


The zero-dimensional physical theory (I): solving reality's puzzle

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Abstract: In advancing upon the Temporal Mechanics zero-dimensional number theory, here is presented the description of the zero-dimensional number theory as scaled with the charge of the electron and the speed of light. The two key equations for timespace as the Fibonacci equation for time and Euler's equation for space are then given physical relevance by this scaling process. In bringing these equations together for 1d, 2d, and 3d timespace, scaled equations for timespace become apparent for physical phenomena, notably the equations for EM, mass, and gravity. The entire process here is one of adjoining the Fibonacci equation with Euler's equation for time and space respectively and saturating that number relationship from a scale of 0 to infinity, giving rise to the equations of physical phenomena. By this process, the zero-dimensional number theory is relatable as a zero-dimensional physical theory as a model of physical events, making number-theory based predictions that agree with empirical observations.

Keywords: zero-dimensional; number theory; timespace; Xemdir; Temporal Mechanics; static charge

1. Introduction

In mathematics, a puzzle is a problem that tests the ingenuity and knowledge of the solver who is expected to put the pieces of the proposed puzzle together in a logical way, such in arriving at the correct solution. The correct solution is ideally a universally known phenomenon, obvious to our perception, namely in being self-evident, yet still requiring the solving process to be accounted for

mathematically. The proposal here is no different, the correct solution being a complete mathematical number theory underwriting a just as complete physical theory for waking reality.

The process of presenting this puzzle and associated proposed solution is as follows:

- (i) Reality in having certain identifiable traits and associated laws is the gold-standard solution to the puzzle.
- (ii) The identifiable laws of physical reality that can be expressed mathematically are the pieces of the puzzle, the actual problem requiring solving, namely in piecing together with each other upon the one mathematical basis.

The solution to the puzzle is proposed to be achieved along one of two routes (iii) and (iv):

- (iii) Applying numbers directly to physical phenomena to then create the pieces of the puzzle to then determine how those pieces can link together by one or both of the following:
 - a. Identifying a new mathematics to link those pieces.
 - b. Identifying new phenomena (such as dark energy and dark matter) to link those pieces.
- (iv) Creating a new time and space number theory that can be demonstrated to be complete through:
 - a. Deriving certain complete proofs (resolving the Riemann hypothesis, Fermat's last theorem, and Goldbach's conjecture) as a singular time and space number theory.
 - b. Applying that singular time and space number theory as a scale to physical phenomena to then represent a platform that links all the known pieces of physical phenomena (iii).

The first proposed route (iii) shall be highlighted (despite the obvious utility of the pieces) to be flawed as a solution simply because of its approach to applying numbers to physical phenomena, and thus not used here as the solution basis. This will be described in section 2.

The second proposed route (iv) will thence be described in sections 2-6.

In achieving such, this paper is sectioned as follows:

1. Introduction
2. Real numbers, and their Cartesian dimensional preordination
3. The proposed solution process: zero-dimensional number theory
4. Scaling the zero-dimensional number theory to physical phenomena
5. Energy domains and associated field components
6. Astrophysical field phenomena
7. Conclusion

This paper follows directly from the previous papers of the Temporal Mechanics zero-dimensional number theory [1-49]¹, specifically papers 48 [48] and 49 [49] detailing the way a proposed zero-dimensional number theory is derived and how such can represent the solution to the puzzle of physical reality. There, the key finding of the zero-dimensional philosophy and associated number theory is the proposal of time being a constant mathematical operation process to execute the relativity of one spatial zero-dimensional point with another, bearing reference to the *insufficiency* and thus *inherent flaw* of applying numbers directly to physical phenomena in the context of non-zero spatial dimensions.

2. Real numbers, and their Cartesian dimensional preordination

Mathematics as a discipline includes the study of:

- (v) Numbers (basic arithmetic and number theory).
- (vi) Formulas and related structures (as per algebra).
- (vii) Shapes and spaces in which they are contained (as per geometry, such as Euclidean space [50] and Hilbert space [51]).
- (viii) Quantities and their changes (as per calculus and analysis, such as Fourier [52] and Lorentz [53] transformations).

Mathematics in its most basic form is the idea of counting physical objects, principally of relating objects numerically. One should then readily assume physical phenomena should be just as easily calculated using advanced counting processes. Of course, reality cannot be counted *entire* given its scale and our relative size, and so mathematical equations are used to formulate and predict the behaviour of a variety of physical phenomena. Those formulae and equations are then matched with one another across the physical phenomena spectrum to then explain physical phenomena on a grand scale. Not only on the grand scale, yet those things in physical phenomena that cannot be directly seen, like the field forces and the dimensions of time and space and their relationship to the field forces, such in bearing reference to physical phenomena as *mass* and the *motion of mass*.

Fundamentally, mathematics *in physics* is central to the utility of *mathematical objects* as *virtual constructs* usually modelled from axioms in their abstract application to physical phenomena.

