\Lambda}$ for luminosity ([39]: p64, eq41).
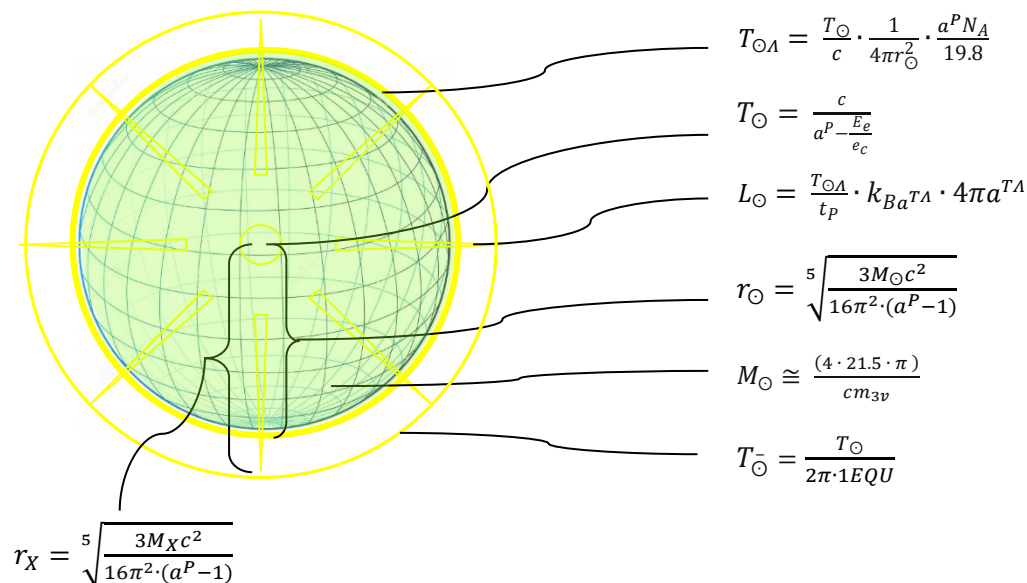

$$T_{\odot\Lambda} = \frac{T_\odot}{c} \cdot \frac{1}{4\pi r_\odot^2} \cdot \frac{a^P N_A}{19.8}$$

$$T_\odot = \frac{c}{a^P - \frac{E_e}{e_c}}$$

$$L_\odot = \frac{T_{\odot\Lambda}}{t_P} \cdot k_B a^{T\Lambda} \cdot 4\pi a^{T\Lambda}$$

$$r_\odot = \sqrt[5]{\frac{3M_\odot c^2}{16\pi^2 \cdot (a^P - 1)}}$$

$$M_\odot \cong \frac{(4 \cdot 21.5 \cdot \pi)}{cm_{3v}}$$

$$T_{\bar\odot} = \frac{T_\odot}{2\pi \cdot 1EQU}$$

$$r_X = \sqrt[5]{\frac{3M_X c^2}{16\pi^2 \cdot (a^P - 1)}}$$

Figure 28 ([39]: p65, fig14): Highlighting the phenomenal features of the sun from the derived fine structure constant (α) and Planck (h) values.

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[19] ([39]: p65, fig14).

