Temporal Calculus: solving the "Yang-Mills Existence and Mass Gap" problem.

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Abstract: The application of the Calculus of Infinitesimals (differentials/integrals) to physical analysis, given the paradoxical lack of precise particle definition it grants the study of the elementary particles, despite the precision of such mathematics itself, and therefore its application to particle physics, is questioned. To offer more mathematical precision of definition to the elementary particles, a new proposal for the mathematics of time and space, as an application of mathematics to the paradigm of time, is proposed, as the calculus of time-points in space, here as "Temporal Calculus", a calculus not focussing on space primarily, yet time. As a standard of reference, this time-algorithm is based on the human temporal perception ability in the three paradigms most commonly associated to the human temporal perception ability, namely time-before, time-now, and time-after, assigning mathematical values to those qualities that then give rise to the "golden-ratio" equation, which when applied to 3-d space forms a fractal (golden-ratio) lattice of time-points that is able to derive all the known equations and constants of physical phenomena, from mass to charge, particle energy to particle spin, elementary and standard particles, presenting the case not for an infinitely metrically expanding universe, yet a steady-state time-space system that successfully links the CMBR with the vacuum permittivity and permeability, together with calculating the Yang-Mills mas gap and associated elementary particle phenomena, while finally explaining the existence of antimatter, all via a field of time-points in space.

Keywords: calculus; temporal; infinitesimals; mathematics; time; space; spacetime; metric; redshift; big bang; dark matter; dark energy; cosmology; CMBR; ΛCDM; Yang-Mills; mass gap; neutrino; anti-particle; antimatter

1.   Introduction

The purpose of this paper is to describe a new calculus termed *Temporal Calculus*, a "time-algorithm" calculus that when applied to 3-d space (vacuum) delivers all the known key equations and constants of physical reality, while then also explaining the inherent time-space indeterminacy-effect of the particle behaviour of all those equations in play. This temporal algorithm is derived primarily from the human temporal perception ability in its most basic sense, concluding that the apex achievement in physics is the human ability to conceptualize the relationship of time and space, not relying upon the standard system of "Calculus of Infinitesimals (differentials/integrals)", nor presuming that space is a metric determined by the calculus of infinitesimals, yet something more temporally structured and perception *skilled* and *related*.

This paper is based on 24 [1]-[24] preceding papers that serve as a repository of essential theory, papers having already laid down the basic foundations and ideas for this more general paper, papers that have a need to be expressed in their own subjective account of "paper 1" to "paper 24" [1]-[24], much like any paper would cite precisely the content of its deliverance as an exercise of being precise, as much as physics seeks to be precise in its determination of a theory relevant to known phenomena and already understood equations related to that phenomena, whatever the approach to derive those equations may have been. A key requirement acknowledged thus by this paper is the need to present a new calculus summarised generally in paper 24 [24] the content of which is used here extensively in order to thoroughly examine the "Mass Gap" problem [25], and so that calculus, despite its length, needs to be given the proper worth of re-presenting here from paper 24 [24]. Notwithstanding, the contemporary account of physics that poses the many questions should be assumed knowledge therefore, a knowledge that is being addressed and brought to theoretic question and discussion by all such referencing. The preceding papers do therefore provide the core derivations, including equations and constants to Gravity (mass) and EM (charge), the Rydberg constant, the fine structure constant, Avogadro's number, elementary particle characterisation, the Lamb Shift, Vacuum energy, Vacuum permittivity and permeability, CMBR, perihelion of Mercury, redshift effect, maximum redshift value (and the scale of this local reality (Oort cloud distance) with associated cosmological phenomena), and the mass gap value, all as referenced in this paper. This paper therefore will also serve as a way to bring the preceding papers into full circle, here proposing a value for the mass gap, its function, in the context of all calculated equations known to be true, and therefore in the context of all standard equations pointing to known phenomena proposed by theory (Yang-Mills included), following which the phenomena of antiparticles explained in this new theoretic context.

Indeed, all of such would be quite a thing to properly comprehend without of course clearly defining the temporal calculus employed for time and space, so that time-algorithm will be clarified here once again in this paper as was the case with paper 24 [24]. Nonetheless, each and all the papers employ the same temporal calculus, the "time-algorithm". In its simplest term, the task here in this paper is to knit all the preceding work/papers together upon a platform of time-space that details how physical reality

operates and functions as it is observed to human perception, and of course to successfully shape reality *as* reality is perceived by human perception, from the atom to cosmology, noting that the time-algorithm central to the Temporal Calculus is not a calculus that requires differentials or integrals, yet a time-algorithm calculus that already exists as the human temporal perception ability, of course defined along a specific mathematical line of thought with numbers.

The Temporal Calculus presented here explains two basic features regarding the proposed mechanics between time and space, namely indeterminism (here as defined by the uncertainty between time and space), and the idea of time mandating a spherical wave-function for any time-point in space. The temporal algorithm nonetheless is quite basic, as presented from paper 1 ([1]: p2-5), as per time-before, time-now, and time-after, where time-after is unknown (the future), time-before being the only historical repository for time-after, and time now arbitrarily being given the mathematical descriptor of "1". Combining all of such as a mathematical expression becomes a golden-ratio equation which then when applied to the concept of space using a step-by-step process of standard Euclidean-Cartesian geometrical spatial construction prescribes a temporal wave-function, which then (via the temporal wave-function associations being required to describe π in reference to a π-*template* for space) accounts for all the equations and associated constants of physical phenomena, all based on the exclusive relationship between the paradigms of time and space. In short, from the fundamental relationship between time and space, an algorithm becomes apparent that leads to a wave-function (papers 1 [1] and 2 [2]). From that wave-function can be derived/proposed elementary particle formation and associated elementary particle qualities (charge, etc) (papers 3 [3] and 4 [4]). Papers 5 [5] through 19 [19] then presented all the required equations for energy and associated particle field forces. Papers 20 [20] to 23 [23] then focused back on the dimensions of time and space to present a simplified structure linking all the equations and associated phenomena, granting the time-points an aether-like status that upholds the results of the Michelson-Morley experiment, and therefore supports a wave-feature for light (dismissing the utility of the particle photon).

To present this algorithm in its finest detail and broadest sense, a stage needs to be set, a mandate for its proposal. And so here shall first be detailed the need for this time-algorithm, given the clear theoretic limitations of current physics theory and its use of the *Calculus of Infinitesimals (differentials/integrals)*. Here in particular a solution to the Yang-Mills Existence and Mass Gap Millennium prize problem [25] shall be presented. The solution presented is not a simple case of highlighting why physics has been unable to solve this problem, yet *why* physics has been unable to solve this problem *in the first place*, and the process of argument here shall be one of focussing on the mathematical tools physics has adopted to solve what it tries to, namely phenomena associated to the dimensions of time and space, and the too simplistic theoretic process that is utilised in that examination of time and space with such mathematics, following which the only real solution made available as per Temporal Calculus (the calculus of time-points in space).

The structure of this paper shall be presented as follows:

(i) Introduction
(ii) Defining the New Theoretic need *for* Temporal Calculus

(iii) Defining the new Theoretic change **_of_** Temporal Calculus

(iv) Conclusion

In the process of solving the Yang-Mills existence and mass gap problem this paper shall highlight a key underlying problem in the use of mathematics for physical phenomena, namely the idea of the idealised determinacy of mathematics and its paradoxical indeterminant phenomenal companion (of the very physical matter being analysed) of symmetry-breaking, and why a mathematics that **_can_** account for the indeterminacy of symmetry-breaking **_is_** required. Ultimately, the process here is to accept the problem of the Yang-Mills approach, its deterministic approach to an asymmetric indeterministic phenomenon, despite the exactness the differential calculus and associated abridged variety of algorithms and gauges have achieved in its proposal of the mass gap concept, while accepting that already rigorous calculus, yet here though requiring a new _more rigorous_ yet uniform calculus that captures all the fundamental standard model (QCD and QED) phenomena and associated resultant equations and associated constants.

This paper therefore must demonstrate with clarity four key steps:

(a) The acceptance of the current theoretic proposals and associated experimental results 4-d spacetime and associated calculus of infinitesimals has generated (including Yang-Mills theory), while also highlighting the limitation of that approach to measuring phenomena in time and space, as evident by the mass gap problem regarding the quantum mechanics mathematical modelling limitations.

(b) To go beyond the calculus of infinitesimals by taking the idea of 4-d spacetime a step further with a calculus and associated fundamental algorithm that primarily accounts for a greater and more rigorous analysis of the dimension of time, successfully incorporating into the temporal algorithm the concept of symmetry-breaking, or more precisely, _asymptotic freedom_.

(c) The need to derive all the equations and constants _using this new calculus_ that contemporary 4-d spacetime calculus (and all associated theory) has derived and verified experimentally.

(d) To then derive the mass gap and associated value and match this with known proposed values for the mass gap and associated phenomena, all without corrupting the ideal itself of being cognisant of known data and associated equations.

As shall be demonstrated, the key to this process is the addition of added structure to time's arrow via a process that accommodates for the indeterminacy (and associated symmetry-breaking) of what 4-d calculus of infinitesimals (complete and partial differentials) is inspecting, in demonstration of this more rigorous calculus which requires access to 24 preceding papers [1]-[24] central to the formulation of this calculus. As such this paper must make direct and familiar relationship with those papers as an exception (paper number, page number, equation number, figure number, and paragraph quote however long), else

not allow the reader the proper navigation ability with this newly proposed Temporal Calculus, the philosophy there not reducing the concept of time to its most simplest understanding , namely 1-d, yet offering it more structure to accommodate for known paradoxes in physics theory, the key one being indeterminism and symmetry-breaking when analysing the most basic of particles, and therefore precise navigation tools with that theoretic process a requirement. Indeed, to reduce things to their most fundamental level *as an understanding* ideally requires a reasoning that has not *lost scope* of that reduction process, and so using "time" as a simple arrow has lost all perceptive scope of what time is, relegating time to its most reduced process as an arrow, yet such is not sufficient for explaining the most basic phenomena, a trap mathematics has found itself within, namely losing scope, as evident by the mass gap problem faced by Yang-Mills theory.

2.   Defining the new theoretic need for Temporal Calculus

There are 4 Key assumptions in physics, leading to 5 key primary problems, and 2 key secondary problems, presenting the case for 1 new solution, a new Calculus, presented as follows as an examination of how the use of mathematics actually has an impact on how physics itself is able to explain phenomena either poorly or very well.

2.1   Assumption 1: The linear-time clock *thought experiment* forming *spacetime*

Counting the dimensions of space is straightforward enough, yet granting *time* the quality of being a mere arrow fails to capture all the subtleties of what relativity theory itself is trying to capture and explain; to say *time* is an arrow wedged in space as 4-d *spacetime* (measured with linear-time clocks) without any further mention of how time works relevant to human perception **is** a simplistic *thought experiment* in its most simplistic sense, which ultimately then presents *time* and *space* just as simplistically as 4-d **spacetime**. All of such presents the case of the assumption of linear time as a _thought experiment_ _without proper thought_. Yet what indeed is *thought*? *Thought* is a perception ability of time and space. Much of the problem in physics is assuming the most fundamental of things, and here the case in point with Einstein's theory of relativity is the linear-time clock, the fruits of such an oversight uncovering measurement discrepancies regarding emission signals from dynamic atoms (as shall be discussed in a later section) which a greater appraisal for the dimensional of time could more suitably handle, as shall be demonstrated.

2.2   Assumption 2: The use of momentum-inertia to explain *spacetime*

The Newtonian idea of mass as inertia requires two key considerations for energy, the first being potential energy, the second being kinetic energy. The idea of potential and kinetic energy though is

essentially one of creating a gradient of energy in comparison to what existed previous to the initial inertial incursion displacing an object into a higher or lower energy state of regard through such intervention, from stored energy to motive energy and/or vice-versa. Indeed, it is not a way to *define* the idea of space or time, let alone the massless entity of light, or even a field. To explain reality fundamentally, as the dimensions of time and space, in terms of potential and kinetic energy, is presenting the case of reality prior the presumed ΛCDM model big bang event having an infinite amount of potential energy which would have then been released as kinetic energy as the metric expansion of space, yet that then *everything* in that kinetic energy context can thence, as the theory goes, be potential or kinetic depending on the local role-plays of inertia, which in itself as a basis for a theory is not only inconsistent with the basis definition itself of potential and kinetic energy with that ΛCDM model, and thus merely a virtual ad-hoc definition of regard for mass (as per *inertia*), yet missing so much detail regarding the definitions of time and space which would otherwise underpin in all likelihood the idea of mass itself and associated fields at play, as shall be demonstrated.

2.3   Assumption 3: The assumption of Metric space theoretic priority

Mathematics usually applies itself to what it can determine, yet when applied to space alone and the particles and phenomena associated to particles thereof, mathematics is still unable to define the fundamental qualities themselves of the unique determinations of those fundamentals, such as the why and how of mass, gravity, charge, and energy. Ultimately in the case of metric space, mathematics assumes *the character of space* as *metric space*.

Indeed though, how does mathematics calculate the here and now and associated indeterminism in play? The act of *drawing* a line in space requires the effort of time, or does space have lines already drawn? Is such not the assumption of metric space, namely needing to ask what space is doing *mathematically* to explain reality, to explain what a vacuum is doing? Yet, if space *is* space *as a vacuum*, should not the question be what *time* is doing with space? How does mathematics as metric space resolve facts central to space, such as the vacuum energy? How indeed does an expanding metric space *fuel itself* if not for requiring a large amount of energy?

Physics claims there must be dark energy, a concept that represents, according to the ΛCDM model, an amount of energy that is 10^{121} greater than what is observed, observed and calculated, *as* the fuel of the metric expansion of space. How can mathematics therefore "*make energy up*" using a metric of spatial analysis as presumably the measurement of expanding space?. Is that mathematical instrument of equating a metric expansion with the need for energy a process of reality though?

Not knowing how the redshift works, as light propagating through space, is the core issue, and the simplest answer would have physics think there is an expansion of *nothing (or as the mathematics "calculus of Infinitesimals" would say, "metric space")* requiring a mysterious energy. Yet, expansion involves time, and the case in point here, the requirement for a more structured understanding of time in space itself, an understanding which could then lend to the actual phenomenon of the redshift effect other than simple *metrically* expanding space, as indeed if space is nothing, a vacuum, what is there to expand

if not for a "metric" therefore giving mathematics complete priority over physics, a priority which essentially is a fabrication of space in this case? Further to this, if it is taken that physical reality *relies* on metric space mathematics, then it could be said that metric space mathematics *supersedes* reality, takes priority over reality, over time, and should therefore have a mathematical determinism to everything, and therefore have the future predicted mathematically. Such goes against all actual human ability of reason, as shall be demonstrated.

2.4 Assumption 4: The Calculus of Infinitesimals (complete and partial)

Calculus, or the *Calculus of Infinitesimals (differentials/integrals)*, is the mathematical study of continuous change; differential calculus relates instantaneous rates of change, and the slopes of curves, while integral calculus relates accumulation of quantities, and areas under or between curves, both streams linked through utilising the convergence of infinite sequences and infinite series to precise well-defined limits (approaching zero). Calculus quite simply is a process of algorithms seeking to find precise solutions using either complete or partial differentials and/or integrals. If such a calculus were applied to space and time, the tendency then in the context of the ΛCDM model would be to prescribe how the geometry of *spacetime* operates to its minutest detail, infinitesimals as an infinite progression from a 0 start event of time and space (big bang) to a metrically expanding space that in all appearance is accelerating. There the case in physics is one of space and time as exact descriptors with associated particle and field phenomena being calculated in that calculus of infinitesimals, placing calculus as a type of deterministic process for the metric expansion of space and all particle and field phenomena within that model. Yet reality and all its phenomena is far from deterministic, despite all the symmetries that exist.

Although partial differentials do not follow the exact same process as the calculus of infinitesimals, they do represent a *partial* process of infinitesimals to solving problems using equations relating functions of several known variables/coordinates to an unknown variable/coordinate, expressing quite simply *how fast a function changes* when one of its variables is changed, the others being held constant, to measure a temporal quality of a set. Yet in that process there are variables always left as unknowns, and therefore such equations present the problem of representing a lack of precision in terms of *how fast* a function changes, the key disadvantage being that it may not have solutions expressed in terms of *elementary functions*, especially so in regard to relativistic effects, therefore requiring substantial mathematical processes to understand elementary functions at any depth, given its intrinsic *partial* operative function process. The fundamental problem therefore with partial differentials is their inability to describe the absolute/precise nature of something, which technically is what the quest of physics is all about, namely the absolute/precise nature of physical reality, the how and the why of particle and field phenomena in time and space, as shall be demonstrated.

2.5 General Problems 1-5

- The **Horizon/Photon Problem:** one of the greatest mysteries in physics despite all the mathematical mechanisms in play to describe it is that of a mysterious particle that has no mass, dismissed as a wave by the Michelson-Morley Experiment, thus enforcing all the phenomena of what should really be a wave (EM) to its service as a particle, the *photon*. Little is known therefore of this massless particle other than where it has come from and what it has landed upon, everything in between being an assumption. For instance, in its passage through space, is it oblong, spherical, does it divide as it propagates through space, or does the photon particle become the spatial sphere itself it propagates in, and if so what happens to that sphere as a *quantized unit* in each point of its surface area propagation shock front in all its spherical encounters? Do those propagation encounters of the one quantized unit have any effect on its ultimate quantum state elsewhere given that it can only still be a quantum unit as a particle as it propagates in space, presumably along a spherical front? In other words, the mystery of the photon is that to know is to measure it, and to measure it changes the nature of the photon relevant to what is being used to measure it. Likewise, as charge requires EM as its carrier, a photon is required to relay the propagation of a charge field through space. Electrons dropping atomic shells is considered to produce photons, yet the charge of the electron exists per se and yet must somehow represent a charge field propagating through space without needing an electron jump. Currently the photon model explains EM as electron jumps in an atom, yet the idea of how static charge propagates as a delivery of photons is also in line with not knowing "what" a photon becomes in its propagation through space other than proposing models related to the photon and its carrier of charge fields as EM. A result of this photon problem is the "***Horizon problem***" in cosmology theory, namely that photons have the same uniform temperature, regardless of the distance they travel, roughly $2.725\ K$.

- The **Flatness Problem**: nearly all the evidence collected by cosmologists indicates that the Universe is flat, as though *spacetime* shows almost no curvature whatsoever, an extremely unlikely thing in the context of a required ΛCDM model (big bang), also a feature of a consistent CMBR reading of $2.725\ K$.

- The **Monopole Problem**: the enormous energies that would have been produced by the ΛCDM model (big bang) should have created a magnetic particle as a monopole, not a dipole, a unique entity, and yet there is no evidence for it.

- The **Hubble Constant Problem**: the difference in H_0 determinations has surpassed 5σ sigma, putting Hubble's Law into question and associated calculated rate of expansion of metric space, suggesting the scaling system used to analyse the metric expansion of space to explain the redshift effect is in fact flawed.

- The **Cosmological Constant Problem**: given the mismatch between the calculated vacuum energy and the required energy to meet the metric expansion of space description for the redshift effect, the amount of energy required is given responsibility to a thing termed Dark Energy, a mysterious and undiscovered level of energy that is 10^{121} greater than what is registered by the vacuum of space's actual energy value.

Associated to Dark Energy (indirectly) is Dark Matter which in line with the proposed metric expansion of space is "dark" because it too has no evidence for its existence. Dark matter is required to keep galaxies together in the context of the proposed metric expansion of space, as those galaxies appear. Of course there are simple explanations for dark matter, such as it is too vast a thing to be measured, and so on, yet what is lacking in physics as per all its theoretical problems is the core understanding of time and space per se, that inter-relationship there if there is one, other than via clocks and momentum. As is obvious, there is a cascading event of problems from the four key assumptions. The solution to the resultant problems therefore is to address those four key assumptions through addressing time and space and those essential features to the human perceptive ability; clearly, as a solution, it would be far better to give *time* the quality of proper human perceptive ability analysis, such as time-points in the three paradigms of time-before, time-now, time-after, then make that a time-algorithm to conduct a proper mathematical examination of 3-d space and how that time-algorithm relates with space, as shall now be demonstrated.