The problem there is automatically thinking numbers are a part of a physical and measurable reality. How so?

In its most basic sense, a number is a mathematical object used to count, measure, and label. In mathematics, a real number is a value of a continuous quantity that can represent a distance along

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].

a line, and/or a quantity that can be represented as an infinite decimal expansion. René Descartes [54] introduced the notion of a *real* number with his proposed dimensional analysis of physical phenomena, such in considering the dimensions as *real* in being represented by *real* numbers, which thence implied a type of preordination for numbers being integral to physical reality.

Subsequently, real numbers have been used to measure as best as possible (as approximations) physical observables such as time, space, mass, and energy. Yet, although real numbers can be represented along a line, they are still abstractions, namely *placements/applications* of numerical values.

In short, numbers can be described in any manner of ways, yet when being applied to reality, to what are proposed to be the ***real dimensions***, those numbers are still abstractions, namely that:

- (ix) A real number does not automatically ***confer*** reality, even if that line is proposed to be a spatial or temporal *real dimension*.

The idealized nature of real numbers pre-supposing physical existence was described in paper 46, particularly regarding the works of Godel, Hilbert, and Turing ([46]: p6-7).

The proposed mathematical solution to reality's puzzle is therefore chosen not to be by the process of directly labelling real numbers with dimensional entities (time, space, mass, energy, and so on), yet via a different process. What can that more correct and less flawed new process be?

The question that should be asked is "*what is not a real dimension, namely what is an unreal dimension, a non-dimension*"?

A dimension by its definition is:

- (x) A mathematical space/entity as the minimum number of coordinates needed to specify any point within it [55].

Thus:

- (xi) A line has a dimension of one (1d), as only one coordinate is needed to specify a point on it.
- (xii) Similarly, a surface area has a dimension of two (2d), as only two coordinates are needed to specify a point on it.
- (xiii) Likewise, the inside of a cube or sphere has a dimension of three (3d), as three coordinates are needed to locate a point within it.

It can therefore be logically proposed that a point in space therefore is itself a zero-dimension, a *non-dimension* for space.

Similarly, one could also propose that a moment in time is a zero-dimension, a *non-dimension* for time.

The question now asked is that if applying *real numbers* to a *real dimension* is still a process of *abstraction*, namely that it cannot be assumed that numbers applied to real dimensions represent what a physical description of phenomena on that dimension is, then would not applying a number to a *non-real dimension* be the purer number theory approach to solving reality's puzzle?

Indeed, it can only be assumed that what is real *is* reality, and so the temptation there is to consider that the term ***real numbers*** (numbers along a line central to 0) presupposes those numbers to be interwoven with reality. Such though is a "*necessary ignorance*" of our basic steps in the philosophy and mathematics of dimensional analysis as inherited from the work of René Descartes [54].

The only thing one can intelligently forward therefore in properly describing physical phenomena in any mathematical manner is that anything that is mathematically real is still *inconsequential* of physical phenomena. The next step to accept is that numbers should be allowed to describe the *nothing* of reality, namely the zero-dimensional aspects of reality. Simply, if the case exists that any type of number on a line is not an exact identity of reality yet an *abstraction*, then the next question to ask there is "what then is not a dimension, and can then a number be applied to such and if not *why*?"

What therefore are the proposed steps to take for numbers being labelled to the zero-dimensionality of space and time?

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? Consider:

- (xiv) A moment in time as zero-dimensional time can exist as a moment of time for any infinitesimal point.
- (xv) Ideally, time is not space.
- (xvi) 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 question to ask therefore is:

- (xvii) Is there a way of time relating with space on this zero-dimensional level, as 1 could relate with 0, as zero-dimensional time relating to zero-dimensional space?

The proposal is 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 *time-before* and *time-after* as unique from zero-dimensional *time-now*. 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, also prescribing Euler's equation, and how thence a number theory evolves by the relationship between the golden ratio equation for time and Euler's equation for space.

In short, the proposed puzzle solution is:

- (xviii) What can be achieved mathematically as the mathematical underwriting for the solution (such as solutions for the Riemann hypothesis [56], Goldbach conjecture [57], and Fermat's theorem [58]).
- (xix) And then how, when that number theory is scaled with two nominated basic phenomenal scales for time and space (such as the charge of the electron e_c and speed of light c), that scaling process should describe what is measured of physical reality.

Thus, here physical reality is not being scaled with real numbers along dimensional lines as a mathematical abstraction of numbers, yet instead the idea of zero-dimensionality as a non-abstraction (as numbers here are applied to zero-dimensionality and not physical reality) is used on a most fundamental (zero-dimensional) level to develop a number theory that when scaled with known data points of physical reality (e_c and c) presents the case of proving that number theory and associated equations by proxy [49].

The benefit of this process is deriving the number theory that forms the basis for what is understood of light and gravity without the known anomalous dimensional and spatiotemporal discrepancies found with gravity and light. The only new problem here is a psychological one, namely:

- (xx) The presentation of a new holistic number theory description of reality and not a jigsaw description that depends on number *abstractions* to non-zero dimensions.

