

# Temporal Calculus (The Calculus of Time-Points in Space)

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**Abstract:** The application of the Calculus of Infinitesimals (differentials/integrals) to physical analysis, given the paradoxical lack of precise spatial and temporal relevance it grants the study of the elementary particles in both quantum and relativistic aspects of determination, despite the precision of such mathematics, is questioned. To offer more precise relevance to time and space and associated phenomena, 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 (Temporal Calculus), a calculus that does not focus on space primarily, yet time. 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 point in space. 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, 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 of space, governing the redshift of light in space.

**Keywords:** calculus; temporal; infinitesimals; mathematics; time; space; spacetime; metric; redshift; big bang; dark matter; dark energy; cosmology; CMBR;  $\Lambda$ CDM

## 1. Introduction

The purpose of this paper is to describe a new 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, and not relying upon the standard system of “Calculus of Infinitesimals (differentials/integrals)”, nor presuming that space is a metric that is determined by the calculus of infinitesimals, yet something more temporally structured and perception *skilled* and *related*.

This paper is based on 23 [1]-[23] preceding papers that serve as a repository of essential theory (~500 pages), papers having already laid down the basic foundations and ideas for this more general paper. The preceding papers do nonetheless 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, all as referenced in this paper. This paper therefore will also serve as a way to bring the preceding papers into full circle, here linking the vacuum permittivity and permeability with the CMBR, providing proof for a steady-state time-space system.

Indeed, it would be quite a thing to properly extrapolate without of course re-explaining the temporal calculus employed for time and space, so that time-algorithm will be clarified here in this paper. Nonetheless, each and all the papers employ the same temporal calculus, the "time-algorithm". The task here in this paper is to knit all of such together upon a platform of time-space that details how physical reality operates and functions as it is observed to, and of course to successfully shape reality **as** reality is perceived, from the atom to cosmology.

The time-algorithm central to the Temporal Calculus therefore is not a calculus that requires differentials or integrals. The only mechanism with the time-algorithm calculus required is one that already exists as the human temporal perception ability, of course defined along a specific mathematical line of thought with numbers. That temporal algorithm nonetheless is quite simple, 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  $\pi$  in reference to a  $\pi$ -*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)*. It is not a simple case of highlighting what physics is unable to solve, yet **why** physics is unable to solve those problems 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 thought 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).

## 2. Defining the new theoretic need

There are 4 Key assumptions in physics, leading to 5 key problems, presenting the case for a new Calculus.

### 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  $\Lambda$ CDM 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  $\Lambda$ CDM 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  $\Lambda$ CDM 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  $\Lambda$ CDM 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.

## 2.6 Problems 1-5

- The **Proton 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  $\Lambda$ CDM 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  $\Lambda$ CDM 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  $5\sigma$  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.

### 3 The new theoretic change

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 temporal perceptive appreciation to a most basic model for space.**

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, the process would require a step by step geometric construction of 3-d space related to that time-algorithm.

It is important to remember that physics, or any discipline, is not reality. It is a way of looking at reality. 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  $z=12$  ( $z_{12}$ ) 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  $\pi$  as the progression of the time algorithm wave-function (PQWF).
  - Algorithm to calculate  $\pi$ : 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. Paper 23: Time-Space Wave-Mechanics [23]

- 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

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, thus 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 valid (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)

The time-algorithm is perhaps best addressed in paper 8 [8], 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  $t_N$ .*

$$(-t_B) + 1 = \text{fundamental property A} \quad \text{equation 1. [8]}$$

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).

$$\frac{1}{(-t_B)} = \text{fundamental property B} \quad \text{equation 2. [8]}$$

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

$$(-t_B) + 1 = \frac{1}{(-t_B)} \quad \text{equation 3. [8]}$$

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

$$t_B^2 - t_B = 1 \quad \text{equation 4. [8]}$$

$$t_B + 1 = t_B^2 \quad \text{equation 5. [8]}$$

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.)

$$t_B + 1 = t_A \quad \text{equation 6. [8]}$$

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

$$t_B^2 = t_A \quad \text{equation 7. [8]}$$

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:

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

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

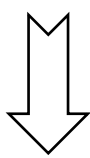
$$\frac{1}{\lambda} = Z^2 \cdot \frac{1}{\left(\frac{1}{n_1^2}\right) - \left(\frac{1}{n_2^2}\right)} \cdot \frac{\lambda_e}{2(2\pi a_0)^2} = R_\infty Z^2 \cdot \frac{1}{\left(\frac{1}{n_1^2}\right) - \left(\frac{1}{n_2^2}\right)} \quad \text{Rydberg constant ([1]: p14, eq25)}$$

$$\left(\frac{-1}{\varphi} \cdot -2\sqrt{3}\right) + 1 = 3.140919 \quad \text{electrical monopole ([2]: p8, eq3)}$$

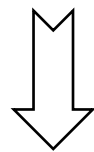
$$(\varphi \cdot -2\sqrt{3}) + 1 = -4.605020 \quad \text{magnetic dipole ([2]: p8, eq4)}$$

$$(\varphi \cdot -2\sqrt{3})^2 = 31.416253 \quad \text{magnetic (time-space) template ([2]: p10, eq6)}$$

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



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



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

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

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

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

|   |  |
|---|--|
| $e_c \cdot f = E \cdot \left(\frac{c}{19.8}\right)^2$   | Plank analogue ([3]: p3, eq1)                    |
| $x_{(t_B+1)} = k \cdot x_{t_B}(1 - x_{t_B})$  | chaos; initial conditions ([3]: p4, eq3)         |
| $M_C = \left(\frac{2}{3}\right)^2 \cdot M_p$  | gravity constant ([4]: p7, eq1)                  |
| $\# \text{ error gradient} = 6.022 \cdot 10^{23} \cdot \text{mass of neutron}$  | 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) |
| $r = 73,500 \text{ au}$   | 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)            |
| $\sim 10^{-9} \text{ Jm}^{-3}$  | vacuum energy value ([14]: p23, eq9)             |
| $\sim 10^9 \text{ Hz}$  | Lamb shift value ([14]: p24, eq10)               |
| $t_B = \sqrt{\frac{21.8 \cdot 1.079}{N_A}} = 6.25 \cdot 10^{-12} \text{ s}$   | cosmological CMBR value ([14]: p25, eq12)        |
| $2.7 \times \frac{22}{21.8} = 2.725 \text{ (temperature)}$  | lowest temperature (CMBR) ([14]: p25, eq13)      |
| $e = m \cdot c^2.$  | Einstein's equation ([14]: p26, eq18)            |
| $532 \times 1.079 = 574 \text{ arcseconds per century}$   | Perihelion of Mercury ([14]: p28, eq19)          |
| $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \frac{1}{7} + \frac{1}{9} \dots \text{etc}$                                | $\pi$ algorithm ([15]: p7, eq4)                  |
| $e^2 + \varphi^2 \sim \left(\sqrt{\frac{19.8}{20}} \pi\right)^2$  | general energy equation ([15]: p11, eq8)         |
| $\sqrt{2} + \sqrt{3} \cong \pi$   | $\pi$ approximation ([16]: p8, eq1)              |
| $e^2 < \text{ENTROPY} > + \varphi^2 < \text{ENTROPY} > \cong \left(\sqrt{\frac{19.8}{20}} \pi\right)^2 < \text{ENTHALPY} >$ | general energy equation ([20]: p10, eq2)         |
| $m \cdot \frac{d}{t} = \text{fundamental property 1}$   | momentum ([23]: p21, eq2)                        |
| $e \cdot \frac{t}{d} = \text{fundamental property 2}$   | charge ([23]: p21, eq3)                          |