2.6   Specific Problems 1-3

There are two secondary yet very specific problems, all intertwined from the small scale to the very large scale, the first problem being that of quantum mechanics, in having adopted the quantum carrier as the massless photon, needing to demonstrate the non-existence of the massless particle (photon) on the sub atomic (sub-quantum) level, and the second problem being quantum physics and associated quantum field theory and standard model being unable to accommodate for gravity and associated field force.

2.6.1   The mass gap problem

As highlighted in the introduction, the key issue with the use of the Calculus of Infinitesimals (complete and partial) is that despite their exactness they are unable to accommodate for the indeterminacy and associated symmetry-breaking feature of the most elementary of particles, which therefore creates a *hypothesis* for the lowest energy state of a particle if indeed it cannot be properly defined owing to its inherent asymmetrical (symmetry-breaking, or as regarded as *asymptotic freedom*) and thus indeterministic characteristic. The real problem is that owing to quantum restrictions, then a photon technically cannot exist on this most elementary particle level (sub-particle), yet only a *mass* can, that which is described as "the non-existence of massless particles in observations of the strong interactions".

The acknowledgement of this problem is found in the Millennium Prize problem for the "Yang-Mills Existence and Mass Gap" problem [25] as follows:

> ***Yang–Mills Existence and Mass Gap.*** *Prove that for any compact simple gauge group G, a non-trivial quantum Yang–Mills theory exists on R 4 and has a mass gap $\Delta > 0$. Existence includes establishing axiomatic properties at least as strong as those cited in [45, 35].*

The problem here is that quantum mechanics prescribes a certain level for energy assortment and utility, yet calculations suggest together with experimental observations that there exists something more fundamental at play, as elementary particles, which themselves therefore need an abridged calculus and associated algorithms from the standard quantum mechanical formulae. So therefore, there are particle *forces* as these elementary particles and there are force "carriers" for these elementary particles/forces. These forces and force carriers need to explain the 4 basic forces themselves, the *strong* (neutron/proton and associated substructures), *gravity*, *electromagnetic*, and *weak* (the *weak* and *electromagnetic* bundled together as electroweak). Understandably, the labelling for each of the elementary particle forces and force carriers needs to be specific and demonstrable, yet the mathematics employed to describe all of such fails, as specified, to accommodate for the inherent symmetry-breaking (asymptotic freedom) and therefore indeterminacy of the most elementary particles/forces, hence the request for a solution to the algorithm currently used on the most fundamental level of particle/force analysis in the elementary particle world, to the Yang-Mills equations.

In short, quantum theory has to accommodate itself with short-range forces and massive particles, with bridging algorithms describing mathematical properties explaining the "mass gap" and associated "asymptotic freedom" of elementary particles, all as a way to explain the non-existence of massless particles (the non-existence of the photon on this sub-atomic level, as it must be) in observations of the strong interactions, hence a rigorous new approach to the "quantum Yang-Mills theory" is required as one that can capture all the required equations and constants thereof central to quantum theory and its progenitor theories. The Millennium Problem *seeks to confirm a rigorous mathematics demonstrating the existence of the "mass gap", namely the non-existence of massless particles in Yang-Mills theory,* which is what this paper proposes to provide.

2.6.2   The Gravity problem

As presented in paper 21, page 11 ([21]: p11, fig1) to get a clearer picture of the current process and associated disciplines of physics, the following flow chart (figure 1) highlights what was presented there in that paper in section 2.1, here as figure 1 as a type of mass-gravity development chart (blue), with its associated problems (red) (2.2), here as figure 1.
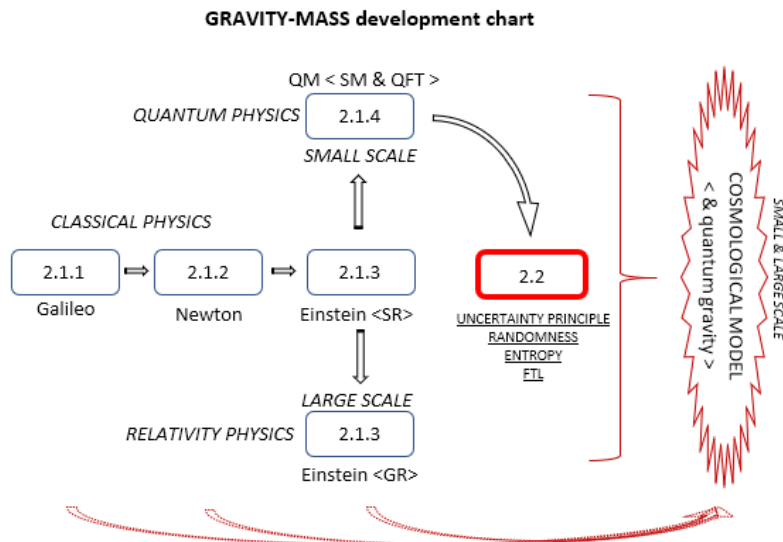
GRAVITY-MASS development chart

Figure 1: The gravity-mass development chart; note here that "Quantum Gravity" is the anomaly, given the "uncertainty principle", "randomness", "entropy", and FTL" are already observed facts.

Such a process requires a vast amount of accountability and fact-checking, a large amount of equations (many inertial transformations, many probability scales, many rounding-off factors, and so on and so forth), all to explain *a simple almost singular context of elementary particles at play*. Such is the process that has evolved, existed, and still exists. What therefore is ***still*** required is how to explain atomic and elementary particle behaviour, the behaviour of light extra-atomically, and the nature of the observed reality, all in the context of an understanding and associated definition of space and time to resolve the simple problem of mass, gravity, and of course EM, together with the associated background features of randomness, uncertainty, FTL, and of course entropy. The problem that becomes obvious on such a quest is the attempt by physics to base any theory on that which can't be explained or proven to exist (such as requiring dark matter and dark energy), to make the problems "fit" with such fixes, while only relying on bits of data and not all the data. Indeed, although data from each of the cosmological models through time has been based on astronomical observations, that data nonetheless has been open to a variety of theories, as is obvious, to solve the known problems, theories that nonetheless propose the stars themselves to be "different things" according to those "different theories". Therefore, if the search for a solution to the connection between mass and gravity must be as real as the reality being explained, then the scientific method employed by physics needs to be "kept real" on this quest. This was explained in paper 18 [18], namely the importance ***not*** to unrealistically manipulate the data, and to remain true to data in the <u>here and now</u>, to the human perception ability of the <u>here and now</u>, and to put unrealistic models of cosmology and associated unproveable cosmology fixes aside. Thus ultimately, the solution to the theoretical link between mass and gravity requires that the theory:

    i.   Supports all known data (not just parts of data, or bits of data).
    ii.   Does not introduce non-existent phenomena as data-fixes (DM, DE).
    iii.   Solves known local and cosmological issues (flatness, horizon, monopole, cosmological constant, and Hubble constant problems, and so on).

Temporal Calculus upholds such in taking all the mentioned problems in view of its **one** Calculus and associated algorithm, as shall now be presented.

3   Defining the new theoretic change of Temporal Calculus

It is well-known that the explanation of physical reality requires two things, human perception, and mathematics. Those two things then assist in explaining phenomena in time and space. The process of physics has been one of using the human ability of temporal perception as the human ability to read a clock, and the human ability of spatial perception as registering a basic 3-d vacuum. Particle behaviour and associated field forces are then measured in the vacuum using clocks, while also using the idea of inertia and momentum for mass and energy readings. This process then aims to uncover the nature of time and space, usually using a calculus that can hone-in on the phenomena to a zero-point determination (infinitesimal).

The question therefore should be asked, namely *"would it not be more logical, if not more practical, to combine the human perception ability in the first place with mathematics to then propose a model for time and space, to go straight to the most underestimated yet significant part, the fundamental source, namely time and space?"*. The proposed solution presented here is to address what time and space are to human perception, with more exactness than 4-d *spacetime* (clocks and momentum), and to then apply that mathematics **of** <u>temporal perceptive appreciation</u> **to** <u>a most basic model for space</u>.

The analysis of time and space as separate dimensions relevant to the human perception ability would ideally "grade" a determination for time with distance, which as a gradient would (when plugged in with the standard units) give rise to what is known of distance regarding time, which would have much to do with the human perceptive limitation of measuring physical things. It is for this basic reason therefore considered far better to give time the quality of *time-points* in the *three paradigms of time-before, time-now, time-after*, to then make that a time-algorithm *relevant* to the human perception ability, and to then conduct a proper mathematical examination of 3-d space and how that time-algorithm relates with space, noting that given how so potentially complex such a process would be<u>, the process would require a step by step geometric construction of 3-d space related to that time-algorithm</u>.

It is important to remember that physics, or any discipline, is not reality. It is a way of looking at, measuring, and then explaining reality with that looking-at and measuring. Reality can be explained this way and that, and each of those ways, whether mathematical or philosophical, are limited by their own theoretic constraints. The best way to understand cooking and food for instance is to understand how our *perception reference* processes cooking and food. The best way to understand travelling is to understand how our *perception reference* understands travelling. Our *perception reference* is all we have to understand what we do, and that carries *limits* of what is possible and what is not, and therefore in physics for instance that is 3 dimensions of space and a few features of time, namely time-before (the past, memory), time-now (here and now), and time-after (the future, the unknown); simply, "*the best way*

to understand reality therefore as features of time and space would be to understand how our perception reference processes time and space", is the key proposal for this Temporal Calculus.

The process here therefore shall present a new calculus, the time-algorithm, that abides by the human perception ability and not the concept of infinitesimal mathematical analysis, not the Calculus of Infinitesimals (differentials/integrals). Essentially, here the calculus being proposed for time is not being applied to a mechanism of partial or complete infinitesimal analysis of space, yet the concept of the arrow of time shall be split into three (time-before, time-now, and time-after) incorporating an algorithm that explains the relationship between those three parts that then determine how that algorithm should be applied to the concept of space as per a basic Euclidean-Cartesian geometry representing the relationship between time and space, between that temporal algorithm and the concept of 3-d space as a vacuum; the focus here is describing a mathematics based on a primary function between a nominated perception-based definition for time and space, that inter-relationship. The test is whether the mathematics implicit to that definition of time and space can derive all the required equations for physical phenomena, to make that new temporal axiom an accurate portrayal of what is observed of reality. Here, the mathematics is not flying blind as an arrow in a metric expanding space, or given variables in a coordinate system to map phenomena, yet given new constraints detailing the temporal-perceptive code central to the relationship between time and space.

In short, this new mathematical process, this Temporal Calculus, is a step-by step geometrical construction of time and space, *not* a set of algorithms that roll infinitesimally or into infinity, either completely or partially, yet a step-by-step geometrical construction of time-space using the temporal algorithm and those defined initial conditions that exist between time and space, not for time alone or space alone or time and space as one as *spacetime*, yet for time and for space as *unique entities* associated nonetheless to each other by their uniqueness.

3.1   Temporal Calculus

The overall theoretic flow of the lead-up papers and associated theory central to this proposed time-algorithm is as follows:

1. Paper 1:   Gravity's Emergence from Electrodynamics [1]
    - Introducing the time-algorithm.
        - Golden ratio time-algorithm: p3-6.
        - *provisional* gravity equation: p8-9.
        - *provisional* EM equation p9-10.
        - Rydberg equation-constant: p10-15.

2. Paper 2:   Golden Ratio Axioms of Time and Space [2]
    - Introducing the link between the time-algorithm and the dimensions of space (derived from the time-algorithm), essentially developing the time-algorithm analogue of the

Schrodinger wave-function, and associated atomic-scaled spatial/wave-function transformations (analogue of Quantum Mechanics).

- Developing the basic structure of Euclidean-Cartesian space from the time-algorithm.
- The development of the wave-function (phi-quantum wave-function) with the electrical (monopole) and magnetic (dipole) features with associated general atomic time-algorithm manifold structure: p3-6.
- Fine structure constant: p12.
- Speed of light c: p13.
- EM equation constant k_e: p13.

3. Paper 3: The Emergence of Consciousness from Chaos [3]
   - Establishing the fundamental level of the Planck scale with the time-algorithm, deriving the time-algorithm analogue of the Planck equation while also investigating the idea of consciousness from the time-algorithm perspective (given the time-algorithm is based on the human perceptive ability of time), to then investigate if indeed consciousness could emerge from a veritable Planck scale level of apparent disorder/chaos.
      - Planck's equation and constant: p3.
      - Logistic map equation: p4.

4. Paper 4: Phi-Quantum Wave-Function Crystal Dynamics [4]
   - Developing the elementary particles upon the basis of the EM and G time-algorithm equations, the association of the elementary particles upon such a basis, and their localised structure and phenomena, all as per the time-algorithm analogue of Quantum Mechanics and the associated Standard Model of particles, while then extending this macroscopically to derive Avogadro's number and a provisional CMBR frequency value.
      - EM and G constants: p7.
      - Avogadro's number: p16
      - *provisional* CMBR frequency: p17.

5. Paper 5: Time as Energy [5]
   - Forming the link between the time-algorithm and the concept of energy, deriving a provisional value for the CMBR for space in the context of an overall steady-state energy system (entropic-enthalpic) and that associated dynamic between the microscopic and macroscopic scales.
      - *provisional* CMBR *energy* value: p9.

6. Paper 6: The Relativity of Time [6]
   - The time-algorithm as an analogue to Einstein's Special and General relativity regarding different independent locations in space and the associated cause-effect of phenomena

is explained, thence presenting a general overall shape to the resultant play of the relativity between the microscopic and macroscopic scales of energy and mass, proposing a general time-scale for the time-algorithm system of macroscopic-microscopic cycles of interactive motion.

7. Paper 7:   Golden Ratio Entropic Gravity: Singularity Field Testing [7]
   - The idea of gravity as a process of "negative energy" is weighed up with the proposals of the preceding papers, presenting two experiments to test the hypothesis of gravity based on the time-algorithm's relationship with space.
     - EX-1: p10-12.
     - EX-2: p13-15.

8. Paper 8:   The Golden Ratio Time Algorithm [8]
   - The time-algorithm is given an overall analysis in comparison to contemporary physics axioms for time and space in review of the preceding 7 papers [1]-[7] and those achievements there.

9. Paper 9:   The Physics Chimera [9]
   - An analysis of "inertia" is undertaken highlighting the problem with equating inertial-mass to gravitational-mass, providing a solution in the form of the time-algorithm to better account for relativity discrepancies between inertial and gravitational mass.

10. Paper 10:   The Conception of Time [10]
    - The idea of consciousness is discussed as being in direct relation to the time-algorithm and therefore the time-algorithm being an ideal frame of reference for concepts on relativity; three key models of consciousness in history are presented to support the time-algorithm concept of human consciousness registering time's flow, an important correlation between time's flow and the human ability of temporal awareness:
      - Rene Descartes: p5.
      - Martin Heidegger: p5.
      - Maurice Merleau-Ponty: p7.

11. Paper 11:   Space, and the Propagation of Light [11]
    - The idea of "space" is discussed relevant to the time-algorithm being the underwriting for the propagation of energy, and how the idea of infinite space that is expanding cannot be resolved by GR owing to the obvious disconnect between inertial mass and gravitational mass, and therefore that a new approach is required, namely the time-algorithm approach, which when used as a wave-function propagating as a spherical front in space would effect an illusion of expanding space.

12. Paper 12:   Space, and the Nature of Gravity [12]
    - Gravity is explained here primarily as a mechanism of space not as a mechanism of a field propagating at "c", yet associated nonetheless to the time-algorithm and that associated cause-effect dynamic with a mass that is based on energy (PQWF, analogue of QM and the SM), while proposing a new experiment to test the different features of the time-algorithm wave-function (PQWF) in relation to space as gravity.
        - EX-3: p10-12.

13. Paper 13:   Space, and the Redshift Effect [13]
    - In addressing known issues in contemporary cosmology theory, the time-algorithm is applied to the propagation of light in space highlighting the key flaws in cosmology theory and providing evidence for the redshift effect of light, calculating a maximum redshift value of $z=12$ (z12) and associated metric limit to the local solar system time-space reality (Oort cloud), while then explaining the most logical compositional nature of the stars and associated scale in such a new context.
        - Redshift value: p11.
        - Oort cloud distance: p11.

14. Paper 14:   Solving the "Cosmological Constant Problem" [14]
    - In developing upon the new cosmological model, the issues of the cosmological constant problem are presented and solved, successfully deriving the key equations for energy microscopically and macroscopically, together with the value for the perihelion of Mercury.
        - Lamb Shift effect: p23-24.
        - CMBR energy *value* and *frequency*: p24-25.
        - Perihelion of Mercury: p28.

15. Paper 15:   Hybrid Time Theory: "Euler's Formula" and the "Phi-Algorithm" [15]
    - The idea of the "natural" process of decay as a microscopic/atomic event in regard to the time-algorithm wave-function of the atom is presented, detailing Euler's formula and associated value in an overall energy equation for time and space, also detailing an algorithm for π as the progression of the time-algorithm wave-function (PQWF).
        - Algorithm to calculate π: p6-7.
        - Euler's formula: p9-11.

16. Paper 16:   The Hybrid Time Clock as a Function of Gravity [16]
    - Directly developing from the energy equation of paper 15, the time-algorithm is explained through this lens of energy dynamic (with space) explaining the nature of

gravity as per using a new set of spatial equations (p6-8), giving a detailed account of the nature of relativity through the application of the time-algorithm.

17. Paper 17:   Hybrid Time Theory: Cosmology and Quantum Gravity (I) [17]
    - The "hybrid time" energy description is applied to the time-algorithm cosmology model, further presenting the case for the time-algorithm model, highlighting all the key cosmological data that is captured and supported by the time-algorithm without the use of the insubstantial data-sets of dark energy and dark matter, presenting a new experiment for the time-algorithm model for gravity.
        - EX-4: p18-22.

18. Paper 18:   Scientific Principles of Space, Time, and Perception [18]
    - The perception-basis of the time-algorithm is given key focus as being the qualifier for what is a more realistic account of time, as per the basis of it being associated to the human perceptive ability accounting for time, and the importance of such.

19. Paper 19:   Hybrid Time Theory: Cosmology and Quantum Gravity (II) [19]
    - The idea of the time-algorithm related to the human perceptive ability of time's flow is further explored, highlighting the themes of determinism and indeterminism, of cause and effect, proposing a new experiment for the time-algorithm model for gravity.
        - EX-5: p15-18.