3. The proposed solution process: zero-dimensional number theory

Here will be described two key systems integral to the proposed zero-dimensional number theory:

- (xxi) The zero-infinity paradox (\odot_0^∞) ([49]: p8-9) mandating a saturation of equations to purpose and achieve a complete relationship between time and space via the derived time equation of $t_B + 1 = t_A$ (where $t_B^2 = t_A$) and space equation of $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$.
- (xxii) How that number theory and associated mathematical theorem saturation of equations can be cross-referenced with known data values of physical phenomena to represent the mathematical solution to reality's puzzle.

Specifically, here will be described the scaling process for time and space as:

- (xxiii) The charge of the electron e_c as the temporal scaling component².
- (xxiv) The speed of light c as a constant for space as the spatial scaling component (given the derived constancy of the speed of light)³.

By scaling the zero-dimensional number theorem with these two values (e_c and c) is proposed to present the case of this zero-dimensional number theory becoming a physical theory bearing absolute relevance to known physical theory equations and associated constant values, together with the description of physical phenomena for those equations by the construction/constitution of those equations noting the number theory basis of the equations holds those equations to be inter-linked dimensionally with time and space by its axiomatic design [49].

From such (by such a basis description) are explained the three *timespace* energy domains, specifically the energy domains for EM , mass (EM^{DIR}), and gravity (EM_X^{DIR}) and how they each manifest as physical phenomena in the time-domain of *time-now*. These energy domains will be demonstrated to comply with an overall conservation of energy principle in demonstrating how if the energy domain of EM is destructively interfered it has the option, depending on its type of destructive interference resonance, of becoming one of either:

- (xxv) Mass (EM^{DIR}) as per a partial destructive interference resonance (DIR) with an associated energy component.
- (xxvi) Gravity (EM_X^{DIR}) as per a complete destructive interference resonance (DIR) with an associated zero-point energy process which as a zero-point energy process reflects onto both EM and EM^{DIR} to maintain its zero-point energy status.

Specifically:

- (xxvii) EM will be described with electric and magnetic features in a constant state of temporal flux, as according to the time-equation $t_B + 1 = t_A$, as per representing a temporal wave function.
- (xxviii) This EM temporal wave function depending on its resonance scheme can become:
 - a. EM^{DIR} (mass field⁴).
 - b. EM_X^{DIR} (gravitational field⁵).
- (xxix) There exist specific relationships between:

² See sections 4-6.

³ The speed of light as a constant for this zero-dimensional number theory basis, as derived in paper 45 [45].

⁴ Including charge and magnetic moments, see section 5.

⁵ Noting the paradoxical issue of the EM_X^{DIR} field being a zero-point energy field, and thus what must happen with the transference of the EM energy there.

- a. EM and EM^{DIR} giving rise to the nature of mass-based charge (positive and negative) and magnetism.
- b. EM and EM_X^{DIR} giving rise to the nature of the spatial propagation of a charge field and magnetic field.
- c. EM^{DIR} and EM_X^{DIR} giving rise to a basic nature of mass (non-electric and non-magnetic, as with a neutrino) and associated nature of gravitational freefall.

Although in using a $0 \rightarrow \infty$ scale for space the suggestion there is that physical phenomena extend off to the scale of infinity for *timespace*. Yet, the saturated and interlinked equations of $t_B + 1 = t_A$ and $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ nonetheless find that the subsequent equations for mass require a maximum allowable mass limiting the extent of physical *timespace* reality, and thence proposing what that shape and constitution of shapes are for physical *timespace* reality, and why. Although Temporal Mechanics (zero-dimensional number theory) has already derived the ideas of EM (light), EM^{DIR} (mass), and EM_X^{DIR} (gravity), particularly in papers 42-49 [42-49], specifically outlined in paper 49 [49] as derived from the e_c and c scaling application to the number theory, here that scaling process will be more closely examined in the regard of energy, and thence of course what the idea of charge is and how charge propagates through space as a field force effect.

In short, relating the zero-dimensional number theory to physical phenomena has been primed by the previous two papers of Temporal Mechanics, namely paper 48 [48] as the description of the philosophy of zero-dimensional number-theory, and paper 49 [49] as a description of the zero-dimensional number theory itself. Now is the process of looking with finer detail into how that number theory as a *timespace* description has been related to physical phenomena and if more refinement to that process can be offered here.

As presented in paper 48 ([48]: p18-23), the fundamental ideas to consider in analysing physical phenomena include:

- (xxx) Prioritizing the datum reference of *time-now* as the focus of physical phenomena study.
- (xxxi) Labelling time as a moment as the value "1" and space as a point as the value "0".
- (xxxii) Given $1 \neq 0$, then a new route must be chosen to make time and space more suitably interactive, resolved by involving the unreal dimensions of *time-before* and *time-after*.
- (xxxiii) By such, $t_B + 1 = t_A$ and $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ were derived as equations primarily for time and space respectively, which when brought together were able to map the prime numbers and thence derive a mathematical theorem for 1d, 2d, and 3d *timespace*.