Another core achievement was deriving the scale of the known solar system astrophysical firmaments from the sun, namely the Heliopause, Hydrogen wall, and Oort cloud, as per figure 29 (from paper 39, figure 15)[20]:
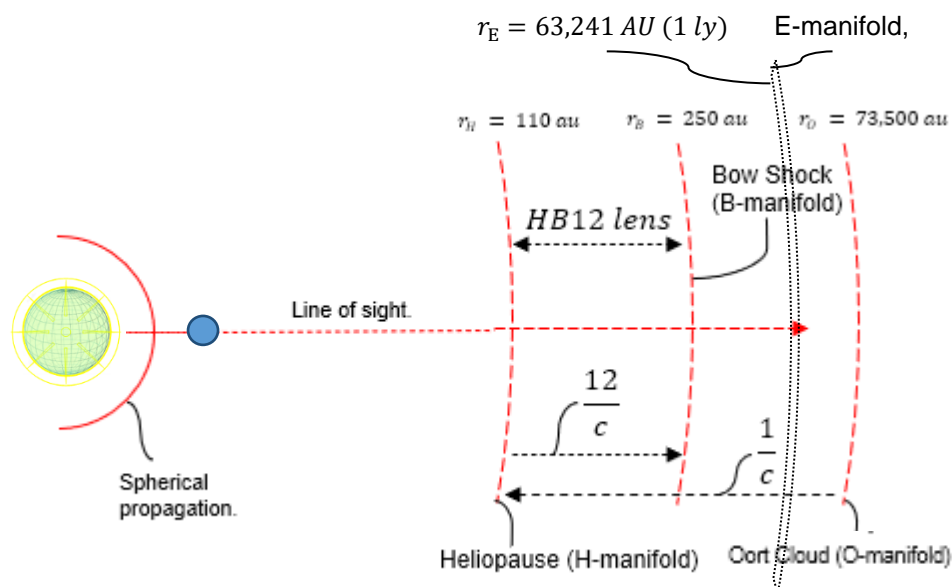

Figure 29 ([39]: p66, fig15): Illustrating the basic astrophysical firmaments, namely the Heliopause (r_H), Bow Shock (r_B), and Oort cloud (r_O) as astronomical units from the sun (sol).

Graphing the stars has presented challenges, as there is proposed to be a new phenomenon in play regarding astrophysical phenomena in the region from the Heliopause to the Bow Shock (Hydrogen wall), namely the "electron degeneracy phenomenon". This was derived in paper 42 ([42]: p7-29) detailing the nature of an electron becoming degenerate in the context of a "maximum mass" scenario, particularly proposed to occur in the Hydrogen wall region, and thus a feature of the limits of the solar system, a phenomenal feature resonating light effects of the electron as it degenerates to a neutrino mass scale. Further work will be focussing on such a phenomenon and those associated effects, the approach there as has been the case with Temporal Mechanics being to _assume nothing_. Despite these new findings, the aim here is to have this proposed theory and associated graphing _map_ reality in a way that is known to our perception of reality. The aim also has been to understand some paradoxical features to that entire process, providing insights to an adequate description for causality, locality, and indeterminism, as presented in paper 51 [51].

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[20] ([39]: p66, fig15).

11.   Conclusion

Temporal Mechanics is an altogether new philosophical approach to the idea of zero-dimensionality for time and space to then create a new geometrical mathematical number theory and associated geometric plotting (graphing) system. Here Temporal Mechanics has identified the strength of using points entirely in their natural zero-dimensional habitat to formulate the basis of that graphing framework. That strength has been made evident in the fine structure constant being derived as a _zero-dimensional graphing code_, and in then scaling the zero-dimensional number theory with the charge of the electron e_c and speed of light c to then use that number theory and associated geometric plotting as the zero dimensional and thus true point basis for physical phenomena. Such has been demonstrated in using the $0d$ number theory to derive the known physical phenomenal traits of EM (Θ), mass and emergent gravity (Θ$_\varphi$), and zero-point gravity (Θ$_\Phi$), and their associated dynamics. Specifically, it is found that for each dimension of space there are derived to be 4 scalars of time resulting in an overall arrow of time for the spatial vector according to a time-equation ($t_B + 1 = t_A$) and space-equation ($e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$). Such results in the primary EM temporal wave function (Θ), a secondary mass and gravity field (Θ$_\varphi$), and a tertiary zero-point gravitational field (Θ$_\Phi$), three fields that are entirely interwoven by this number theory approach of examination, and thus what is a far more useful approach to physics. The next step is to propose new experiments to demonstrate this Θ-Θ$_\varphi$-Θ$_\Phi$ field interplay.

Conflicts of Interest

The author declares no conflicts of interest; this has been an entirely self-funded independent project.

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