20. Paper 20:   Mathematical Principles of Time and Energy [20]
    - The key relationship between energy as time with space as per the time-algorithm is explored by means of an equation for time central to space that explains the "uncertainty" of a point in space per the time-algorithm, highlighting that the "uncertainty principle" regarding the measurement of particles encountered in QM is a pan-phenomenon, as based on the relationship between time and space.
        - ***Time-space uncertainty* principle (TSU): p11-13.**

21. Paper 21:   Dimensional Mechanics of Time and Space [21]
    - Given the importance of the "uncertainty" principle being a key feature of the interplay between time and space, the dimensional mechanics between time and space is explored, resulting in a description of inertial mass compared to gravitational mass, and thence a description of gravity in comparison to EM, as from the fundamental relationship between time and space.
        - ***Time-space groove* (TSG): p20-23.**

22. Paper 22:   Dimensional Thermodynamics [22]

- The idea of thermodynamics as the transposition of energy through space is discussed as a process of the dimensional mechanics between time and space, proposing a dimensional enthalpic mechanical order in play between time and space as time's arrow, together with presenting a newly derived case of the quality of mass as it approaches light speed.
    - EX-6: P23-26

23. <u>Paper 23:   Time-Space Wave-Mechanics [23]</u>
    - The idea of the time-space field (TSF) is proposed explaining how light propagates through such a field *as a wave* (and ***not*** as the photon particle). Together with the TSF is the primary idea of time-point spin, as time-space spin (TSS), The relationship of the TSS with the TSF events a time-space template (TST) for the development of particle phenomena, beyond which is the time-space wave (TSW) phenomena of the particle field interactions, whereby mass and charge are both properly derived and linked as field force players, highlighting a new link between EM and space that prescribes both the vacuum permittivity and permeability, which gives rise to the basic phenomena of a time-space pulse (TSP) as the simplest relationship between EM and G.
        - ***Time-space spin (TSs): p12-15.***
        - ***Time-space field (TSF): p15-17.***
        - ***Time-space template (TST): p17-23.***
        - ***Time-space wave (TSW): p23-27.***
        - ***Time-space pulse (TSP): p27-28.***
        - Vacuum permittivity and permeability: p29-30

24. <u>Paper 24:   Temporal Calculus (The Calculus of Time-points in Space) [24]</u>
    - The general temporal algorithm is brought together in view of the previous 23 papers, highlighting how the time-algorithm started in the first paper and developed as a theoretic device through each paper to the most recent time-space principles of paper 23, highlighting how the modelling of the time-points in space has kept consistent with the standard Euclidean-Cartesian spatial modelling approach to points in space, here as time-points.
        - Deriving the CMBR from the Vacuum Permittivity-Permeability and the time-space template (TST).

The general theme of the papers is one of setting the basic definitions for time and space, and then measuring that interdimensional mechanics by nominating references of time in space in developing a basic wave-function according to those interdimensional mechanics, from the atomic level to cosmology, while then taking an entire view of the papers to determine what new is at play, namely what new concepts can be determined based on this time-algorithm and its application to space given the equations it has

derived are confirmed (matching known equations and constants of physical phenomena). Such a flow of ideas occurred as follows:

- Basic foundation for the time-algorithm (paper 1)
- Wave-function development from the time-algorithm in presenting an atomic template (paper 2)
- General relationship of perception to the time-algorithm (paper 3)
- Wave-function based atomic template model of elementary particles (paper 4)
- Time and its relationship with energy (paper 5)
- Addressing the idea of relativity (paper 6)
- Time and space dimensional and phenomenal constraints and associated field effects (papers 7-12)
- Addressing limits for time and space limits; Cosmology (papers 13-19)
- Determining the fundamental shape of the time-space interaction (papers 20-23)
- Deriving the CMBR from the Vacuum Permittivity-Permeability and the TST (paper 24).

The time-algorithm is perhaps best addressed in paper 8 ([8]: p4), as follows:

In mathematics, an equation is a statement that asserts the equality of two expressions. To present an "absolute" equation for time requires a type of equality to be established between two expressions/properties of time. What can we say about "time" that has two properties using both "1" (as t_N) and t_B, as an expression of equality?

If time is a singularity, we can relate time-before to time-after along a basic linear mathematical construct as via t_N. This has been the Achilles heel it seems of our logic of time, so let us break it down further. For instance, we know that placing t_B next to t_N requires a negative sign for t_B (equation 1) given t_B is a "backward/negative" step compared to t_N.

$$(-t_B) + 1 = \quad \underline{fundamental\ property\ A} \qquad \text{paper 8, equation 1}$$

Yet, if time is a singularity, we can present the case that t_N can also be "per" $(-t_B)$ as another equation as technically t_B would already be contained within the t_N construct, as it would have already happened (equation 2).

$$\frac{1}{(-t_B)} = \quad \underline{fundamental\ property\ B} \qquad \text{paper 8, equation 2}$$

Thus, if these two features represent fundamental properties of time, and time itself is a singularity, then <u>fundamental property A</u> must equate to <u>fundamental property B</u> (equation 3.)

$$(-t_B) + 1 = \quad \frac{1}{(-t_B)} \qquad \text{paper 8, equation 3}$$

From equation 3, we arrive at the following (equations 4-5).

$$t_B^2 - t_B = 1 \qquad \qquad \text{paper 8, equation 4}$$
$$t_B + 1 = t_B^2 \qquad \qquad \text{paper 8, equation 5}$$

Equation 5 is interesting, as essentially it suggests that if we consider an "arrow of time" equation that is absolute, and we add the past as a "positive value" (as it would be in considering an arrow of time equation) to t_N, as past + present, only logically we would arrive at the future, let us call t_A (equation 6.)

$$t_B + 1 = t_A \qquad \qquad \text{paper 8, equation 6}$$

Yet as we know, $t_B^2 = t_A$ (equation 7.)

$$t_B^2 = t_A \qquad \qquad \text{paper 8, equation 7}$$

Is this the common-reference universal time-algorithm we need to link all observable data of reality? The only way to know is to apply this time-algorithm to 3-d space, as though building a theoretical model of reality from this new axiom for time. This process was outlined in paper 2 [2], as the golden ratio axioms of time and space. The primary idea of applying time to space was to consider space as t_A, and how both values of the golden ratio would be related to this t_A realm as space.

This algorithm forms the basis of the Temporal Calculus.

3.2 Temporal Calculus Results

The analysis of time and space as separate dimensions relevant to the human perception ability would ideally "grade" a determination for distance with time, which as a gradient would, when plugged in with a standard dimensional unit, give rise to what is known of the equations relevant to the particle phenomena associated to time and space. The time-algorithm $\frac{t_A + t_B}{t_A} = \frac{t_A}{t_B}$ as per paper 1 ([1]: p4, eq6) and as from the previous section (3.1), has achieved the following derivations when applied to the idea of space:

$$G_{AB<NEWTONS>} = \frac{M_C c^2 M_A M_B}{d^2} \ (kg^3 t^{-2}) \qquad \qquad \text{gravity ([1]: p8, eq11)}$$

$$Q_{AB<NEWTONS>} = \frac{Q_C c^2 Q_A Q_B}{d_{AB} d_{BA}} \ (C^3 t^{-2}) \qquad \qquad \text{charge ([1]: p10, eq14)}$$

$$\frac{1}{\lambda} = Z^2 \cdot \frac{1}{\left(\frac{1}{n_1^2}\right) - \left(\frac{1}{n_2^2}\right)} \cdot \frac{\lambda_e}{2(2\pi a_o)^2} = R_\infty Z^2 \cdot \frac{1}{\left(\frac{1}{n_1^2}\right) - \left(\frac{1}{n_2^2}\right)} \qquad \text{Rydberg constant ([1]: p14, eq25)}$$

$$\left(\frac{-1}{\varphi} \cdot -2\sqrt{3}\right) + 1 = 3.140919 \qquad \qquad \text{electrical monopole ([2]: p8, eq3)}$$
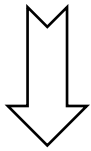
$$\left(\varphi \cdot -2\sqrt{3}\right) + 1 = -4.605020 \qquad \qquad \text{magnetic dipole ([2]: p8, eq4)}$$
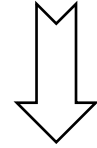
$$(\varphi \cdot -2\sqrt{3})^2 = 31.416253$$ magnetic (time-space) template ([2]: p10, eq6)

$$\frac{\lambda}{2\pi} = \frac{a^0}{2\pi \cdot 21.8} = \frac{a^0}{137}$$ fine structure constant ([2]: p12, eq9)

FROM THE METRIC MEASUREMENT OF THE BOHR RADIUS USING THE TEMPORAL CALCULUS, THE FOLLOWING EQUATIONS/CONSTANTS AND ASSOCIATED METRICS CAN THENCE BE DERIVED

$$\frac{19.8 \cdot \lambda}{e_c} = \frac{19.8 \cdot 2.426 \cdot 10^{-12}}{1.60218 \cdot 10^{-19}} = 2.998 \cdot 10^8 \ ms^{-1}$$ speed of light ([2]: p13, eq10)

$$k_e = \frac{3 \cdot 2e_c}{4\lambda} \cdot c^2 = \frac{6 \cdot 1.6 \cdot 10^{-19} \cdot (3 \cdot 10^8)^2}{4 \cdot 2.426 \cdot 10^{-12}} = 8.9 \cdot 10^9 \ Cms^{-2}$$ EM coupling ([2]: p13, eq13)

$$k_e = \frac{3 \cdot 2 \cdot 20 \cdot c}{4} = 30c$$ EM coupling to time-space template ([2]: p14, eq14)

$$k_{e`} = \frac{3 \cdot 2 \cdot 21.8 \cdot c}{4} = 32.7c$$ energy shell quota ([2]: p17, eq16)

$$e_c \cdot f = E \cdot (\frac{c}{19.8})^2$$ Plank analogue ([3]: p3, eq1)

$$x_{(t_B+1)} = k \cdot x_{t_B}(1 - x_{t_B})$$ chaos; initial conditions ([3]: p4, eq3)

$$M_C = (\frac{2}{3})^2 \cdot M_p$$ gravity constant ([4]: p7, eq1)

$$\text{╫ } error\ gradient = 6.022 \cdot 10^{23} \cdot mass\ of\ neutron$$ Avogadro's number ([4]: p16, eq9)

$$\frac{4\pi r_2^2}{s_x} - \frac{4\pi r_1^2}{s_x} = 12\ (z)$$ maximum redshift value ([13]: p9, eq1)

$$E = h_x f$$ variable photon energy equation ([13]: p11, eq5)

$$r = 73,500\ au$$ Oort cloud distance ([13]: p11, eq8)

$$V_A = \frac{21.8}{20} \times \frac{19.8}{20} = 1.079$$ vacuum energy factor ([14]: p23, eq8)

$$\sim 10^{-9}\ Jm^{-3}$$ vacuum energy value ([14]: p23, eq9)

$$\sim 10^9 Hz$$ Lamb shift value ([14]: p24, eq10)

$$t_B = \sqrt{\frac{21.8 \cdot 1.079}{N_A}} = 6.25 \cdot 10^{-12}\ s$$ cosmological CMBR value ([14]: p25, eq12)

$$2.7 \times \frac{22}{21.8} = 2.725 \ (temperature)$$ lowest temperature (CMBR) ([14]: p25, eq13)

$$e = m \cdot c^2.$$ Einstein's equation ([14]: p26, eq18)

$$532 \times 1.079 = 574 \ arcseconds \ per \ century$$ Perihelion of Mercury ([14]: p28, eq19)

$$\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} \dots etc$$ π algorithm ([15]: p7, eq4)

$$e^2 + \varphi^2 \sim \left(\sqrt{\frac{19.8}{20}} \ \pi \right)^2$$ general energy equation ([15]: p11, eq8)

$$\sqrt{2} + \sqrt{3} \cong \pi$$ π approximation ([16]: p8, eq1)

$$e^2 < ENTROPY > + \ \varphi^2 < ENTROPY > \ \cong \ \left(\sqrt{\frac{19.8}{20}} \ \pi \right)^2 < ENTHALPY >$$ energy equation ([20]: p10, eq2)

$$m \cdot \frac{d}{t} = fundamental \ property \ 1$$ momentum ([23]: p21, eq2)

$$e \cdot \frac{t}{d} = fundamental \ property \ 2$$ charge ([23]: p21, eq3)

$$\cong 1.67 * 10^{-27} kg$$ proton/neutron mass from charge ([23]: p22)

$$\varepsilon_0 = \frac{1}{4\pi} \times \frac{1}{Q_C \cdot c^2} = \frac{1}{4\pi \cdot k_e}$$ vacuum permittivity ([23]: p30, eq5)

$$\varepsilon_0 = \frac{1}{\mu_0 \cdot c^2}$$ vacuum permeability ([23]: p30, eq7)

These equations were derived from the time-algorithm when applied to the concept of space via "time-lines" (from a nominated spatial point) forming the idea of 3-d space (refer here specifically to paper 2 [2] *entire*) as derived from the time-algorithm (golden-ratio) ***using basic Euclidean geometry in a Cartesian coordinate system***; the time-algorithm with these time-lines formed a wave-function that then lead to the concept of a space "template" (TST) allowing the time-algorithm to satisfy its requirement of the *wave-function of time in space (PQWF)* forming "π", a 2-d circle (or 3-d sphere). In abiding by that condition, a wave-function coupling force became apparent setting a precedent for the basic "EM" wave-function, the concept of charge, and how this would prescribe an atomic template (TST) with a particular limitation of functionality, namely that there exists within the mass-charge phenomena of the atomic template (TST) a general process of interdimensional (time with space) EM and mass *coupling* on an elementary level, as presented in paper 2 figure 16 ([2]: p16, fig16), which executes itself as a prelude to the actual features that exist for the elementary particles (paper 4 *entire* [4]) making up that manifold, here as figure 2:
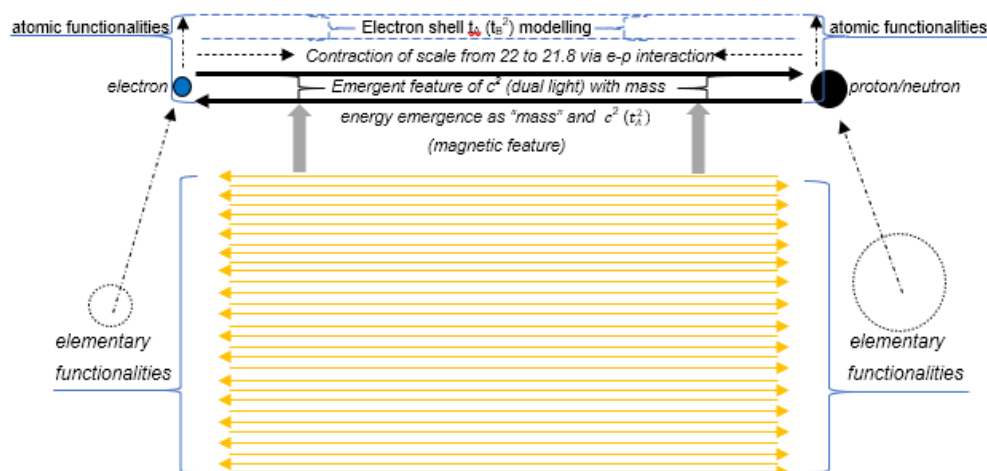
Figure 2

Figure 2 ([2]: p16, fig16): "beyond" the 30c manifold is a "c" factor that can only be
"squared" as a "future" ($t_B{}^2$) event beyond the primary 30c "now" event. Also note the
contraction of the atomic scale from 22 to 21.8 owing to the emergent force between the
electron and the proton, and subsequent electron shell modelling.

Papers 4 [4] and 5 [5] *entire* explain this process, detailing the formation of not just the atomic
template, yet the set of elementary particles. This template then required the feature of time-space
structuring in the wave-function needing to fulfil its course of completing "π", as closely as it could with all
the mechanisms available to it, according to the proposed nature of the nominated arrow of time in space
as a wave-function propagating from a spatial *point source* (namely spherical), hence the concept of π
being required. The template became descriptively layered to illustrate its mathematical functionality
regarding the wave-function and its relation to space beyond the confines of the spatial template, as
highlighted in figure 6 paper 14 ([14]: p23, fig6), here as figure 3:

> *This value of energy now needs to be re-integrated to the atomic level, namely the
> relationship of this general energy level to the particle reference, and so the focus now becomes
> on this theory's own standard model of particles and associated quantum mechanics (phi-
> quantum wave-function), as per paper 4 [4]. Paper 2, Golden Ratio Axioms of Time and Space,
> ([2]: p3-17) initially presented the feature of the atom in relation to energy and light (photon) which
> was then incorporated into the description of what was termed the Phi-Quantum Wave-Function
> Error Gradient ([4]: p16), the condition of time needing to define/trace "π" as the unfolding of the
> wave-function of light, as summarised in figure 6.*
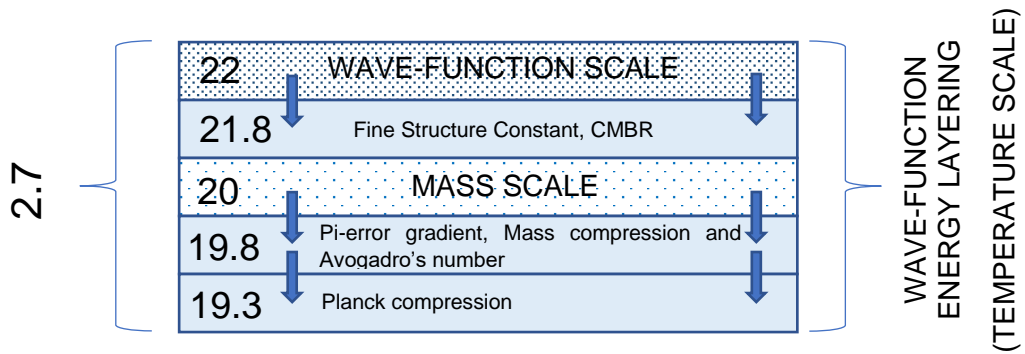
Figure 3

Figure 3: ([14], p23, fig6)

The idea of the π error gradient was presented to calculate the value for Avogadro's number relevant to the mass of a neutron, as in paper 4 ([4]: p16).

These layers can be thought of as wave-function unit layers within the (atomic) time-space template (TST), as per figures 2 and 3, and figure 10 from paper 23 ([23]: p24, fig10), together as figure 4:
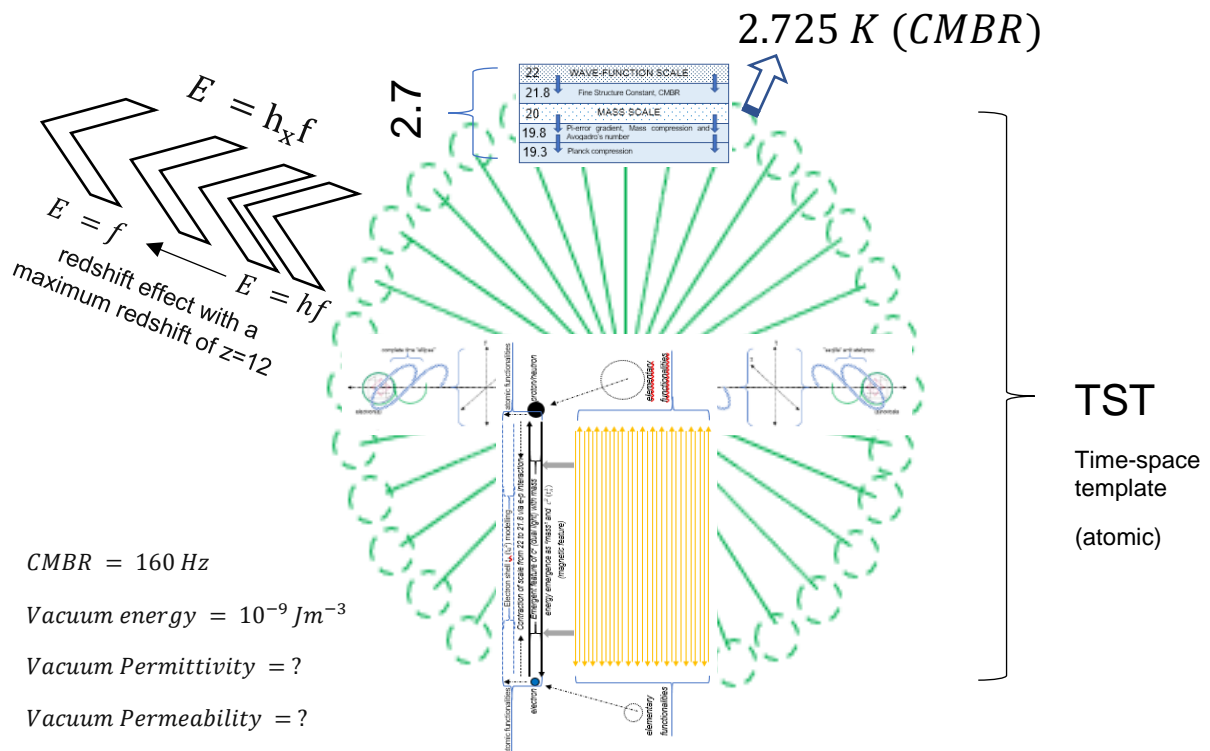
Figure 4

Figure 4: time-space template (TST) showing the general functions from figure 16 paper 2 ([2]: p16, fig16), figure 6 paper 14 ([14]: p23, fig6), and figure 10, paper 23 ([23]: p24, fig10).