Here, the idea of a hypothetical zero-dimensional reference for space (as 0) relating with another hypothetical zero-dimensional reference for space (as 0) via a zero-dimensional value for time as a moment (as 1) creates a scheme of equations⁶. To achieve this, the idea of a *zero-infinity*

⁶ Under the condition that a 0 scaling for space using 1 in that process as time can reach a scale of infinity (∞).

paradox (\odot_0^∞) had to be addressed. This was presented in the two recent papers, papers 48 ([48]: p17-18) and paper 49 ([49]: p8-9). There, with zero-dimensionality, the zero-infinity paradox (\odot_0^∞) formed the basis for asking how time and space relate with each other using different mathematical values for zero-dimensional time and zero-dimensional space. This was initially described in paper 43 ([43]: p3) where it was described that to properly scale numbers as a number theory one needs to accept the zero-infinity paradox (\odot_0^∞) in utilizing the notions of time and space. In doing that, one can derive all the primes from zero to infinity using Euler's equation and the Fibonacci (fractal) equation and thence solve the Riemann hypothesis as per paper 44 ([44]: p14-19) and 49 ([49]: p18-24).

To summarize all those key steps, the following tasks were executed:

- (xxxiv) Labelling the ideas of zero-dimensional time and zero-dimensional space with the idea of numbers, specifically 1 for zero-dimensional time as a moment, and 0 for zero-dimensional space as a point.
- (xxxv) From there, in defining how time relates with space according to our known temporal and spatial perception abilities (involving the temporal domains of *time-before* and *time-after*), were derived a time-equation as the Fibonacci equation $t_B + 1 = t_A$ (where $t_B^2 = t_A$) and Euler's equation and $e^{i\pi} + 1_{t_N} = 0_{t_A}$ for space.
- (xxxvi) From there, specifically from the time-equation, was derived a temporal wave function with two features, a monopolar π feature (circular sinusoidal wave function) and associated dipolar component.
- (xxxvii) In using the scaling of the charge of the electron e_c and the speed of light c this temporal wave function was demonstrated as being analogous to *EM* having electric (monopolar) and magnetic (dipolar) features.

So here there 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*. The next step there was to understand how that temporal wave function interacts with itself and what the conditions of its existence are. There, it was found that the temporal wave function can interact in two ways:

- (xxxviii) A partial *EM* destructive interference resonance (*DIR*) revealing itself as mass (EM^{DIR}).
- (xxxix) 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.

It was discovered with the derivation of mass (EM^{DIR}):

- (xl) 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).
- (xli) 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).
- (xlii) Derived from the neutrino mass m_{ex} is the value for the gravitational constant G :
 - i. ([35]: p28-29, eq3).
- (xliii) 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).
- (xliv) 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).
- (xliv) 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).
- (xlvi) A maximum mass 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 was thence derived detailing:

- (xlvii) The mass of the solar system.
- (xlviii) The mass of the sun and associated phenomenal values (radius, temperature, corona).
- (xlix) Thence from (xxv) and (xxvi) 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.
- (l) 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).
- (li) The astrophysical phenomena associated to those firmaments, including the various features of the stars, particularly the description of the redshift effect:
 - ii. [32][33][34][35].

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

In short, it was found:

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

This process of equation derivation is held in the context of an absolute saturation of number references, specifically prime number references held in a *timespace* theoretic context, relating with one another as particle references. Indeed, the interaction of $t_B + 1 = t_A$ and $e^{i\pi} + 1_{t_N} = 0_{t_A}$ as a *time=space* condition is derived to involve an entire ecosystem of number and equation types by their *time=space* relationship, including mapping the primes as demonstrated in papers 44 [44] and 49 [49]. The next step was to then understand how the EM , EM^{DIR} (mass) and EM_X^{DIR} (zero-point energy) fields interact.

4. Scaling the zero-dimensional number theory to physical phenomena

To describe how the zero-dimensional number theory is scaled to physical phenomena requires one to mention those scaling ingredients, namely charge e_c and the speed of light c , and their

respective characteristics. Through the filter of contemporary physics (Einstein's relativity) such though becomes a potential mess, namely in relying on current notions of static charge e_c and the speed of light c , as on one hand EM has electric and magnetic features, yet on the other hand static electric and magnetic fields are two distinct phenomena, both characterized by steady direction, flow rate, and strength (thus a frequency of 0 Hz).

The key therefore to a 0 Hz static electric field and associated magnetic component in the event of relative motion of that static electric field thence requires involving a medium that is a natural 0 Hz static charge carrier, as one that also perfectly describes the constancy of light c for all frames of reference, together with that 0 Hz field being related to an EM field. How can such be so?