The relevant issues with figure 4 to note are as follows:

- The electron shells (*as calculated by the Rydberg constant in paper 1 ([1]: p12-15), and then calculated with the maximum allowable number of shells in paper 2 ([2]: p16-17)*) would exist on the mass-scale level (the "*20*"-layer level, as per figure 3).

- The 2.7 factor of temperature scaling (figure 3), in then needing to be related to space *outside the template,* had to be factored with that *outside process*, this as a factor of $\frac{22}{21.8}$, as a wave-function scale per a CMBR scale, giving rise to a basic temperature value of $2.725\ K$, the energy of the CMBR, therefore relating the CMBR to the atomic template (TST).

- The vacuum permittivity (ε_0) and permeability (μ_0), although elusive from papers 15 [15] through to 22 [22] despite all other energy equations being successfully derived using the time-algorithm and associated TST, were derived in paper 23 ([23]: p30); the issue following such was relating the idea of the resistance between space with EM (and thus vacuum permittivity ε_0 and permeability μ_0) to the CMBR, to demonstrate that the **entire** process is "steady state", entirely disproving the CMBR as the *result* of the ΛCDM big bang, yet a value related to something born of the atom itself, namely how an atom's energy is in equilibrium with space, *and why* (which is what a non-expanding space and time reality would be, namely steady-state, thus requiring a new description for the CMBR and red-shift effect), and how light (EM) is related **to** space.

- The redshift effect was explained by virtue of the nature of light as it propagates beyond the atomic template (TST), in pure space [13], no longer restricted by the Plank equation yet finding itself with a variable Planck constant approaching the value of "1" as light propagates through space, a process which correctly calculated the distance of the Oort cloud from the sun 13 ([13]: p11, eq8), yet more fundamentally in abiding by an EM-space process of interaction, as defined by the EM-EM^{DIR} mechanism ([23]: p24-31).

Thus, the quest was on to find the relationship between the CMBR and the vacuum permittivity (ε_0) and permeability (μ_0) and that association with the atomic template (and associated energy scaling system) together with space, to complete the equations and associated phenomena.

3.3   New Fundamental Descriptors

The most important if not fundamental features of the time-space relationship were yet to be installed, only reached in papers 20-23 [20]-[23], as an account of an even more fundamental relationship between time and space themselves, as a purely structured *dimensional mechanics*, as presented in papers 20-23 *entire* [20]-[23]. The new terms and descriptions that were defined in papers 20-23 [20]-[23]

are considered necessary given this new process of determination between time and space and associated phenomena:

- TSU (time-space uncertainty) principle:
  - The idea of the time-points forming an uncertain cloud with a certain *central* time-point structure ([20]: p11-13).

- TSC (time-space context)
  - The use of a *relative* time-space frame of reference ([21]: p16-17).

- TSG (time-space groove)
  - The idea of the *fundamental* time-space connection, as a conceptual time-space *ring*, as an underlying a *broad-reaching* association between time and space ([21]: p20-22).

- TSS (time-space spin)
  - A proposed feature between time and space as per the TSG using multiple TSC's to provide the idea of relative motion in time-space for time-points ([23]: p12-15).

- TSF (time-space field)
  - The general time-algorithm fractal tapestry of TSS time-points in an overall TSG context ([23]: p15-17).

- TST (time-space template)
  - The basic atomic template for elementary particle formation and interaction ([23]: p17-20).

- TSW (time-space wave)
  - The wave properties of the EM and G field forces through the TSF ([23]: p23-27).

- TSP (time-space pulse)
  - A resultant feature of the TSW owing to the repulsion between EM and space (EM^{DIR}) ([23]: p27-28).

The new terms summarise the process entire of the discovered interaction between time and space, namely indeterminacy (TSU) in a time-space context (TSC) and the fundamental nature of particle "spin" (TSG)(TSS), and how that translates as the field forces in space as a type of temporal-aether (TSF) with associated TSW and TSP phenomena central to a TST context, fundamentally replacing the idea of

the photon as the carrier of EM through space, using the TSF as the carrier and the TST as the receiver/generator of the TSW.

Figure 5 shows a x, z plane sliced view of the time-space scheme being interlinked, each of the subsequent pieces shown in order of presentation and description in the papers (as referenced) in figure 6 and then joined in figure 7. This is the conditional *architecture* of time-space, bearing in mind all of this becomes entwined in a fractal 3-d lattice of time-points in space; essentially, the time-point *aether* underlies the process of wave propagation (TSW) in the TSF in the vacuum of space, not a particle aether, yet a *time-point aether*.

Figure 5
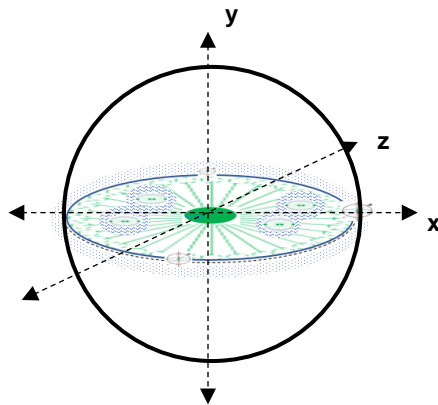
Figure 5: overall spherical context of 3-d space in regard to a proposed *locale* of time-points, here taking a sliced view in the x, z axis plane for figures 6 and 7.

Figure 6 shows the *time-space principles and conditions* as they were presented in their conception through the referenced papers, here drawn according to the x, z plane of figure 5.

Figure 6
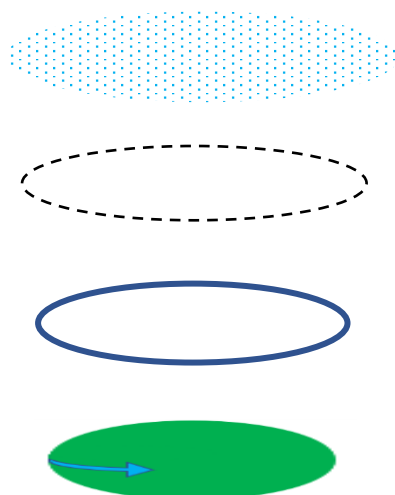
TSU: Time-space uncertainty   ([20]: p11-13)

TSC: Time-space context   ([21]: p16-17)

TSG: Time-space groove   ([21]: p20-22)
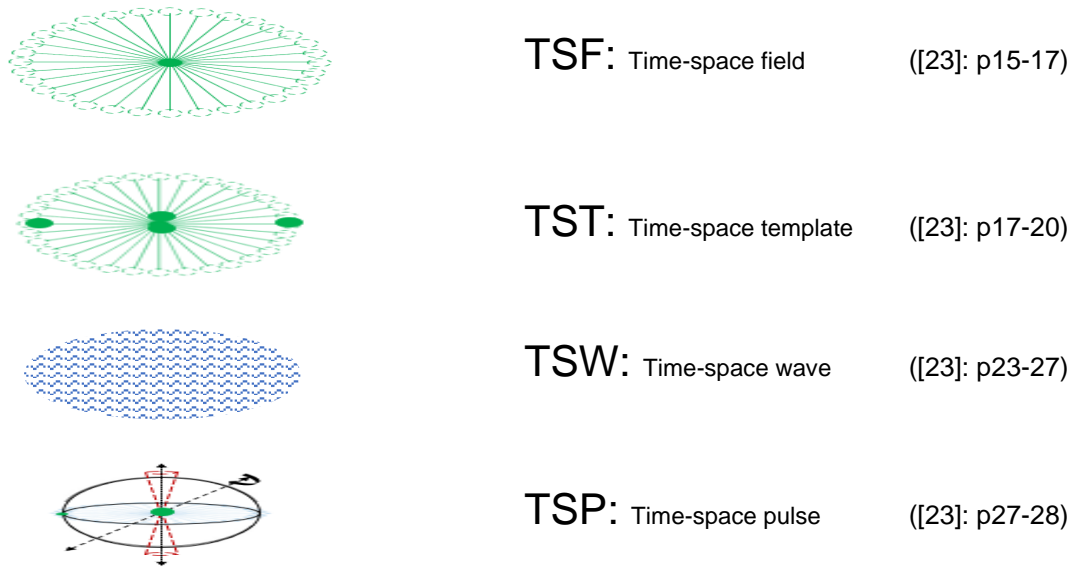
TSS: Time-space spin   ([23]: p12-15)

TSF: Time-space field   ([23]: p15-17)

TST: Time-space template   ([23]: p17-20)

TSW: Time-space wave   ([23]: p23-27)

TSP: Time-space pulse   ([23]: p27-28)

Figure 6: here each of the *time-space principles and conditions* for the relationship between time and space are organised in their respective theoretic account through the papers, from the time-space uncertainty (TSU) principle in paper 20 [20], to the time-space pulse (TSP) in paper 23 [23]. The aim here is to join these facets into the one time-space manifold figure, despite the limitation it presents as a simple figure (figure 7).

Figure 7 makes the attempt to arrange the *time-space principles and conditions* of figure 6 together in the one x, z plane.
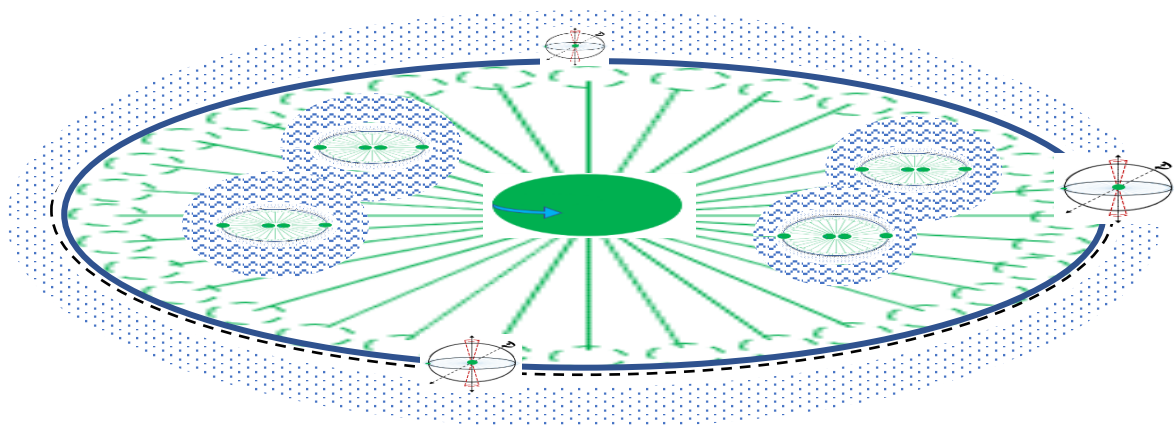
Figure 7

Figure 7: amalgamation of figure 6, inclusive of all the time-space set of conditions derived from the Temporal Calculus, presenting itself as a type of fractal (golden-ratio) aether, as a type of echo from the greater TSG manifold to within that manifold, combining all its elements as they have been defined to interact (and not necessarily portrayed) in this simple figure.

The attempt in figure 7 is to highlight the TSW (waves) surrounding the TST's, waves propagating in the general TSF, all in a general TSU and TSG context (as a fractal echo through time-space), with an underlying TSP in play based on the relationship between light and space regarding the TSW in the TSF, and so on. Once again, this general TSU/TSG context would represent a type of fractal (golden-ratio) time-algorithm echo within itself needing to meet its own systemic energy balancing act dictated by the equations and processes of figure 4.

These new terms are considered for what they are, terms describing basic phenomena reduced to their simplest parts, new terms considered imperative to then explaining how charge and mass come into existence, and their relationship to the vacuum constant, and how such is associated to the CMBR and Lamb Shift, as follows from paper 23 ([23]: p22):

> *It would be now possible to calculate the mass of the proton (and neutron) if it is considered that such a basic time-point particle as mass when taken up to near light speed produces the charge equivalent to that of an electron. For instance:*
>
> - *If particle speed and wavelength are known, distance and time:*
>   - *the charge can be calculated as $e_c = \frac{19.8 \cdot \lambda}{c}$ ([2]: p13, eq11)*
>   - *and so too its mass **from which the electron as a charge came** (in using $m = \frac{e}{c^2}$ ([2]: p16, eq15) and $e_c = \frac{e}{c} = fundamental\ property\ 2,\ eq3$):*
>   - *thus m equates to $\cong 5.3 * 10^{-28} kg$*
>   - *Factor this by π and the mass of a proton (or neutron) can be calculated.*
>   - *Why a factor of π?*
>   - *The mass of the electron would have been "per" π, the actual spherical reference it is upon as the time-point cloud (TSG), yet the mass of the central time-point would not be per π and thus the $5.3 * 10^{-28} kg$ value needs to be factored with π, giving:*
>   - $\cong 1.67 * 10^{-27} kg$
>
> *Such would be the mass of a proton and neutron from this value of electron charge, a confirmed fact. Fundamentally here mass is related to charge and therefore gravity to EM.*

What was delivered in paper 23 ([23]: p24-30) is a connection between EM and G, between charge and mass, replacing relativity theory completely. A greater length of explanation for this relativity theory replacement is provided in papers 6 [6], *The Relativity of Time*, and 16 [16], *The Hybrid Time Clock as a Function of Gravity*, where it is presented that the function of clocks as linear time counting mechanisms is not in-sync with how time and space are at play with each other regarding the field forces, and the case in point here, atomic phenomena regarding EM emissions. Nonetheless, the propagation of

a charge field (as with light) is better explained through the time-space field (TSF) description, namely the inherent association of e to m in the wave-function itself; field lines from static charge would register magnetic field lines perpendicular to the electrical field lines, which would only become apparent if there would exist relative motion of an object in the static electrical field, given magnetism is a di-polar construct, and therefore a type of gradient itself; the propagation of charge in space *as* this EM was given the quality of experiencing a measure of resistance by space due to the actual resistance between EM and an EM^{DIR} (space) field *as the TSP* (time-space pulse), meaning that there is therefore a natural resistance by space for an electron jump, setting the precedent for a natural arc of stability for an atom relevant to the fine-structure constant.

Can therefore the CMBR be calculated from the permittivity (ε_0) and permeability (μ_0) of space relevant to a steady-state stable atomic template, as though the energies would be equal, that the energy of the CMBR would be in almost equality with the energy of the electron given it is the electron on this forefront of atomic↔space activity? Of course, the obvious question is, "how can time be related to energy if such a relationship is possible?". The time-algorithm prescribes such is so, as follows.

3.4 Deriving the CMBR from the Vacuum Permittivity-Permeability and the TST

From paper 23, equation 5 ([23] p30, eq5):
$$\varepsilon_0 = \frac{1}{4\pi} \times \frac{1}{Q_C \cdot c^2} = \frac{1}{4\pi \cdot k_e}$$

From paper 23, equation 7 ([23]: p30, eq7):
$$\varepsilon_0 = \frac{1}{\mu_0 \cdot c^2}$$

Then, from paper 14, eq 18 ([14]: p26, eq18):
$$e = m \cdot c^2.$$

Therefore, the following applies:
$$e_e = \frac{m_e}{\varepsilon_0 \cdot \mu_0} \tag{1}$$

Here, e_e is the energy of the electron, and m_e its mass. Why is this significant? Let it be proposed this value for e_e is put into the atomic scale template as per figure 6, paper 14 ([14]: p23, fig6), as presented in section 3.2 figure 2, into the TST, and determine what this value of energy represents there. The first idea to note is that this value of energy is a t_A entity, and therefore a t_B^2 entity according the time-algorithm. Why? That is what the time-algorithm prescribes as presented in paper 2 page 11 ([2]: p11), as per:

> *Two results for the golden ratio for $\frac{-1}{\varphi}$ extending a π length in each direction (eq. 3), the other as $t_B{}^2$ result extending 22-π lengths (eq. 6). Two results on each axis extending diametrically opposed to each other for 11 electrical wavelength steps. Note that we are using the electrical step because this is considered as the only way for the wave function to satisfy its requirement to trace π.*

Given the electron inhabits this perimeter/shell, then it is represented as $t_B{}^2$, as follows:

$$t_B^2 = \frac{m_e}{\varepsilon_0 \cdot \mu_0} \tag{2}$$

Thus:

$$t_B = \sqrt{\frac{m_e}{\varepsilon_0 \cdot \mu_0}} \tag{3}$$

Knowing those values produces the following:

$$t_B = \sqrt{\frac{9.11 \cdot 10^{-31}}{1.11 \cdot 10^{-7}}} = 2.86 \cdot 10^{-12} \, s \tag{4}$$

However, this time is "per" a 0-space point start point moving 10 PQWF time-units in either direction along the spatial axis from the 0-reference, as per the required need to include the magnetic component in this value, as per paper 2 page 10 ([2]: p10), as follows:

Note now the squared value for φ; we can say that it appears the value for φ offers the idea of "10" π-steps (eq. 6), and thus what would appear to be 10 $(\frac{-1}{\varphi})$, (the true value for π) steps to arrive at the almost exact value for π. Yet of course this is a value for a t_B value of <u>magnetism</u> (φ) by considering using 10π t_A steps as an "electrical" $(\frac{-1}{\varphi})$ component. How does this look on a spatial grid (fig. 12)?

Not only this, given this is an entire atomic spatial template (TST) phenomenon being investigated, this value of time needs to be factored with the Fine Structure Constant value of that atomic space template, namely 21.8 (as per paper 14 figure 6 ([14]: p23, fig6) presented here in section 3.2 figure 2), and therefore this value of time for the energy of an electron related to this atomic space template must be factored with a value of $\frac{21.8}{10}$ as follows:

$$t_B = \frac{21.8}{10} \cdot \sqrt{\frac{9.11 \cdot 10^{-31}}{1.11 \cdot 10^{-7}}} = 6.235 \cdot 10^{-12} \, s \tag{5}$$

As a value of frequency, this represents:

$$t_B^{-1} = 160 \, GHz \tag{6}$$

This value corresponds quite directly with the CMBR value of $160 \, GHz$. This is significant, as contemporary physics regards the CMBR as a result of the ΛCDM model's "big bang" event, as a relic of that event. Here with the Temporal Calculus it is something more local and explainable, if not more reasonable, providing a "steady-state" scenario on three fronts:

(i)   The $160 \, GHz$ value ([14]: p25, eq12), as per $\frac{21.8 \cdot V_A}{N_A}$.

(ii)   The $2.725\,K$ value ([14]: p25, eq13), also as presented in figure 3.

(iii)   The temporal value of this energy, as per the vacuum constant (ε_0 and μ_0) and the energy of an electron, as per equation 1, $e_e = \dfrac{m_e}{\varepsilon_0 \cdot \mu_0}$.

Such eliminates the ΛCDM model in the context of all the derived equations and constants, for what has been achieved with the Temporal Calculus is a statement regarding the energy of an electron (as a *temporal* expression) in regard also to its magnetic point localised on an atomic space template (TST) featuring the resistance between EM and space **as** this CMBR value directly related *to* the coupling strength of the atom (internal TST value of 2.7, see figure 3). Or in other words, this TST value for the energy of EM is equivalent to what was calculated for space through a cosmological scale as per paper 14 equation 12 ([14]: p25, eq12) as *frequency*, and per equation 13 ([14]: p25, eq13) as *energy*, therefore directly suggesting that there is an *equilibrium* of energy (steady state) in play, denoting *stability* to a TST reference, to an atom in space, given this *energy* equalisation is a *temporal* entity.