The answer is best understood by asking how, as shall be detailed here, the EM , mass (EM^{DIR}), and gravity (EM_X^{DIR}) fields relate with each other. Here, zero-dimensional number theory describes:

- (lvi) The EM analogue temporal wave function with electric and magnetic flux features.
- (lvii) Charge as a feature of a mass field (EM^{DIR}), namely a mass field being a partial destructive interference resonance of an EM field, and thus mass (EM^{DIR}) having partial EM qualities as charge and magnetic moments (temporal components).
- (lviii) Charge for mass can be of two forms, namely positive and negative, as much as the electric moment of the EM temporal wave function can be of one of two temporal moment orientations.
- (lix) Both EM and mass (EM^{DIR}) fields are associated to a more fundamental field responsible for the effect most understood as gravity, the proposed EM_X^{DIR} field which has no charge or magnetic moments.
- (lx) Mass thence can have properties absent entirely of charge and magnetic moments, as has been derived for the neutrino⁷.
- (lxi) The constituent particles (quarks) of the subatomic particles (hadrons, the neutron and proton) would also possess electric and magnetic properties combining to result in the known hadron particle charge (proton) or non-charge (neutron) features⁸.
- (lxii) The speed of EM as c , as the condition of EM , is derived to be constant for any frame of motion reference for EM^{DIR} and thus charge [45].
- (lxiii) The motion of mass-charge relative to another object creates an EM induction condition given the EM condition of c .
- (lxiv) The EM_X^{DIR} field as a zero-point energy field provides a certain *resistance* to EM as a value of electric permittivity ϵ_0 and magnetic permeability μ_0 .
- (lxv) The EM^{DIR} field as a zero-point energy field provides a certain *resistance* to EM^{DIR} manifesting as gravitational free fall.

⁷ See paper 42 [42] on the electron degeneracy process explaining why neutrinos have no charge characteristics.

⁸ To be explored in a subsequent paper detailing the aetiology of particle spin.

Those are the primary features of the EM , EM^{DIR} , and EM_X^{DIR} fields and associated inter-relationships when the $t_B + 1 = t_A$ and $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ equations interrelate as the EM , EM^{DIR} , and EM_X^{DIR} field equations, in *then* being scaled with the charge of the electron e_c and speed of light c .

There is a key derived secondary feature to such, as follows:

- (lxvi) The "*electron degeneracy*" condition, thence proposing that the electron can be degraded from its charge and mass to the level of a neutrino:
 - i. see points (xxx)-(xxxi).

What therefore happens to charge if an electron can become degenerate? Is not charge meant to be conserved? As zero-dimensional number theory finds, energy is more fundamental to charge; *energy* is conserved, not necessarily charge per se.

Fundamentally here though, the hub of the EM - EM^{DIR} - EM_X^{DIR} inter-relationship is the concept of e_c and c . It may not be entirely correct to say e_c is the temporal component and c the spatial component given they are both features of *timespace* per se. It may indeed be more correct to suggest that c is the EM component and e_c the mass component, and that EM_X^{DIR} need no component if EM_X^{DIR} is entirely zero-point energy. Yet, it was logical to consider that the only way to scale the proposed number theory to physical reality was to first identify what the basic phenomenal concepts of that zero-dimensional number theory are. There, simply, are the two basic ideas of time and space. The question was then asked, "what is the scale for time to be approached, adapted, and thence executed, and what is the scale for space to be approached, adapted and thence executed, in regard to applying the number theory [49] to physical phenomena?" Thus, as proposed:

- (lxvii) Electric charge (Coulomb charge) e_c is considered as the temporal component key for physical phenomena, or more simply, for mass.
- (lxviii) The speed of light c is considered as the spatial component key for physical phenomena (mass), given that c was derived to be a constant:

Such thence is a proposed *physical model* describing the basis of charge e_c propagation limited by c according to a $0 \rightarrow \infty$ *timespace* scale and associated phenomenal landscape resulting in the known Poynting vector equations⁹. Note that such is quite different to a standard EM propagation wave front in space which, by its zero-dimensional number theory description, is a temporal wave function $t_B + 1 = t_A$ seeking to propagate according to the idea of $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$, yet in being a fractal equation, is constantly hampered by such a process, resulting nonetheless in the known Riemann mapping of the primes on a 2d *timespace* scale level¹⁰. Such an issue led to the need to present the idea of an atomic locale as the resultant scale for π for the temporal wave function and how such is

⁹ The directional energy flux (the energy transfer per unit area per unit time) of an electromagnetic field.

¹⁰ See paper 49 [49].

related to both the fine structure constant α and Planck constant h^{11} by their successful derivation and associated phenomenal description [39].

The next step to describe is a little more difficult, namely the energy scaling for EM , EM^{DIR} , and EM_X^{DIR} , and how energy is conserved in the context of a phenomenally scaled *zero-dimensional* yet more specifically $0-\infty$ paradox (\mathcal{O}_0^∞) number theory.

5. The energy domains and associated field components

Granting the scaling features of e_c and c , underlying such e_c -scaling with a c -scaling is the need to take into consideration the $0-\infty$ paradox (\mathcal{O}_0^∞), as follows:

- (lxix) The 0 zero-dimensional (infinitesimally sized spatial point) energy scale is, can only be, zero-point, and thus 0.
- (lxx) The ∞ zero-dimensional (infinitely sized spatial point) energy scale is, can only be, constrained by the fundamental idea of temporal flux, and thus $E = f$.
- (lxxi) Therefore, the temporal component of space in *timespace* as the effect of the temporal wave function ($t_B + 1 = t_A$) in space ($e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$) is *conserved* as a basic representation of energy for *timespace*.
- (lxxii) This energy factor changes to $E = hf$ for the atomic reference in needing to accommodate for:
 - a. The π condition (namely, the $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ condition) of the temporal wave function, thence delivering the atomic locale and associated fine structure constant and Planck constant values:
 - i. ([2]: p1-16).
 - ii. ([39]: p37-67).
 - b. The associated constraints of mass as an EM^{DIR} field effect, namely minimum and maximum mass requirements regarding the temporal wave function and atomic locale:
 - i. ([39]: p30-37).

What therefore must be considered is that by applying this number theory derivation of equations to the scales of electric charge e_c and the speed of light c then it follows that e_c and c in being applied to the temporal wave function equations for a propagation in space must therefore uphold Gauss' law¹² for that EM charge field propagation, as nothing to the contrary would suggest otherwise.

¹¹ See paper 39 ([39]: p46-59).

¹² Gauss's law, namely that the flux of any electric field from an arbitrary closed surface is proportional to the electric charge enclosed by the surface despite how that charge may be distributed.

By the scaling process of e_c and c , all the derived number-theory equations for *timespace* thence interface perfectly with the known equations of physical phenomena, except for general relativity gravity where new equations not of the basis of general relativity are derived, as described in paper 49 ([49]: p28-32).

This has been a feature of the Temporal Mechanics papers, namely paper 1 deriving the basic time-equation ([1]: p2-5), and then in paper 2 using the Coulomb charge e_c and the speed of light c to account for the idea of energy for space ([2]: p15-17), in bringing clarity and relevance to the proposed temporal wave function regarding the idea of energy.

The question therefore is what energy processes as a scaling system from $0 \rightarrow \infty$ for time and space are in play regarding physical phenomena.

The idea of the temporal wave function equation $t_B + 1 = t_A$ and the associated spatial equation of $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ together were proposed to be the idea of energy in its most basic sense, namely the phenomenal feature of *timespace* relating between zero-dimensional references. More specifically, given $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ is proposed to be the zero-point energy equation, it is the $t_B + 1 = t_A$ equation as the basis for the temporal wave function that is proposed to represent the key process of energy for *timespace*. How thence zero-dimensional references relate with each other in 3d *timespace* is proposed to be a process of energy transference in utilizing the 3 basic concepts:

- (lxxiii) The *EM* temporal wave function (*EM* analogue):
 - i. ([2]: p3-14).
- (lxxiv) The *partial EM destructive interference resonance (DIR)* phenomenal derivative EM^{DIR} field, as mass formation (particle pair production):
 - i. ([42]: p7-21, p37-39).
- (lxxv) The *complete EM destructive interference resonance (DIR)* phenomenal derivative EM_X^{DIR} field, as gravity:
 - i. ([42]: p21-55).
 - ii. ([47]: p15-19).

In the context of this proposed *timespace* scheme therefore, energy (as *EM*, EM^{DIR} , and EM_X^{DIR} *timespace* field properties) is constrained by the following principles:

- (lxxvi) Energy (E) as a fundamental property of the temporal wave function (*EM*) as $t_B + 1 = t_A$ is in equivalence with the ratio of the two derived qualities of the temporal wave function, as the golden ratio variables $-\frac{1}{\theta}$ and θ , and thus together as $E \propto \frac{(-1/\theta)}{\theta} = -1$.
- (lxxvii) Hence the proposal of $e^{i\pi} = -1$ (EM_X^{DIR}) for space, yet as the temporal analogue $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$.

More specifically, energy is constrained for the *EM* field as follows:

- (lxxviii) The two golden ratio variables of EM represent the electric ($e; -\frac{1}{\theta}$) and magnetic ($B; \theta$) features of the EM temporal wave function:
- i. ([2]: p1-14).
 - ii. ([5]: p3, fig1).
 - iii. ([41]: p33, eq4-6).
- (lxxix) By (lxxviii) the ratio of the electric ($e; -\frac{1}{\theta}$) and magnetic ($B; \theta$) features of the temporal wave function can be represented as the frequency of the temporal wave function as $f \propto \frac{e}{-B}$.
- (lxxx) That $f \propto -\frac{e}{B}$ is a property of c where $f = \frac{c}{\lambda}$.