The initially calculated CMBR value was on the basis of a wave-function compression, as per paper 14 ([14]: p25, eq12), which certainly fits with the idea here of vacuum permittivity (ε_0) and permeability (μ_0) being associated to a type of "*resistance*" of space to light, thus creating this compression-effect of the wave-function. Utilising therefore equation 14 from paper 14 ([14]: p25, eq14), the following would apply when using equation 2 here in this paper:

$$\frac{m_e}{\varepsilon_0 \cdot \mu_0} = \frac{21.8 \cdot V_A}{N_A} \tag{7}$$

$$N_A \cdot m_e = 21.8 \cdot V_A \cdot \varepsilon_0 \cdot \mu_0 \tag{8}$$

Note the interplay here of the atomic time-space template (TST; 21.8) through these equations, and this leads to only one conclusion regarding the CMBR, namely it is an *atomic* phenomenon. Moreover, the observed CMBR in reality is known to be continuous throughout space, and not only continuous, yet uniform, giving rise to what is known as the *Flatness Problem*, an issue that discredits *the metric expansion of space* hypothesis associated to the ΛCDM model. The solution here therefore almost states that *cosmological phenomena* would indeed constitute basic atomic phenomena, and although this was obviously not the intended discovery of the papers [1]-[24], the evidence became increasingly strong, namely the stars are not solar systems as such, yet far more basic phenomena demonstrating all the features of the process of time and space dimensionally interacting (and all those vast subtleties) in a process of mass-decay. In fact, given the uniform value of the CMBR, it would seem space in the outer reaches of this solar system is riddled with particles and dust given the appearance of the stars conforming to the basic phenomena characteristic of dimensional mechanics for particles as presented in papers 22-23 [22][23], notably the TSP phenomena, together with the correct calculation of the Oort could distance from the sun *as* in accordance with the maximum redshift *zone* region of space (as light

from that zone reference reaching the Earth reference), a calculated size that then derived the vacuum energy of space, as per paper 14 ([14]: p23):

Another feature to consider is that the compression that occurs regarding mass on this phi-quantum wave-function level is of the order of $\frac{0.2}{19.8}$, or in other words "0.2" $(20 - 19.8)$ is lost to space for every phi-quantum wave-function atomic reference 19.8 length result. And this would happen "per" the maximum distance of space in total factored with V_A. This is useful in calculating the effect of negative energy (space), the "vacuum energy of space", on the atomic reference, a case of relating this value to the overall maximum theorised distance of light propagating in space. As per paper 13 ([13]: p11), the distance of Oort region to the sun is ~ $1.1 \times 10^{16}m$. Thus, the factor level for distance regarding E^2 for space would be:

$$\frac{0.2}{19.8} \times \frac{V_A}{1.1 \times 10^{16}} \qquad\qquad \text{paper 14, equation 8}$$

Now, incorporating this in with equation 7, $E = \sqrt{d}$, the following value for energy per metric volume of space (in Jm^{-3}) is arrived at thus:

$$\sqrt{\frac{0.2}{19.8} \times \frac{V_A}{1.1 \times 10^{16}}} \cong 10^{-9} Jm^{-3} \qquad\qquad \text{paper 14, equation 9}$$

*This value of energy would represent a basic background level of energy that is absorbed **from** atomic matter, from the fundamental process of $E = hf$, from the atom, a value consistent with the estimated value of the vacuum energy of space [33]*

In short, Temporal Calculus can confirm a steady-state time-space reality, together with presenting a strong case for the stars being largely the effect of small-scale atomic phenomena.

3.5 Deriving the Elementary particles

3.5.1 Elementary Particle review (papers 1-24 [1]-[24])

The key concepts of the derivation of the elementary particles using the time-algorithm (Temporal Calculus) shall be presented as follows.

3.5.1.1 Symmetry-breaking:

Initially the time-algorithm sought to understand the idea of symmetry-breaking in the following manner, as from paper 1, page 4 ([1]: p4):

Here t_N represents that process of time-dividing, becoming dual time as t_A, as two possible outcomes for t_B, a process of symmetry-breaking for a vector of 0-scalar space (as it involves a process of an uncertain outcome), yet here we are assigning this feature of symmetry-breaking to time. Let us suggest the following:

$$t_A = t_B^2 \qquad\qquad \textit{paper 1, equation 3}$$

Now consider the following as a standard for time's flow:

$$t_N = 1 \qquad\qquad \textit{paper 1, equation 4}$$

Here time "now" has a constancy (in its application to space), a uniformity (eq. 1.) that has the potential for entropy, of division, of diversity, of symmetry-breaking for S_2 (compared to S_1). Let us also consider a standard:

$$t_N = t_A - t_B \qquad\qquad \textit{paper 1, equation 5}$$

Simply, t_B when applied to space (as 1, t_N) leads to t_A, as a proposed equation for "time". Thus:

$$t_B + 1 = t_B^2$$

$$\frac{t_B + 1}{t_B} = t_B$$

$$\frac{t_B^2 + t_B}{t_B^2} = \frac{t_B^2}{t_B}$$

$$\frac{t_A + t_B}{t_A} = \frac{t_A}{t_B} \qquad\qquad \textit{paper 1, equation 6}$$

This equation is significant, for it represents the "golden ratio"[7], φ, which is solved as a quadratic equation for t_B as -0.61803... or 1.61803...; for each scalar/vector event in space, each past event is divided as a "now" event into the future as a change in state/reference in time, hence "randomness", "entropy", etc. Note each result for t_B can be 1.61803... or its negative inverse (-1/1.61803) as - 0.61803... (the quadratic solutions for t_B). In using both quadratic results together for t_A (which technically breaks equation 6., yet is nonetheless how time is proposed to operate as symmetry-breaking):

$$t_B^2 = \varphi \cdot -\frac{1}{\varphi} = -1 \qquad\qquad \textit{paper 1, equation 7}$$

Thus, t_N as "1" is the opposite of a future event "-1", hence t_N sending itself to t_A as a negative inverse flip (in much the same way as t_B regarding t_A), thus a type of continual process of this equation as a "now" event. Yet according to the result here, the following is effected:

$$t_B = i \qquad\qquad \textit{paper 1, equation 8}$$

This would be the <u>limit</u> of the progression at "imaginary time"[8] (as developing equation 6. is ineffective using "i" for t_B), thus keeping time in its regular t_N beat (fig. 9.):
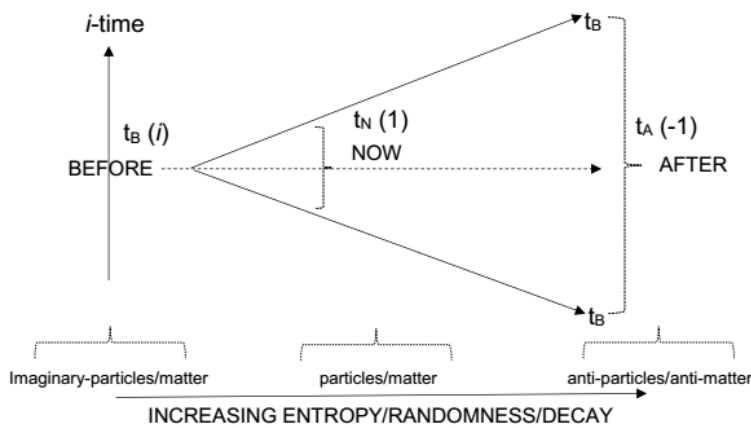
Paper 1, Figure 9.

The proposal here is that the past t_B is "imaginary" (i), as imaginary-particles/mass, the present t_N "real" (1), as real mass/particle, and the future t_A "inverse-negative" (-1) as anti-matter/particle (which represents a dual potential outcome according to a scale of φ or $\frac{-1}{\varphi}$.

Fundamentally, the value "i" for t_B would represent the idea of time as entropy remaining fixed on such a threshold of consideration. Note also the ratio of t_N/t_B respective to time, a value of $\frac{1}{\varphi}$, is an idea related to energy manifold reversal of black-holes[9], which also provides an indication confirming "c" being a universal constant.

The idea of imaginary time associated to the time-algorithm was left at paper 1 [1] in preference for discussing the finer features of the actual dual outcomes of the temporal golden ratio equation, as it was considered that much more theory was required to make any estimations on how the time-algorithm worked in regard to matter at that stage of development.

3.5.1.2 Higgs mechanism/field:

The Higgs mechanism/field was given consideration in regard to the time-algorithm in the first paper 1 ([1]: p10-11) in the following manner:

> The next new step of logic is considering that there would thus need to exist a directly proportional relationship between the wavelength of the electromagnetic field of the atom and the distance between *p* and *e* in our need to understand a scale of applying the golden ratio scale of time to 0-scalar space, and the only dimensionless constant available for the atom regarding the strength of electromagnetic interaction with the electrical field of atomic points, namely the *p* and *e*, is the Fine Structure Constant (α), a variable which would be integral to the relationship between such as a measure of distance and electromagnetic strength of association of those fundamental particles. Thus, based on research, we employ the following equation *(eq. 17.)*:

$$\lambda_e = 2\pi \cdot \alpha \cdot a^0 \qquad\qquad \textit{paper 1, equation 16}$$

$$`\lambda_e = \alpha \cdot a^0 \qquad\qquad \textit{paper 1, equation 17}$$

Here we employ the Bohr radius (a^0)[17], lambda ($\grave{}\lambda_e$) representing the "reduced Compton wavelength" as the natural representation for mass on the quantum scale, and alpha (α) as the fine structure constant 1/137 (fig. 14.):
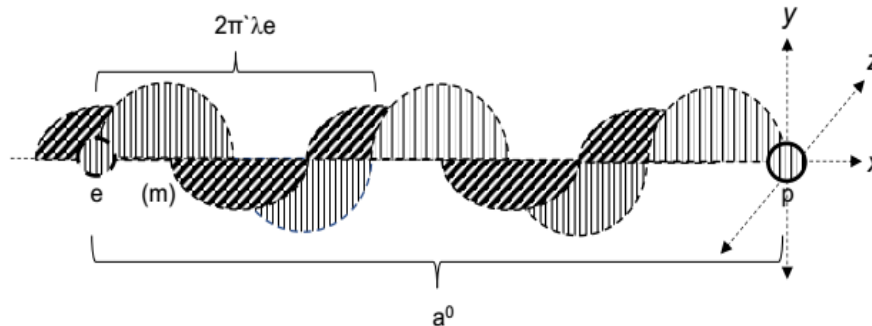
Paper 1, figure 14.

To prove this "mass" feature of the Fine Structure constant of the atom and its generation through electromagnetic means, we need to account for the energy associated to it, to the mechanism of this feature of the atom. Let us suggest that it would simply be represented as a mass, the mass of for instance the most basic mass of an atom, a proton and an electron, divided by the fine structure constant, as per current known values *(eq. 18., 19.)*:

$$\frac{M_{(p+e)}}{\alpha} \cong 128 \, GeVc^{-2} \qquad\qquad \textit{paper 1, equation 18}$$

$$mass \, (atomic) \cong \alpha \cdot H^0 \, (Higgs \, particle \, mass)$$

$$\frac{mass(atomic)}{H^0(Higgs \, particle \, mass)} \cong \alpha \qquad\qquad \textit{paper 1, equation 19}$$

Here the suggestion is that the "mass" of an atom is relevant to the fine structure constant and an underlying elementary electrodynamic process. According to research it appears to be the Higgs[18] particle that "provides" the atom with Gravitational features, and this happens "through" Q for the actual mass of the particles, and thus through electrodynamic means, as our theoretical calculation falls well within the experimental calculated range of between 114 - 140 GeV/c$^{2.}$ of the Higgs Boson, noting that the experimental research would, owing to inherent energy losses in measuring the value from an observer reference, be slightly above the discovered 125GeV/c^2 value. This result therefore could suggest that there exists a process of mass, as exemplified in pre-CERN[19] theory regarding the Higgs particle, that can be relayed via the Fine Structure Constant scale to warrant the idea of mass/gravity of the atom, hence the idea of an emergence of gravity from a scale that accords the electromagnetic strength of the atom. It is like suggesting there exists the idea of a particle that essentially has no mass, yet behaves "as" a particle as though it should have mass, yet is entirely electromagnetic in means. This is an idea that will be further investigated in a subsequent paper.

Technically, in presenting symmetry-breaking and the Higgs particle in the context of the time-algorithm of paper 1 [1] a stage was being set, a task to better understand those most fundamental two concepts, a task for the time-algorithm to unravel. The next step on that path was to examine the nature of the fine structure constant of the atom.

3.5.1.3 Fine structure constant:

The Fine Structure Constant was calculated in paper 2 [2] in following the logic of the time-algorithm as a wave-function needing to prescribe a "circular" wave front with both of the outcomes of its golden ratio integral function/feature, as per the following extract ([2]: p12):

2.5   The fine structure constant

Thus, for 22 wavelength steps (in using both directions from a $\frac{-1}{\varphi}$ 0-scalar reference point), the wavelength λ of light would be given by the following equation (where a^0 is the Bohr radius):

$$\lambda = \frac{a^0}{22}$$ *paper 2, equation 7*

If we factor in the value of 2π the equation becomes:

$$\frac{\lambda}{2\pi} = \frac{a^0}{2\pi \cdot 22} = \frac{a^0}{138}$$ *paper 2, equation 8*

Compare this to the equation for the fine structure constant of the atom [3]. This is similar to the true value of the fine structure constant which points to the fact via calculation that the number of wavelengths is not 22 yet 21.8. Why? The fine structure constant is the need for a monopolar time force to find the perfection of a circle, and can only do so in considering two monopolar electrical sources, ultimately as 22 wavelengths between each two monopolar sources, the electron and proton (as shall be derived), as per on the atom. So why the length contraction in the atom? It would be due to the overall interaction between the electron and the proton, that attractive force between the two when they become manifest as the atom, as we have yet to couple that force in yet, namely the force of attraction between the proton and the electron (although the basis for their existence was explained in the first paper ([1]; p9-11), a feature we shall explain. Simply, the fine structure constant would be indicative of the electromagnetic strength between the elementary charged particles, and thus the value of ~1/138 would be slightly greater in considering this electromagnetic strength, hence the contemporary calculated value with 1/137, for the value of ~1/138 is what the theory suggests from first [principles and this value can't be departed from too severely (say 1-2% change in value). Thus, in recalibrating our "22" it brings it to 21.8 (eq.9).

$$\frac{\lambda}{2\pi} = \frac{a^0}{2\pi \cdot 21.8} = \frac{a^0}{137}$$ *paper 2, equation 9*

What remained unknown at that point was of course how the value of the wave-function set at "22" would step down to 21.8 (which shall be discussed shortly). Yet it was considered at the time of writing the paper that there would exist a type of electrostatic "compression" between the negative and positive charge regions causing such to event, giving rise to the 1/137 value as opposed to the 1/138.

3.5.1.4 Elementary particle formation:

From the theoretical development achieved using the time-algorithm in papers 1-3 [1]-[3], it was considered logical to make the next step in proposing how the elementary particles would come into being via the wave-function (termed the phi-quantum wave-function). Given the detailed nature of that process, the entire paper is dedicated to that process of elementary particle and wave-function association, first bringing to attention the idea of "direct interference resonance" of the wave-function leading to basic particle formation. The attention to detail there of course was basic at best with that wave-function, yet the proposal was being made, and the idea set into place (as with the previous notions of symmetry-breaking, the Higgs mechanism/particle, and the fine structure constant) for the scripting to further explain such potential theoretic utility of the time-algorithm.

3.5.2   Temporal Calculus Elementary Particle TSC context (eTSC)

Given what has been presented thus far in the previous sections of this paper, the "next-step" of theoretic development will be taken using the idea of the time-space context (TSC) in the time-space uncertainty (TSU) arena, a new level TSC in the "fractal" time-point aether system/field uncertainty manifold. The reason to consider a new "subatomic" level is based on the "12" factorial initial presented in paper 5 ([5]: p9), as shall be now explained.

3.5.2.1 Mandating elementary particles:

To adhere strictly to the time-point Temporal Calculus, the question needs to be asked, "why is an elementary particle level required, what function does it serve?". The function that it would serve would be a necessary if not entirely fundamental function, and the only issue not yet fully accounted for is the general energy equation of the time-algorithm itself, as presented in paper 5 ([5]: p9), as follows:

> Yet we must consider that in using t_B we must invoke a steady-state situation in considering t_A. Thus, this t_B process, to link with the condition of time as a t_A event, can only do so in providing for the enthalpic φ^2 level of the atom, which on the atomic level is a value of "$12\varphi^2$", and thus in one sense "$12\varphi^2$" could be required from t_B on the emergent energy (entropic) level to fulfil this steady-state event (figure 3, using fig.1 template).
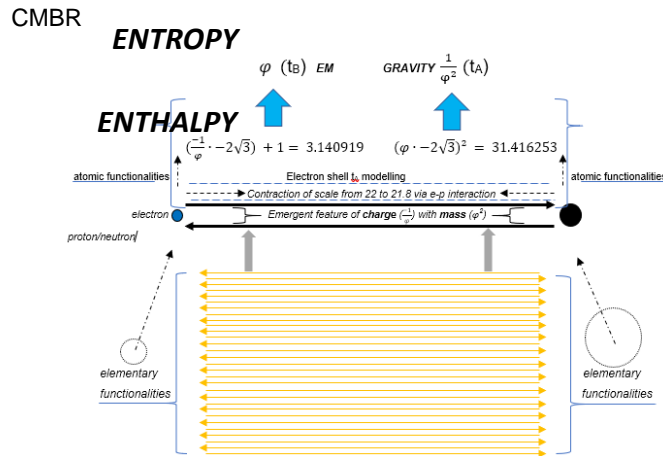
Paper 5, figure 3: *THE CMBR entropic/enthalpic event.*

3. <u>Beginning, to End, to Beginning</u>

With this steady-state model, we are suggesting that the CMBR and associated temperature represents a continual energy "creation"/emergence through time, but more to this, that this creation is associated to the gauge invariance we find in reaching the Avogadro number and associated mass-compression of the emergence of the phi-quantum wave-function. Thus, as time develops, the energy of a system gets less along with distance-squared, yet it does so in the vast context of a gauge fractal invariance (symmetry) of time seeking to perfect itself as π in producing the effect of energy itself, as the "atomic"-based CMBR. Thus, the question of "where does energy come from in the system" can now be answered; with the gauge invariance of time seeking to perfect itself as an ultimate π-wheel of time. Simply, along with decay there would be the emergence of energy as the CMBR. Ultimately the logical deduction is a steady state system. Figure 4, as an extension of figure 3, highlights this process.
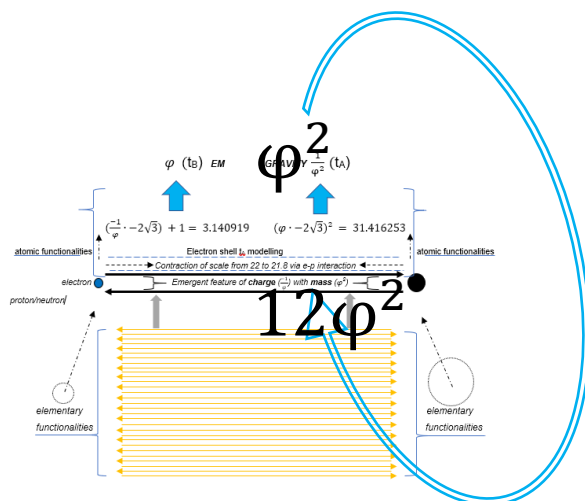
Paper 5, figure 4: φ^2 >>> *12* φ^2, φ^2 >>> $(\varphi \cdot -2\sqrt{3})^2$, a process of the CMBR.