Energy is constrained for the EM^{DIR} (mass) field as follows:

- (lxxxi) Planck's constant h :
- i. ([3]: p2-3).
 - ii. ([39]: p52-59).
- (lxxxii) Energy-mass relationship $E = mc^2$:
- i. ([19]: p10-13).
- (lxxxiii) The basic value for the energy of EM in the context of EM^{DIR} and EM_X^{DIR} timespace as $10^{-9} Jm^{-3}$:
- i. ([14]: p17-23).
- (lxxxiv) The temperature value of the energy of space as 2.725 Kelvin:
- i. ([14]: p23-25, eq13).
- (lxxxv) By (lxxxiv), mass (EM^{DIR}) temperature scales:
- i. ([37]: p24-30).
 - ii. ([39]: p22-26, p52-63).

Energy is constrained for the EM_X^{DIR} (gravitational)¹³ field as follows:

- (lxxxvi) EM_X^{DIR} is constrained by a basic 0 (zero-point energy) value and associated temperature value.

The energy unit scale of an EM temporal wave function is derived to be constrained by the following key factors according to the equation $E = h_x f$:

- (lxxxvii) The frequency of the temporal wave function, as f , where:
- a. $f = \frac{c}{\lambda}$ as per (lxxx).

¹³ Not to be confused with curved spacetime.

- b. c as the speed of energy transmission (as the temporal wave function) in space as per (lxxxi).
 - c. λ is the wavelength of the temporal wave function.
- (lxxviii) h_x , where:
- a. The condition of $h_x = h$ (Planck's constant) is based on a mass based (EM^{DIR}) constraint for e_c and c .
 - b. The condition for $h_x = 1$ as based on an absolute $EM-EM_X^{DIR}$ constraint for e_c and c , as $E = hf$.
- (lxxix) That therefore a scale exists between the microscopic based $E = hf$ scale to the macroscopic based $E = hf$ scale that limits the propagation of EM energy (the temporal wave function) in space from a scale of the sun to the calculated Oort cloud as $E = hf \rightarrow E = hf$:
- i. ([13]: p9-11, eq1-8).

Simply, for the real dimensional range above and beyond a point in space, and thence to the ∞ scales in satisfying the $0-\infty$ paradox (\odot_0^∞), for any prime number value and thus scale, the energy of EM is directly proportional with the temporal flux (frequency) of EM , yet when this energy is divvied out in the maintenance¹⁴ of mass (EM^{DIR}), in upholding a conservation of energy principle, that energy process is hedged in encountering a microscopic scale, namely how energy is and can only be measured with the microscopic scale, as per $E = hf$. The process of that hedging thence describes basic energy scales registered by mass for that EM effect, prescribing a host of phenomena, including the Lamb shift effect and resultant CMBR value [14] as constant values.

6. Astrophysical field phenomena

To note is that how EM propagates in space as a process of $E = hf \rightarrow E = hf$ is that such upholds the basic condition of how the frequency of EM must be kept as a constant value in satisfying the basic underlying zero-infinity paradox (\odot_0^∞) condition of $E = hf$. As a consequence, the propagation of light in space describes an ultimate $E = hf$ limit, most logically as a distance from the greatest source of EM , the sun [13][32][33][34][35], a distance of $E = hf$ at the sun to a c -scaled $E = hf$ value (noting the constancy of f), derived to be the known distance to the Oort cloud [13]. To note is that in this context is the equitable maximum mass event scenario ([39]: p59-67). The *redshift* of light though along that $E = hf \rightarrow E = hf$ course from the sun to the Oort cloud, as a phenomenon, is more fundamentally and strictly¹⁵ described according to a more fundamental feature of the electric and magnetic features of the EM temporal wave function *in the context of a maximum mass (electron*

¹⁴ As the EM , EM^{DIR} , and EM_X^{DIR} fields are all *required* and thus *maintained* with each other.

¹⁵ In resisting the simple temptation of proposing a metric expansion of space and associated cosmological scales.

degeneracy) scenario and yet also in the context of a more fundamental theoretic $E = hf \rightarrow E = f$ scale.

It becomes evident therefore how such an electron degeneracy phenomenon in being associated to a maximum mass event scenario (and associated black hole phenomenal incursion effects), would be easily mistaken for a solar event phenomenon, namely as galaxies of solar events swirling around black hole or potential black hole cores. Specifically, the derivation by the zero-dimensional number theory and associated physical theory is that such a phenomenal event (electron degeneracy) happens at and within the Hydrogen wall and Heliopause [32][33][34][35], derived nonetheless with all the known astrophysical phenomenal features for stars and galaxies (other than *Sol*, which is a true maximum mass event scenario, as described). Such is an especially prominent issue, to be more fully explored in a subsequent paper.

One thing to note though is the idea of how in the context of an underlying zero-infinity paradox (\odot_0^∞) exists the clear dilemma of not just scaling, yet the idea of phenomena and associated energy manifold *holography* for events in 1d, 2d, and 3d *timespace*, to also be the subject of a subsequent paper.

Notwithstanding such are proposed to be three basic energy firmaments:

- (xc) Zero-point level of space of 0, as per $e^{\frac{i\pi}{t_B}} + 1_{t_N} = 0_{t_A}$,
- (xci) Infinite boundary level of $E = f$ as per $t_B + 1 = t_A$.
- (xcii) The intermediary atomic scale of $E = hf$.

The temperature scales for these energy firmaments were derived in paper 42 ([42]: p18-47, fig1-2, fig15, fig17), substantiating their known pan-phenomena features.

By all of such, it is noted that physics is missing several key features in its physical theory repertoire, features that have been derived by the zero-dimensional number and associated physical theory¹⁶. A list of unsolved problems in physics is available from the Wikipedia page [59] that can be cross referenced against the findings of the zero-dimensional physical theory¹⁷. Further to such, all phenomena that physics has described by a physical theory, such as quantum mechanics and Einstein's general relativity, have been accommodated for via derivation by the zero-dimensional number and associated physical theory. Importantly, are proposed solutions for the Riemann hypothesis, Goldbach's conjecture, and Fermat's last theorem.

The general conclusion that the zero-dimensional number and associated physical theory finds with contemporary physics is that the scales used for astrophysical phenomena (the stars) are *magnitudes* out of order owing to contemporary physics (at the time of publication of this paper, 8/8/2022) missing the "electron degeneracy" phenomenon and mistaking such for solar-based events,

¹⁶ The complete paper listing in the one PDF (ideal for word search in finding where Temporal Mechanics has resolved the listed unsolved problems) is available at www.xemdir.com.

¹⁷ See paper 49, Zero-dimensional number theory [49].

which is very understandable in not granting/acknowledging the electron degeneracy context of a maximum mass (incursion, and thus black hole) scale event. The key understanding there is that:

- (xciii) The region the electron degeneracy appears to happen within is an overall/entire maximum mass event of this solar system.
- (xciv) Such thence implies each electron degeneracy event prescribes being featured in an overall maximum mass astrophysical event in appearing *as individual unique maximum mass events* given the zero-infinity paradox (\odot_0^{∞}).

Given the current system of physics applies numbers directly to the dimensions, especially so with the idea of a metric expansion of space, namely metricizing space absolutely in the context of presuming stars to be as suns, then such unavoidably has the following theoretic result:

- (xcv) Maximum-mass incursion events and associated electron degeneracy phenomena appearing to be beyond this solar system as unique solar systems, namely by the Λ CDM “metric expansion of space” scaling process.

According to the solution here, the electron degeneracy phenomenon as a microscopic phenomenon occurs *within* this solar system albeit on a macroscopic scale (Hydrogen wall), of course with other effects (scaling and holographic) in play, bringing into effect nonetheless a perceived effect of a maximum mass event scenario for each microscopic electron degeneracy phenomenon locale. The resolution of the stars therefore as an electron degeneracy event in yielding the neutrino scale can only be quite phenomenal, grander in appearance than a simple electron shell jump, as the proposed correct basis of astrophysical phenomena.

In short, zero-dimensional physical theory *derives* astrophysical phenomena in *predicting* what is to be noticed there across the broad range of astrophysical phenomena, from nebulae to black holes, by first deriving all the required values of this solar system (mass, spatial scale, temperature, and associated phenomenal features).

The core problem with current physics therefore is on two fronts:

- (xcvi) Applying numbers directly to physical phenomena (and in the case here to the dimension of space).
- (xcvii) Thence per that process (xcvi), namely in basing its physical theory structure on Einstein’s general relativity work and associated Λ CDM model and those erroneous dimensional scales, is proposed to be how that resultant physical theory becomes entangled together with being off-scale in proposing what are thought to be valid physical theories for known physical phenomena when technically key scales in play are being considered erroneously as abstractions upon time and space, and thence technically invalidating what are thought to be valid physical theories.

In resolving this issue, Temporal Mechanics and the associated zero-dimensional physical theory proposes to offer new proof, as new predictions which can be verified by new observations, regarding the proposed EM_X^{DIR} zero-point gravitational field in a manner Einstein's curved spacetime account of gravity cannot, without entertaining theoretic descriptors disputing known observed phenomena.

7. Conclusion

From a zero-dimensional philosophy [48] was developed a zero-dimensional number theory [49] thence pointing here to a zero-dimensional physical theory in scaling the zero-dimensional number theory to physical phenomena, specifically to e_c and c .

A further series of papers are proposed to support this solution of reality's puzzle, namely:

- (xcviii) A full description of the idea of causality.
- (xcix) The finer points of the energy transference relationships regarding causality between the EM , EM^{DIR} , and EM_X^{DIR} fields.
- (c) Astrophysical holography.

There, the quality of this zero-dimensional physical theory shall be judged on its ability to make new predictions which can be verified by new observations without interfering with the known limitations of human prescience and associated ideas of knowability and causality.

Conflicts of Interest

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

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