This process suggests that "time" emerging in "this" way in the form of the "steady-state"-adjusted heat (φ) would need to suffice a value of "*12* φ^2", or more specifically would need to undertake "12" factors of the theorised π "time-wheel" to accommodate for the fundamental atomic $(\varphi \cdot -2\sqrt{3})^2$ manifold. How this occurs would dominate how the overall cosmos/universe is organised/shaped, dimensions included, as per the

behaviour of gravity, how indeed that balance would be achieved in a steady state reality, a detailed concept that will be addressed in a later paper.

This paper here is that "*later paper*". The $12\varphi^2$ level is the issue to consider needing accounting for. This level was considered to be *enthalpic* in line with the proposed subatomic functionality as presented in paper 2 figure 16 ([2]: p16, fig16) and here in this paper as figure 2. The CMBR ([14]: p25, eq12-13) has been calculated by the time-algorithm, together with the vacuum constants ([23]: p30, eq5, eq7), demonstrated to be a process of the atom's energy dynamic. To explain this as simply as possible, the elementary level by design is enthalpic compared to the vacuum, namely needing to absorb more energy to grow and give structure to their greater dimensional aspects (TSET). Above the TSET *enthalpic* level is the TST *entropic* atomic level, and such are in a steady state relationship relative to the entire TSU context. According to the time-algorithm, certain equations are required in that process that not only decide the gauge of the atom itself (fine structure constant), those dimensional metrics, yet also how that atomic manifold relates itself with surrounding atomic manifolds in a field of time-points in space. The 12-factor is a calculation based on a feature of time-algorithm that needs to be accounted for as per page 5 figure 4 ([5]: p10, fig4), and the proposal is that this 12-factor is accounted for *on* the TSET level (elementary particle), yet not only this level, yet that it determines how energy propagates through space as a "maximum" factor of a quantum approaching an TSET level, as was presented in paper 13 [13], "Space, and the Redshift Effect". It shall be demonstrated in a section ahead (3.5.2.5) that this 12-factor is able to properly account for the mass gap.

3.5.2.1 TSEC time-points:

In regard to particle formation central to the time-points, the proposal is that there is the standard time-space context, as the time-space template (TST), as presented in paper 23, figures 10 and 11 ([23]: p24, fig10-11), and there is the time-space elementary context, and the time-space elementary template (TSET) as per figure 8.
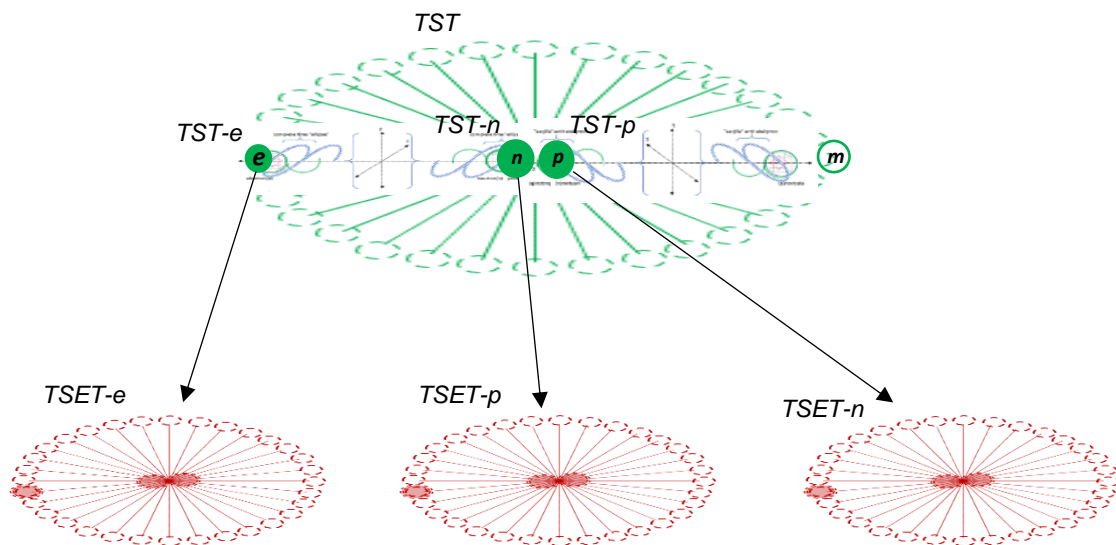
Figure 8: the time-space template (TST) and the time-space elementary context with the time-point entities of the TST, each representing an *elementary* time-space template (TSET: TSET-e, TSET-p, and TSET-n)

This TSET level is warranted, as essentially the overall TSU harbours the TSF that according to the time-algorithm represents a fractal array of time-points, points that can exist anywhere in 3-d space, and link by whatever metric of TST scale and gauge. Here, recognition is given to the basic atomic level (TST) and associated time-space elementary-template (TSET). For each TSET (TSET-e, TSET-p, TSET-n) there would exist "3" particle-type traits (1-3), as elementary *particles*, granted the magnetic time-point is not a particle. These would represent the values of TSET-e_{1-3}, TSET-p_{1-3}, and TSET-n_{1-3}. Each of the elementary particle characteristics (3 for the electron, and 6 (3+3) for the proton/neutron) would represent unique functions underlying the structure of their parent particle, typically characteristic of the time-space principle functions as prescribed primarily by time-space spin (TSS) as explained for the nature of time-points relevant to the TST, and here on the TSET level it would be no different. Consider figure 9.
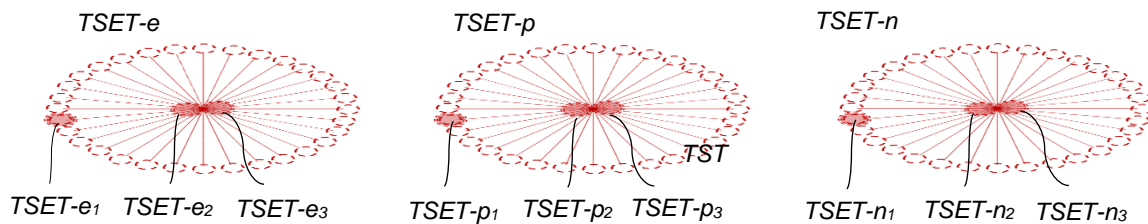

Figure 9: expanding the TSET-e, TSET-p, and TSET-n templates to their time-points.

These TSET elementary *particles* must be all unique, confined in their respective TSET realms, and as shall be demonstrated, *asymptotic*, and yet would nonetheless interact with each other as do the standard TST time-point particles, yet in a unique fashion different to that of the TST level, here governed as shall be demonstrated by the vacuum of space (EM^{DIR} level) providing the asymptotic nature of the particles.

One key feature to note is that as the electron as a time-point particle on the TST is always in an uncertain position as defined by the TSU and so would each of the elementary particle "1" entities on the TSET field level be, namely occupying uncertain particle positions, and how that would relate with the elementary particle dynamics of elementary particle sets of "2" and "3". Note also that these elementary particles are not being described with standard quantum mechanics, yet time-points, meaning that their manifestation and association with each other is defined by the primary time-algorithm itself that prescribes the relationship between time and space to make this phenomenon what it is. Nonetheless, a clear comparison/analogue with 4d-spacetime theory is quantum chromodynamics (QCD) for TSET-p and TSET-n (as per the *6 quarks*), and quantum flavour dynamics (QFD) for TSET-e (as per the *3 neutrinos*);

here in using the proposed time-algorithm, the particle/force itself is the time-points prescribed as particles, and the force carrier is the time-space field (TSF) which acts both on the standard level and also the elementary level, which makes the idea of the photon as a massless particle redundant given the presence of the TSF itself (which therefore makes certain other aspects of the SM electron elementary particle set described by the photon and central to the photon redundant). Nonetheless, in the TSF acting as the carrier of particle force on the TSET level, let this field be likewise be termed the time-space elementary field (TSEF), as per figure 10.
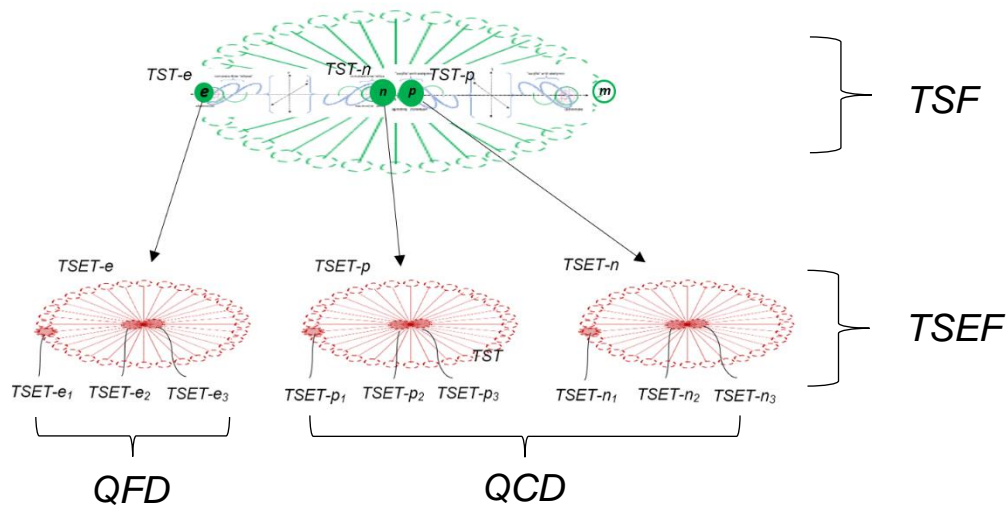

Figure 10: giving nomenclature to the TST and TSET time-point particle field carriers as the TSF and TSEF (time-space fields) respectively, also acknowledging the analogue description with the stand model (SM) descriptive devices of quantum flavour dynamics (QFD) and quantum chromodynamics (QCD).

Now taking this back to 3.5.2.1 and the entropy-enthalpy figures references from previous papers there, the following is proposed to be in play, as per figure 11.
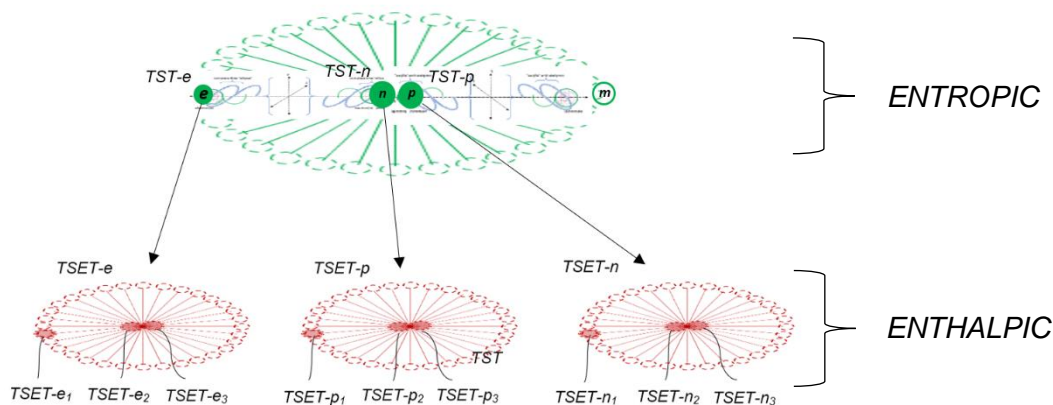

Figure 11: proposing how the *enthalpic* and *entropic* realms are generally assigned from the vacuum to the particle level (TSET and TST levels), suggesting therefore that the TSET level would be a level requiring a high amount of energy to examine its individual particles.

Such is not to say that enthalpy only occurs on the TSET level and entropy only on the TST level, yet how these levels compare to the vacuum of space regarding one another. In the TSEF being *enthalpic* compared to the TSF and thus in regard to the vacuum of space, the particle binding energies there would represent a value greater than that of the binding particle energies of the TSF level. In terms of the fundamental field forces, the following would apply, as per figure 12.
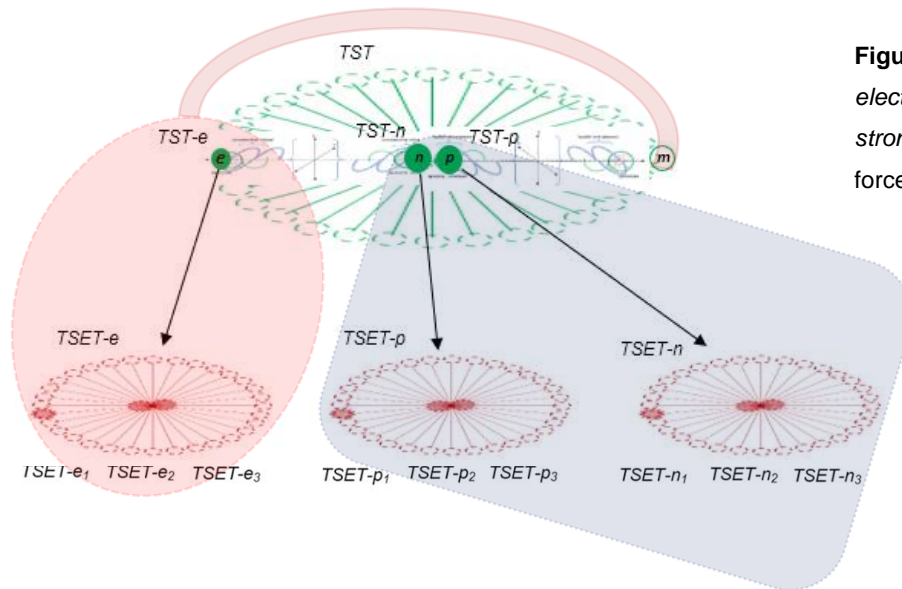

Figure 12: highlighting the *electroweak* (red shading) and *strong* (blue shading) nuclear forces.

The weak association is a mix of the enthalpic-entropic requirements between the TSF and TSEF, together with the fact that the "e" and "m" time-points are in a constant state of uncertainty, as per the TSU principle. It is therefore best described as an EM-weak force, or as 4-d spacetime theory suggests, electroweak (EM and weak force). The primary "weak" force here is the basic TSU mechanism at play with the "e" time-point (and its associated "m" time-point feature), a determination effected by the very nature of the association of time and space, a definition not apparent in simple 1-d time theory. The strong force likewise is effected by the very nature of the association of time and space, and in the case here as per the time-point time-algorithm requirements, a strong association between the two t_N1 points as presented in paper 23 page 13 ([23]: p13) and also initially in paper 4 page 7 ([4]: p7). Note also that the TST and TSET define the ***confinement*** of the time-point particles in the context of these strong and electroweak field forces. The question now is how these forces (strong and electroweak) can unite, and on what level, and of course how the field force of gravity as associated to mass can work itself in there.

3.5.2.4 Mass Gap:

The next level from the TSET away from the TST level would logically be the vacuum of space if no further mandate exists for a new sub-TSET level is required. Yet it is not just the vacuum of space, yet all that the time-algorithm has prescribed thus far for the very phenomenon of space, and here detailed

attention needs to be cast to paper 23 ([23]: p24-27) where the nature of space is directly related to the EM[DIR] effect of light, or in other words, direct interference resonance of an EM field (cancelling out) is consistent with the concept of the vacuum of space. Not only this, the EM[DIR] field is both the idea of space, and the idea of mass also. The one detail that has yet to be stated as clearly as it should be obvious is how mass is able to "manifest" as an EM[DIR] concept, as though manifest from apparently nothing. The answer is that *mass* manifests when an EM[DIR] field as space is obliged to by time-points operating *as* a TST (and therefore TSET). Simply, the way the time-points find relativity with one another in an overall system of time-points obeying all the requirements of the association of time with space *creates* a reality of time-point concentrations and harmonics in the form of the TST 9and TSET) that prescribe reality to manifest the way it is, as shall be presented shortly. Consider nonetheless figure 13 highlighting the underlying vacuum and associated mass gap between the vacuum and the TSET level.
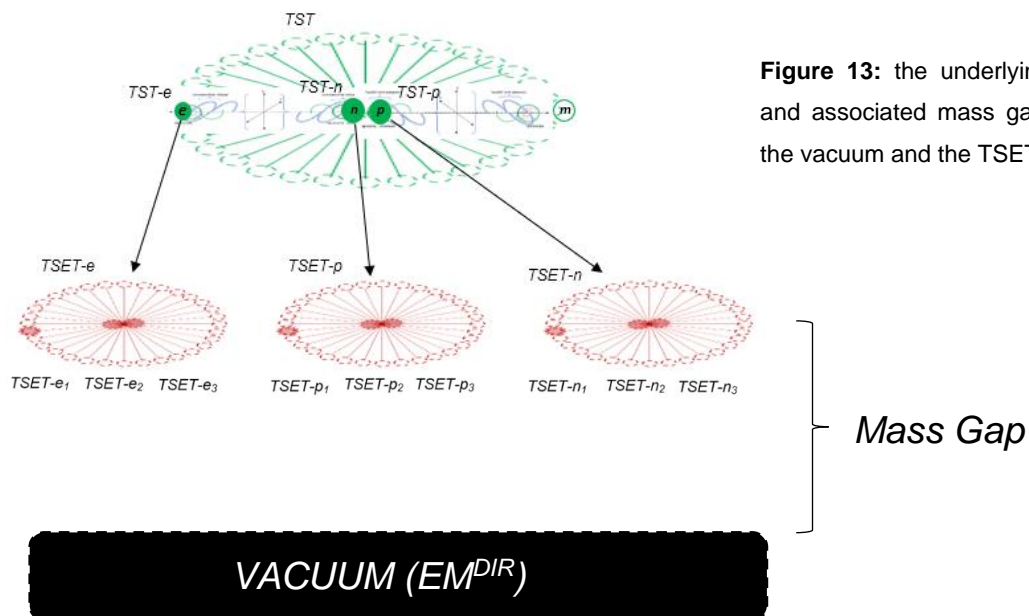

Figure 13: the underlying vacuum and associated mass gap between the vacuum and the TSET level.

Note here that by definition space has to be derived from the basic dimensions, the axiom time-algorithm, as presented per paper 2 ([2]: p3-11), and so it has become logical to utilize space with a time-algorithm that brings itself (space) to naught as per "destructive interference resonance" (EM[DIR]). Mass would come into existence from the vacuum of the EM[DIR] field into the TSET and thence TST level. The difference between the lightest proposed particle on the TSET level and the EM[DIR] vacuum would represent what is termed the "mass gap", proposed here to be a real positive value. Before calculating this value, it would be important to address the idea of what is considered as the particle/carrier for mass, namely the Higgs mechanism.

3.5.2.3 Higgs mechanism and gravity:

The Higgs mechanism was one of the first paper's targets (to be followed up on in a subsequent paper). This is that paper. Once again from paper 1 ([1]: p11), a more cropped version:

To prove this "mass" feature of the Fine Structure constant of the atom and its generation through electromagnetic means, we need to account for the energy associated to it, to the mechanism of this feature of the atom. Let us suggest that it would simply be represented as a mass, the mass of for instance the most basic mass of an atom, a proton and an electron, divided by the fine structure constant, as per current known values *(eq. 18., 19.)*:

$$\frac{M_{(p+e)}}{\alpha} \cong 128 \ GeVc^{-2} \qquad\qquad \textit{paper 1, equation 18}$$

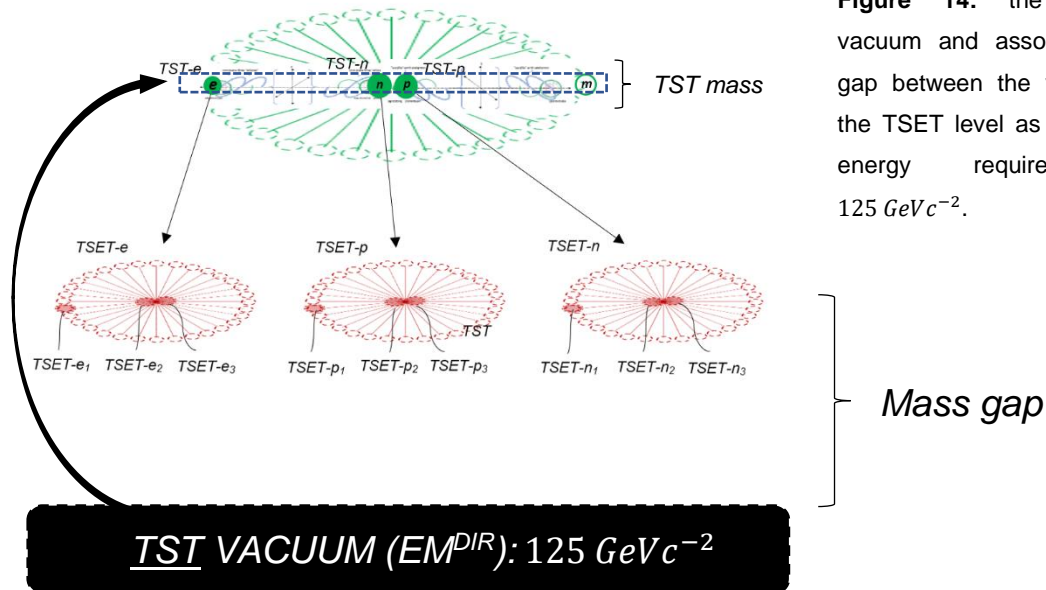$$mass \ (atomic) \cong \alpha \cdot H^0 \ (Higgs \ particle \ mass)$$

$$\frac{mass(atomic)}{H^0(Higgs \ particle \ mass)} \cong \alpha \qquad\qquad \textit{paper 1, equation 19}$$

Here the suggestion is that the "mass" of an atom is relevant to the fine structure constant and an underlying elementary electrodynamic process. According to research it appears to be the Higgs[18] particle that "provides" the atom with Gravitational features, and this happens "through" Q for the actual mass of the particles, and thus through electrodynamic means, as our theoretical calculation falls well within the experimental calculated range of between 114 - 140 GeV/c$^{2.}$ of the Higgs Boson, noting that the experimental research would, owing to inherent energy losses in measuring the value from an observer reference, be slightly above the discovered 125GeV/c^2 value

Essentially the "Q" feature relating to mass is the EM effect, yet as a process of direct interference resonance, as EM^{DIR}. More to this, this process is relevant to the TST, to the atomic template itself. It was considered to be causally related to the fine structure constant, yet when the first paper was penned the EM^{DIR} effect was not fully understood and had to be properly formulated. In understanding the EM^{DIR} effect therefore, it is likewise understood that the basic "non-compressed" version of the TST represents "22" and not "21.8" phi-quantum wave-function units, as presented in paper 2 ([2]: p11-13). This is important, because a folded EM field is no longer an EM field and therefore must default back to the "22" value. Yet more to this, for this field to be an EM "direct interference resonance" field, it must be out of phase with itself, and therefore must drop ½ a phi-quantum wave-function, and therefore to 21.5. This value when gauged with the TST as an EM^{DIR} field (straight line) when factored with the resultant atomic mass would represent the underlying EM^{DIR} field potential energy value *as mass*. Therefore, the following equation would apply in regard to what this EM^{DIR} field would represent as a potential carrier for the manifestation of particle mass:

$$atomic \ mass \ M_{(p+n+e)} \cdot 2\pi \cdot 21.5 \ = \ 125 \ GeVc^{-2} \qquad\qquad (9)$$

Consider figure 14.

Figure 14: the underlying vacuum and associated mass gap between the vacuum and the TSET level as a calculated energy requirement of $125\ GeVc^{-2}$.

To note is that gravity and its relationship with mass has been explained as per the G-A (gravity-A as mass) and G-B (gravity-B as space(EM^{DIR})) relationship, as per paper 21 ([21]: p2), "*Dimensional mechanics of Time and Space*", as summarised in its introduction:

> *The feature of describing this mechanics of time and space is that it must underwrite all physical phenomena, and that to develop a theory of reality that does not make mention of such an underwriting can only become confused with the absence of the required proposed key principles to be outlined in this paper, namely:*

> *(A)   The time-space uncertainty (TSU) principle: <u>the key to known issues with indeterminacy and uncertainty regarding the temporal and spatial location of elementary particles.</u>*

> *(B)   Gravity as a primary feature of the mechanics between time and space: <u>the key to determining why gravity appears to be a separate concept to mass and what that inter-relationship between mass and gravity is.</u>*

> *(C)   EM as a primary feature of the mechanics of time (and energy) in space: <u>the key to explaining the redshift effect and associated propagation of light through space, providing a new cosmological model.</u>*

The next question before moving on to the value of the TSET mass and therefore mass gap value is the nature of TST time-point mass in the first place, given its origin is primarily from an apparent

"nothing", from the EM^{DIR} field, and here the idea of "symmetry-breaking" comes to attention as the process of an EM^{DIR} field manifesting itself as time-point mass particles.

3.5.2.4 Symmetry-breaking:

The idea of symmetry-breaking was presented in the first paper as with the Higgs mechanism, here also in this paper in section 3.5.1.1, here now the cropped version ([1]: p4, eq3):

Here t_N represents that process of time-dividing, becoming dual time as t_A, as two possible outcomes for t_B, a process of symmetry-breaking for a vector of 0-scalar space (as it involves a process of an uncertain outcome), yet here we are assigning this feature of symmetry-breaking to time. Let us suggest the following:

$$t_A = t_B^2 \qquad\qquad \textit{paper 1, equation 3}$$

Simply, the idea of symmetry-breaking is hard-wired into the time-algorithm as $t_A = t_B^2$, as the two possible outcomes of the temporal algorithm, as the values of the golden ratio, which interestingly when each value is factored with each other, give rise to a value observed to be related to the energy manifold reversal of black-holes (-1) ([1]: p5), or in other words, related to what is proposed to be the EM^{DIR} phenomena, namely that the cosmological black hole phenomena is associated to the EM^{DIR} effect, as proposed in paper 22 page 17 ([22]: p17).

The key feature nonetheless to note is that in symmetry-breaking being born from an EM^{DIR} effect, an apparent "0" of space, suggests that there always exist two possible outcomes for any manifestation with each of its time-point activities in space, and that is the essence of a calculus that accommodates for an inherent indeterminism in play with particle phenomena. However, associated to this indeterminism would be the general overall time-space principles that would manifest in the overall time-space system as presented in figures 6 and 7 of this paper. Ultimately this process would accompany the general overall energy equation for all the time-points in space and that associated pattern formation of particle mass. Initially though, the breaking of symmetry from the EM^{DIR} level would represent the manifestation of mass on the TSET level of the atom, and to highlight this, that value must be derived.

In knowing nonetheless that the two outcomes of the golden-ration time-algorithm as one represent a value of -1, as a negative unit value, this value in theory in relationship with the fundamental $t_N 1$ process would represent a confounding issue for the particles manifesting on the TSET level, a type of "*anti*"-t_N1 concept (and therefore anti-particle potentiality), as per $\left(\varphi \cdot -\frac{1}{\varphi}\right) + t_N 1 = 0,$ having the effect of eliminating (it would seem) a *full* expression of each particle, putting each elementary particle in a state of compromise in regard to the anti-particle mathematical nature of the vacuum central to a particle's asymptotic freedom manifestation from the vacuum, yet not just manifestation, yet "percentage relationship" to their TSET particle neighbours (1-3). Consider figure 15.
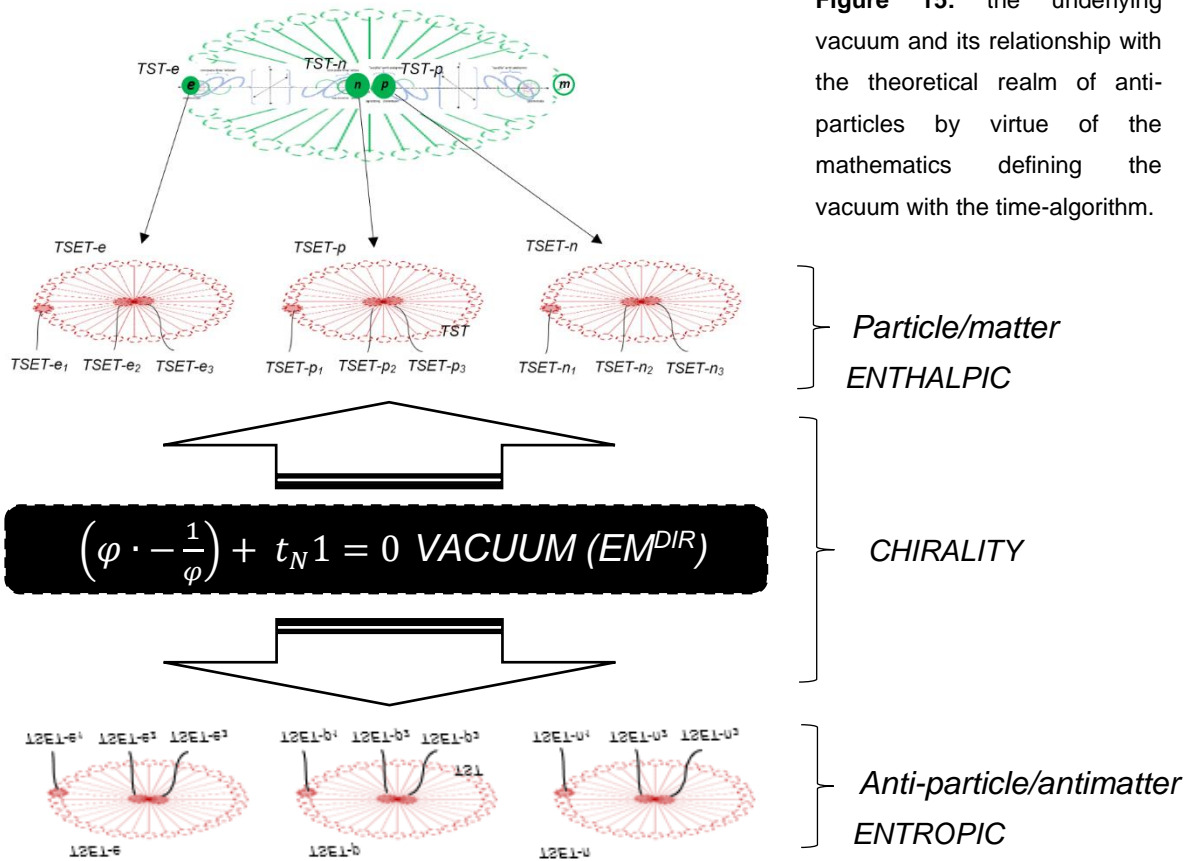
Particle/matter
ENTHALPIC

$$\left(\varphi \cdot -\frac{1}{\varphi}\right) + t_N 1 = 0 \; VACUUM \; (EM^{DIR})$$

CHIRALITY

Anti-particle/antimatter
ENTROPIC

Note here why particles (matter) would dominate over anti-particles (antimatter), given the elementary particle level is fundamentally enthalpic (energy conservation) whereas the anti-particle realm would be entropic, purely, and therefore be exhausted almost instantaneously. This anti-particle *potential* realm would nonetheless represent an entirely theoretical confounding limit for mass in breaching the vacuum, and provide space with a type of repulsive effect against particle mass as it does with light as calculated in paper 23 ([23]: p24-31), together with giving space a type of "negative energy" feature in regard to mass, as proposed initially in paper 7 ([7]: p2-3), as follows:

> When the idea of negative energy is discussed, the idea of anti-particles cannot be ignored, as it is embedded in the current idea of negative energy; in regard to anti-particles, more specifically the positron, Dirac associated his "Dirac sea" as full of negative energy with "anti-particles" as a theoretical model of the vacuum containing an infinite sea of particles with negative energy [10]. Negative energy was first postulated to explain the anomalous negative-energy quantum states predicted by the Dirac equation [11] for relativistic electrons. The positron [12], the antimatter [13] counterpart of the electron, was originally conceived of as a hole in the Dirac sea, well before its experimental discovery in 1932.This idea was revised; although quantum field theory replaced the idea of the Dirac sea owing to the notion of anti-particles representing "real" matter, the theory presented a new explanation for anti-matter in paper 4 ([4]; p8-10), the idea of the positron being as an electron that has undergone a magnetic field "flip", the case in point regarding the relationship here between positron and electron as a new

explanation for a relativistic electron that when becoming super-massive would undergo a magnetic flip according to the phi-quantum wave-function. The question though with this theory, as per the phi-quantum wave-function, is why would there be a magnetic flip in the electron? The thinking is that electron in reaching relativistic speeds would undergo a magnetic flip according to the phi-quantum wave-function where the wavefunction would track back on itself as though mirroring the magnetic moment of the proton in taking on the signature of a massive particle at such a relativistic speed. It's not a remarkable concept in this phi-quantum wave-function golden ratio theory, just a derivative of a newly-defined process for time as the golden-ratio, yet a theoretical and research-based explanation. Therefore, the "idea" of anti-particles will not be used here in the process of describing "negative energy gravity". The idea used here in this paper is "entropic" emergent gravity, which by its very nature in being entropic allows for this increase in kinetic energy of its associated mass (being enthalpic); to properly explain this process, a further step of equations and field modelling for time is required.

Anti-particles (antimatter), a concept of *chirality* in the Standard Model, is satisfied as such (chirality) in this golden ratio context ($\varphi \ \& -\frac{1}{\varphi}$), yet also delivered in a way Dirac envisaged for the vacuum. Moreover, with the time-algorithm description here, the particles of each TSET group (TSET-e$_{1-3}$, TSET-p$_{1-3}$, and TSET-n$_{1-3}$) would exist in asymptotic freedom in *apparent* varying/fluctuating levels of mass, both with their family TSET set particles (1-3) and also in regard to other TSET set particles, the reason such being apparent owing to the nature of elementary realm itself and the chirality effect in play between matter and antimatter particles. Although earlier papers presented the then concept of antimatter with the theoretic tools available at those steps of theoretic development, namely paper 1's description of the t_A realm being involved with antimatter, which technically it is as a "0" value, and paper 4's [4] account of anti-matter being primarily electron related (which the positron being the predominant antimatter particle technically would in all appearance make its appearance as such on the TST level), the proper account is being proposed here such, a concept that shall now be confirmed with the calculation of the most basic/lightest TSET-e *maximum* particle mass

3.5.2.5 Calculating the mass gap (TSET basic particle mass):

The aim here is to now calculate the TSET particle mass, yet in particular the maximum value of lightest TSET-e particle, namely the TSET-e$_1$ value. The guide here is to interface with the contemporary understanding of the subatomic element of mass associated to charge, because essentially it is an EM^{DIR} field being considered, and therefore a charge field that has undergone direct interference resonance. The current known proposed maximum value of the lightest neutrino particle has been proposed by researchers from *UCL, Universidade Federal do Rio de Janeiro, Institut d'Astrophysique de Paris and Universidade de Sao Paulo* [26], setting an upper limit for the mass of the lightest neutrino for the first time at a value of $1.5 \cdot 10^{-37}\text{kg}$, and so such is the target value here.

Taking this process step-by-step, the following is to be recalled regarding how it was possible to calculate *mass* from *charge* on the TST level, as per paper 23 ([22]: p21-22):

6.4   Charge

What is *charge* therefore, and why is there a duality of charge in the atom?

As presented in paper 21 ([21]: p16-22), energy is primarily related with time, and mass primarily related with space, with such a description being a part of the described association of mass with gravity. So, in regard to the universal constant "c" for the TSF, and in considering energy and mass, energy in regard to "c" would be directly in accordance with "time" per space (space as distance), as per equations 2 and 3 as initially presented in paper 22 ([22]: p18):

$$m \cdot \frac{d}{t} = fundamental\ property\ 1, \qquad \textbf{\textit{<momentum>}} \quad paper\ 23,\ equation\ 2$$

$$e \cdot \frac{t}{d} = fundamental\ property\ 2, \qquad \textbf{\textit{<charge>}} \quad paper\ 23,\ equation\ 3$$

The proposal here is that fundamental property 1 as $m \cdot \frac{d}{t}$ represents **_momentum_**, of course, and that fundamental property 2 as $e \cdot \frac{t}{d}$ represents the concept of **_charge_**. The proposal therefore here is that momentum relates to charge if *fundamental property 1* relates with *fundamental property 2*. Why is this important? This is important in the fact that when $\frac{d}{t} = c$, when mass approaches the value of "c", it becomes as $\frac{e}{c}$, and thus purely electric, as the charge of an electron, e_c. Therefore, when mass approaches conceptually light speed, its momentum designated by its mass becomes as *charge* designated by "e_c", and therefore the property of mass becoming faster has it develop charge.

In short, the proposal is that when mass is at light speed, it represents "charge". How can mass be light speed? The TSU principle says it can be, as light speed essentially means it can be anywhere in the spherical time-point TST spherical zone, and it is this feature that creates the idea of *charge*, and in the case here, electric (negative) charge for the electron. Essentially, the time-point TSU principle cloud represents pure charge, mostly; there would be nonetheless a residual level of mass in association with the need for that time-point to have a location itself nonetheless.

Is this proposal an actual fact?

According to paper 2 ([2]: p13, eq11)], $e_c = \frac{19.8 \cdot \lambda}{c} = 1.60218 \cdot 10^{-19}\ C$, an actual fact. Charge therefore would exist as the electron cloud associated to a *magnetic* time-point, while also needing to be balanced with a positive charge of equal value to the electron, as such a balance of charge would need to exist as the property of the TSF and associated TST representing a type of overall neutral footing basis.

6.5 Proton, Neutron, and Electron mass

It would be now possible to calculate the mass of the proton (and neutron) if it is considered that such a basic time-point particle as mass when taken up to near light speed produces the charge equivalent to that of an electron. For instance:

- o *If particle speed and wavelength are known, distance and time:*
  - *the charge can be calculated as $e_c = \frac{19.8 \cdot \lambda}{c}$ ([2]: p13, eq11)*
  - *and so too its mass **from which the electron as a charge came** (in using $m = \frac{e}{c^2}$ ([2]: p16, eq15) and $e_c = \frac{e}{c} = fundamental\ property\ 2,\ eq3$):*
    - *thus m equates to $\cong 5.3 * 10^{-28}kg$*

- Factor this by π and the mass of a proton (or neutron) can be calculated.
  - *Why a factor of π?*
  - *The mass of the electron would have been "per" π, the actual spherical reference it is upon as the time-point cloud (TSG), yet the mass of the central time-point would not be per π and thus the* <u>$5.3 * 10^{-28}kg$</u> *value needs to be factored with π, giving:*
    - <u>$\cong 1.67 * 10^{-27}kg$</u>

Such would be the mass of a proton and neutron from this value of electron charge, a confirmed fact. Fundamentally here mass is related to charge and therefore gravity to EM.

To address the TSET-e$_1$ mass value therefore, to note clearly here is that the idea of "e" is being considered as a "$fundamental\ property$", and that $e_c = \frac{e}{c} = fundamental\ property\ 2$. In therefore using that same line of logic in having successfully derived the proton (and neutron) mass from *charge* on the TST level, and now applying the same logic to the TSET level, two things need to be factored:

(i) The "12" factor, as presented.
(ii) The fact that a new *charge* level is being encountered as a new electron analogue (as TSET-e$_1$), and this would therefore invoke a new "c" factorial according to $fundamental\ property\ 2$.
(iii) $m = \frac{e}{c^2}$ ([2]: p16, eq15) still holds as $m = \frac{e}{c} \cdot \frac{1}{c} = \frac{e_c}{c}$

Therefore, the equation for the mass of TSET-e$_1$, the value of the mass gap m_{MG}, would be as follows:

$$m_{MG} = \frac{e_c}{c} \cdot \frac{1}{12} \cdot \frac{1}{c} = 1.5 \cdot 10^{-37}kg \qquad (10)$$

This would be the value for TSET-e$_1$ as confirmed by researchers from UCL, Universidade Federal do Rio de Janeiro, Institut d'Astrophysique de Paris and Universidade de Sao Paulo [26]. Note also that this value is **not** a π-factored <u>*analogue particle mass value*</u> on the TSET level, the reason being is that in the context of the TSET level, <u>*in being different from the TST level*</u>, this value is *not derived from the mass of the π-factored proton or neutron* as per fundamental properties 1 and 2 relevant to the TST level, for as here on this TSET level *mass is derived directly from the EM^{DIR} vacuum* where distance and time would be in equality on this level as a straight line, as what the EM^{DIR} prescribes for this most elementary level as per paper 23 pages 24 through to 31 ([23]: p24-31); simply, the environmental manifold on the TSET level would primarily disenchant itself from the TST level as a "1" not "π", a line as per the resultant EM^{DIR} field as compared to the "π" (a circle) for the TST environment. The theory here therefore has correctly calculated the *maximum* mass value of the theoretically lightest neutrino in comparison to the vacuum as the *reliable* value for neutrino manifestation, despite the asymptotic freedom and therefore varying

manifestation *quantity* from the vacuum the elementary particles would be undergoing on the elementary (TSET) level.

The proposal therefore is the value of $1.5 \cdot 10^{-37} kg$ would be the reliable value of the mass of the lightest neutrino, proposed here as a key feature to the existence of sub-atomic mass and the associated mass gap, the mass of the gap between of what can only be the most reliable value for the lightest particle and the vacuum of space, thereby solving the "Yang-Mills existence and mass gap" problem in the context of a calculus (Temporal Calculus) that upholds all known prior-art equations and associated constants for known physical particle and field phenomena central to the Yang-Mills equations, as per all derived quantum and gravitational equations and constants thereof.

3.5.3   Summarising the Mathematics in play

As has become obvious, there are two approaches to understanding particle behaviour, one using 1-d time applied to 3-d space as 4-d spacetime (process A), the other a time-algorithm split into three temporal dimensions applied to 3-d space (process B), one that uses various types of algorithms and calculi, never ultimately linking though all the different phenomenological features of time and space (process A), the other using only the one time-algorithm and associated Temporal thereby joining all the phenomenological features of time and space (process B):

Process A: multiple types of algebra and associated mathematical automations of calculus, differential, integral, and so on, and continuous transformation groups (*lie*), a spectrum of algebraic methods all trying to link together to explain particle behaviour from a basic observable level to a fundamental elementary particle level, all as a process of ad-hoc mathematical construction seeking to **capture** what **is** *observed.*

Process B: A singular time-algorithm that creates a Temporal Calculus of time with space, a fundamental tenet of association, upheld in all temporal references in space and as the results show **manifests** all the required particles and field forces to uphold the basic relationship of time-points within the vacuum of space; the problem of trying to interlink different manifolds and associated algebra is therefore avoided yet the new focus is on how time-points in varying locations interact with each other (relativity in space) seeking to **derive** what **is** *observed*.

Technically, as it is the same reality being explained, the same phenomena, on the one hand one process tries to capture and explain phenomena using ad-hoc mathematical modelling, and on the other hand the other process (Temporal Calculus) derives phenomena with the required in-built limitation of asymptotic freedom. The mathematics of one process is deterministic in seeking to capture and thence predict particle behaviour (process A), yet the mathematics of the other process acknowledges a distinct indeterminism between the parameters of time and space (process B). To therefore calculate as a mathematics the determinism of symmetry-breaking and associated mass gap although well intentioned (yet in not being able to accept the inherent indeterminism at play with symmetry-breaking) would be

unable to capture the concept of asymptotic freedom *fully*, given process A represents the need to be ultimately deterministic and therefore destined to not succeed in properly explaining the ultimate shape itself of reality itself and associated cosmological data.

The principle in play proposed here with process B therefore is addressing what process A has overlooked, namely the nature of the relationship between time and space and how that registers to human perception. Yet the task of process B has been to derive all that process A as a joining of different mathematics tools has failed to properly model in the one mathematics. Given process A and process B are different processes, obviously, different terminology must be used to describe the same phenomena, yet the phenomena being described is the same, noting that with process B there is no one concept alone such as a unique particle/force and an associated unique force carrier of that particle/force yet always a resultant feature of the underlying principles involved in the **primary** relation between time and space as the manifestation of the particles/forces and their field effects in that time-space relationship continuum. Conversely QFT and the SM aim to deterministically define (as per linear-time mathematical modelling of space) individual phenomena related to other individual phenomena through a vacuum requiring different structures of field effects and associated mathematics to take shape, the great omission of course being QFT and the SM capturing the understanding of gravity, the red-flag itself for an underlying issue with the whole process of examination, and of course not realising that the wrong tool (determinism) is trying to understand something inherently indeterministic (time with space).

3.6   Cosmological Dynamics: Indeterminacy and Cycles

One thing to note regarding the time-aether field (the time-space field components), is that space is mutually exclusive to the time-point function it is assigned to, simply because space is a vacuum, and the time-point structure operates in its context with other time-point structures with each 0-space assignment to the time-points. Space is not the metric, yet time. With mass therefore associated to space, as presented in paper 22 ([22]: p16-21), the motion of space central to gravity, its operator, is as though mass *glides over* this TSF ([23]: p23), this time-aether. The transmission of energy and therefore all associated wave-functions in this time aether, given that light is not being considered a particle here (photon), is _constant_, and this has been determined as "c" despite the relative speed of mass to this underlying TSF. And this solves all the problems in relativity theory more cleanly, together with not requiring the mysterious photon yet more appropriately a *wave-function*. Note also that the space being presented here as a vacuum is not moving in the one lattice*, yet *associated* to how time *applies itself uniquely* to space as time-points, as a fractal lattice (golden-ratio time-algorithm) of time-points represented by unique fractal lattices of dynamic spaces.

Therefore, "light" is only measurable with *mass* which as an entity to human perception, as mass, *glides (*on its own level) the fractal time-point scenario, which makes "c" as an observable mass/particle entity *constant*, the gliding explained in the previous paper ([23]: p23). And once again, that has much to do with the human limitation of perception, therefore making a time-algorithm for human perception *on that basis* ever more *required*. Furthermore, the analysis of time and space as separate dimensions relevant to the human perception ability "grades" a determination for distance with time, which

is a gradient that when plugged in with the standard units gives rise to what is known of distance and time, as per "c" as a constant for time in space regarding a wave-function, with all equations obviously factored in relative to "**mass**" with "c".

Emission signals from atoms and those discrepancies with linear-time clocks therefore only highlight the fallacy of using clocks as a measurement instrument per se. Two papers best describe this process as mentioned, namely papers 6 [6], *The Relativity of Time*, and 16 [16], *The Hybrid Time Clock as a Function of Gravity*, where it is presented that the function of clocks as linear time counting mechanisms is not in-sync with how time and space are at play with each other regarding the field forces, and the case in point here, atomic phenomena regarding EM emissions, and therefore the vacuum energy together with the CMBR. Given particle charge is related intrinsically to EM and therefore the wave-function and associated time-points of the TSF, particle charge would therefore, its value, be invariable to the speed of the mass it would be associated to, which is a *known* fact, derived here from this Temporal Calculus.

The shape of everything that exists would therefore be a combination of two key things, the time-space set of conditions as per figure 7, and the more finer detailing of the time-space template and associated elementary particle-coupling and asymptotic freedom (and associated energy requirements), as per figure 4. Combing those two would give rise to the shape of everything that exists, as per figure 16.
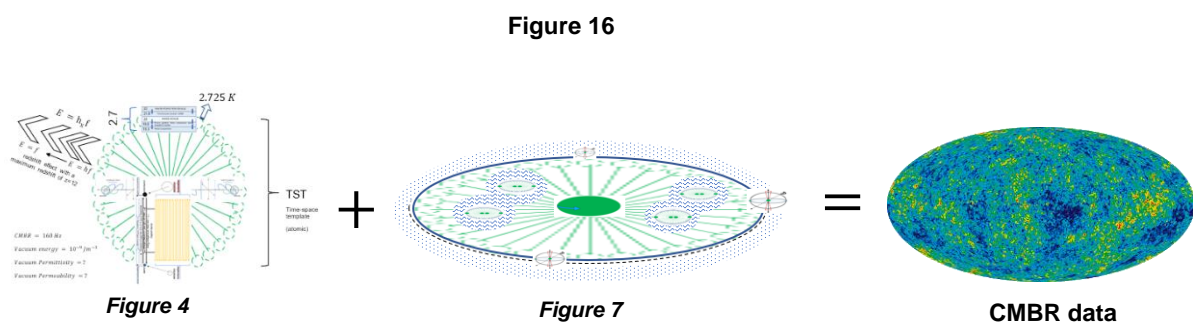
Figure 16

Figure 4   *Figure 7*   **CMBR data**

Figure 16: combining the time-space template and associated elementary particle-coupling (figure 4) with the general time-space set of conditions (figure 7) results in a uniform CMBR reality *recorded* by physical instruments, as the reality of what is presented to physics.

How can such a thing be stated so simply, namely that the particle-coupling manifold of the time-space template (TST) when associated with the time-space field (TSF) scheme in an overall TSG context presents the same reality physics observes and measures? It is merely by association of facts, namely that the shape of everything that exists is so in accordance with all the fundamental data that has been extracted from the shape that *already* exists, fundamental data that has been plugged into this Temporal Calculus to give rise to a steady-state system as it appears (and not the ΛCDM model system). Here, in this Temporal Calculus system, the redshift is accounted for [13], the nature of the stars/galaxies and

other cosmological phenomena also accounted for in that same paper ([13]: p13-20), all the equations of associated phenomena thereof are accounted for as summarised and referenced in this paper.

Therefore, locally here in this solar system all the way to the Oort cloud, human perception can only be graded a certain way that meets with a certain structure of reality. If anything exists beyond that structure, it would be something else entirely as a perception entity (as a different temporal perception gauge), as this Temporal Calculus is based primarily on an algorithm related to the human perception ability with time and not some other form of perception. The only logical thing therefore, according to human logic, is to propose a steady state reality given all the evidence. Despite the infinite vastness of the stars as they appear, their appearance is entirely explainable using a fractal based temporal calculus of atomic phenomena, atomic phenomena approaching an event horizon scenario of atomic decay (and this shall be followed-up in a subsequent paper, as the papers have made key references to the nature of the stars through the Temporal Calculus building process, and requires a paper of its own given the volume of cosmological data and associated theory there).

In short, although the Temporal Calculus presented here prescribes that the future is an unknowable entity, the algorithm prescribes a steady state time-space system within which it would seem the human perception reference would still have the faculty of choosing its own future (as based on the dual outcome of t_B in t_A as t_B^2 in the time-algorithm). Ultimately, the proposed Time Calculus steady-state reality harbours within its general cyclicity a constant flux to keep time-after (t_A) as an uncertain thing, leading to what can only be considered as a process of cycles, also to be followed-up in a subsequent paper given the volume of theory presented there throughout the papers, and how that can be further tied together.

3.5   Temporal Calculus Applications.

The real "find" of the Temporal Calculus is the connection between EM and G, and so an experiment has been proposed, as per paper 23 ([23]: p30-31), to further demonstrate the validity of the Temporal Calculus at play:

The question then of how to create the EM^DIR field is to most simply create a RF (radio frequency) field in the centre of a spherical resonance chamber and for simplicity have an EM field (electric field, positive or negative charged plate on the resonance chamber structure), be directed into the chamber from without, presenting an intruding electrical field into the chamber which would be repelled by the EM^DIR field, yet of course according to that bang-on alignment to incur the 45º passage realignment repulsion. Further to that design challenge for the resonance chamber is that it is no easy feat to generate a RF field in the centre of a chamber without effecting the source RF structure itself, together with having an electrical field entering into the resonance chamber without causing adverse arcing on the body of the resonance chamber, which makes the design of resonance chambers for this task challenging.

Quite simply, an example of the EM^{DIR} *thruster* device would comprise of a RF resonance chamber that contains the EM^{DIR} field, an internal aerial providing for the signature destructive interference resonance (the EM^{DIR} field) from the RF source, an intruding EM source (electrically charged plate, positive or negative) located at the distal end of the resonance chamber or located anywhere else on the resonance chamber that acts to oppose the EM^{DIR} field, a RF (radio frequency) power-source applied to the aerial to generate the EM^{DIR} field, and an overall containing bulkhead structure to relay the thrust. Owing to the purely spatial nature of the EM^{DIR} field as presented in paper 23 ([23]: p26-28), the interfering EM field is unable to push back against the EM^{DIR} field, and therefore the result is a type of overall compression against the interfering EM field and associated structure, thus producing unidirectional *non-inertial* thrust of the EM^{DIR} field against the intruding EM field, a mechanism that would replace standard inertial fossil-fuel/jet/rocket propulsion systems. Of course, it cannot be understated the underlying feature here is the application to contemporary physics in the manner of better explaining the elementary particle habitat and associated macro-dynamic systems.

4   Conclusion.

The most difficult process in compiling this Temporal Calculus was to break free from the usual constraints of metric space analysis, the associated Calculus of Infinitesimals (differentials/integrals), and those theoretic norms. The second most difficult task was to present the papers in a genuine manner, to keep the papers genuine to the human perception temporal ability, and therefore to demonstrate the process of creation and discovery of the Temporal Calculus as strict to its own true time-line of development as possible, as after all it is a calculus for *Time*, a theory developed through a step-by-step process of time-space construction on each level to the next. The importance of each of the individual papers and their timely relevance as the process of development of the theory that it depended on therefore should not be underestimated, as each paper is essential to the theory development.

As explained in the outset, the theory development is one of constructing the geometry of the time-algorithm, not using a calculus of infinitesimals (a calculus which has become customary in physics), yet making *time* the descriptor and **then** creating the geometry from that time-description, not with an automated set of equations looking for solutions, yet by the actual fact of what the time-algorithm is requesting for space to achieve *at that step of theoretic development for time*, therefore making this calculus entirely new, and therefore requiring a detailed explanation. In short, the process undertaken is one of constructing the geometry of space, step-by step, and not asking mathematics to construct the geometry other than through the use of simple Euclidean-Cartesian principles known in any geometrical construction process.

The fundamental issues in this geometric construction process therefore have been primarily adhering to the time-algorithm, together with acknowledging the relative uncertainty between time and space, and then thirdly acknowledging the associated drive of the time-algorithm to define a circle/sphere as it progresses through space as a wave-function for the underlying connectivity of time-points in the

time-space field (TSF), all seeking relativity with each other. It has been, in short, a sizeable undertaking, taken one step to the next, in piecing together *how* the time-algorithm links with space in *seeking* "π", and finding how that general equation *as a build* requires itself to be a holistic establishment central to the dimensional mechanics of time and space, that inter-play, not having algorithms, whether infinitesimal or partial differential conducting surveys of space, yet here using the time-algorithm to dictate how the time-algorithm interacts with space. Therefore, it is an entirely new approach to standard physics, as it only could be, in not treating space as the fundamental metric, yet time.

Physics is primarily a data-based discipline, studying bodies in motion, celestial to atomic and back again, relying purely on an *unbiased* perception reference, ideally. The temporal algorithm utilised here is not a thought experiment as Einstein proposed, yet an unbiased perception reference utility for time, using time as the algorithm, the calculus, according to accepting three fundamental features of the human perception reference, the first that the future is an unknown paradigm, the second that reality exists in the here and now as a standard for time's flow, and the third that the past is a historical data-base at best of what has actually happened in that "now" spatial context. There is no bias there, which is why it would work best for physics. Those three features of time form the substructure of time's arrow, *coming together* as the golden-ratio equation, which then becomes a fractal sequence of time-points in space. Although the Temporal Calculus prescribes that the future is an unknown paradigm, the algorithm prescribes a steady state within which it would seem the human perception reference would still have the facility to choose its own future (as based on the dual outcome of t_B in t_A as t_B^2 in the time-algorithm); ultimately the steady-state system reality would harbour within its general constancy a flux/disturbance to keep time-after as an uncertain thing, leading to what can only be considered as a process of *cycles*.

Albert Einstein has received the accolade for gravity as *spacetime* with his predictions about light bending in the midst of large structures. Yet he has shown to be incorrect on a number of fundamental issues, the key one being the cosmological constant. His fundamental basis of reason he termed *relativity theory* based on two key pieces of writing, Special Relativity and General Relativity, the small-scale relativity of bodies in motion and large-scale relativity of bodies in motion (gravity) respectively. However, despite the depth of description of his thought experiments with his clocks and momentum descriptors, he was unable to be "complete" with his theory, unable to explain key cosmological issues, leading to the cosmological constant problem. In comparison, the key attribute to Temporal Calculus is its "consistency", using only one algorithm-type for time, deriving all known relevant equations and associated constants for particles and their field interactions.

Indeed, *current* cosmology theory is in many ways central to *science imitating the arts* in attempting to place itself somewhere beyond the human local reality, which does make physics a part of a quest, a purpose, a determinism in itself without thinking objectively about those far off places and analysing the data appropriately and therefore impartially. The ΛCDM model is the result of what was initially accepted as the metric expansion of space based on the only explanation for the redshift effect upholding linear time and its application to the calculus of infinitesimals, a stage of the beginning of everything playing the infinite of everything using a metric expansion of space as the vehicle for the redshift effect. Understanding light and its propagation through space is the key issue. And so, the key

disruption Temporal Calculus presents to physics theory is the disruption to the ΛCDM model, in refuting it rather thoroughly.

If mathematical cosmology as the metric expansion of space can never be actually physically proven, namely the ΛCDM (big bang) model, the metric expansion of space, and all other such features to explain the redshift of light, given the extreme distances one would have to travel to actually physically prove that theory, one could only consider that a large amount of trust is required in those quests of discovery. Such though is not perhaps *physics being better at being physics*. *Physics being better at being physics* asks for the exercise of theory and calculation to be held impartially *upon* the very platform of the dimensions being examined, namely time and space. To accord mathematics with space *as* space and then assume time runs through it linearly is as simple as it deterministic. Yet even the calculus of infinitesimals cannot explain the indeterminism objects in space present physics with. The only question to then ask, as was asked with this series of papers [1]-[24] as with this paper, is whether or not there is a relationship between time and space as a mechanics that permeates that simplicity that can be credible *in the least* as a model of cosmology, of *time as we perceive it* in the greater extent of space, a mechanism of time that explains this indeterminism at play in a steady-state system that is locally applicable, bringing all the known equations upon a common time-space platform of knowledge together. The paper presented here hopefully has demonstrated such is possible.

Indeed, the quixotic theoretic realm cosmology has found itself in is the need to explain local phenomena, local phenomena that has already put itself to the stars for assistance, and still does, to find answers there with that putting, with that 4-d spacetime model, a model that on both fronts of putting and receiving is still lacking. Understandably, two wrongs though do not make a right. Would it be absurd therefore to present an ideal case of finding what works locally **first**, and **then** apply that to cosmology? Considering that a link between EM and G can be found locally with this Temporal Calculus, as presented with the solutions provided in this paper (Mass Gap), would such then have a mandate to alter cosmology theory if that EM-G link theory found errors with cosmology theory?

Conflicts of Interest

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

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