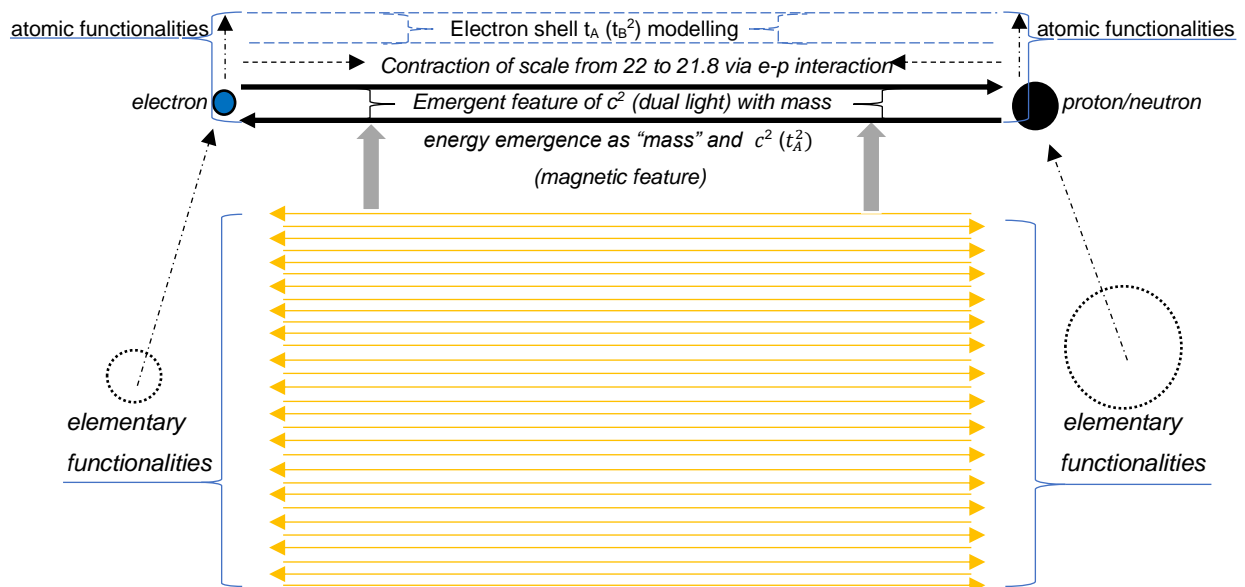
$\cong 1.67 * 10^{-27}kg$  proton/neutron mass from charge ([23]: p22)

$\epsilon_0 = \frac{1}{4\pi} \times \frac{1}{Q_C \cdot c^2} = \frac{1}{4\pi \cdot k_e}$  vacuum permittivity ([23]: p30, eq5)

$\epsilon_0 = \frac{1}{\mu_0 \cdot c^2}$  vacuum permeability ([23]: p20, 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 “ $\pi$ ”, 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 1:

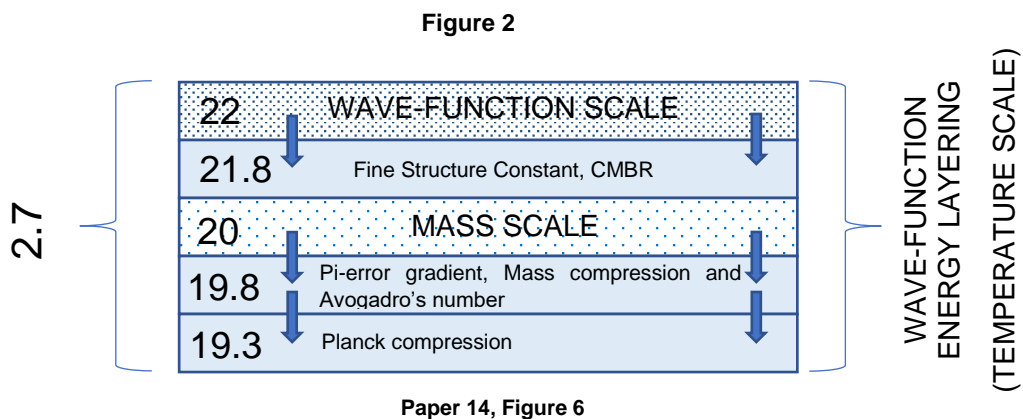
Figure 1



Paper 2, Figure 16; “beyond” the 30c manifold is a “c” factor that can only be “squared” as a “future” (t<sub>a</sub><sup>2</sup>) 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 “ $\pi$ ”, 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  $\pi$  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 2:

*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 “ $\pi$ ” as the unfolding of the wave-function of light, as summarised in figure 6.*



*The idea of the pi 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 1 and 2, and figure 10 from paper 23 ([23]: p24, fig10), together as figure 3:

Figure 3

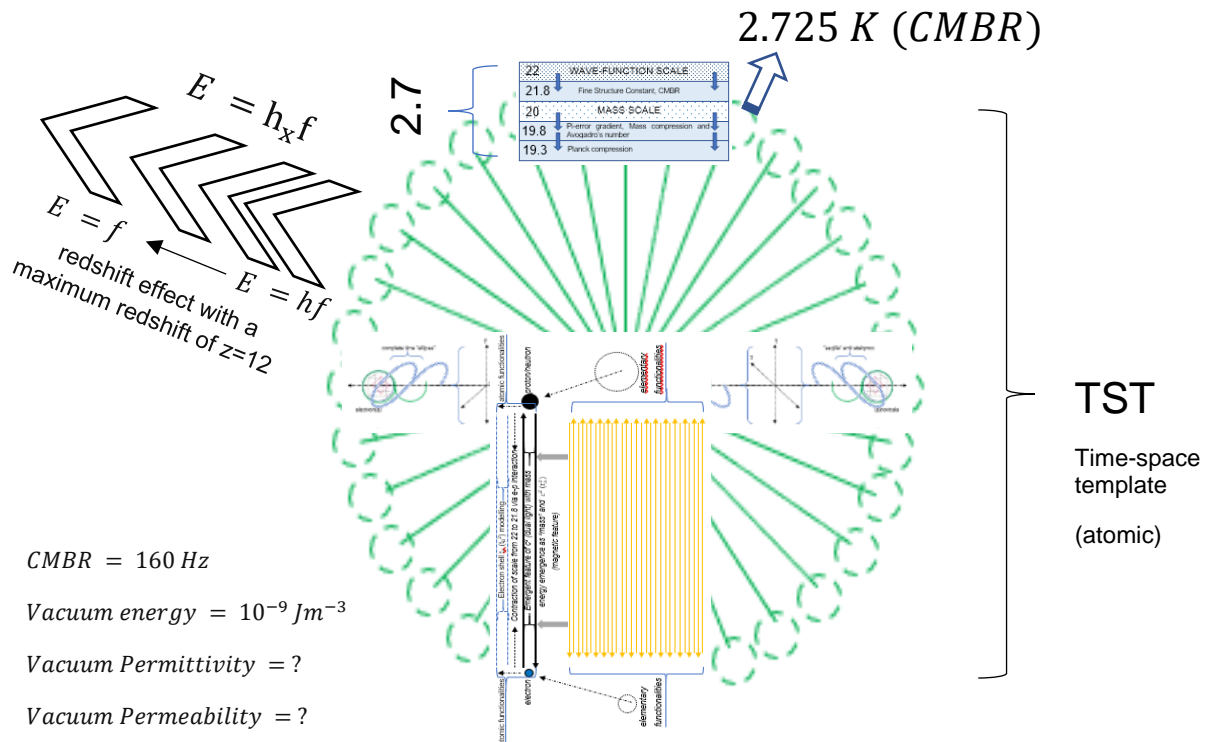


Figure 3: time-space template (TST) showing the general functions from figure 16 paper 2 ([2]: p16, fig16), figure 6 paper 14 ([14]: p23, fig6), and figure 10, paper 23 ([23]: p24, fig10).

The relevant issues with figure 3 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 2).
- The 2.7 factor of temperature scaling (figure 2), 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 ( $\epsilon_0$ ) and permeability ( $\mu_0$ ), 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  $\epsilon_0$  and

permeability  $\mu_0$ ) to the CMBR, to demonstrate that the **entire** process is “steady state”, entirely disproving the CMBR as the *result* of the  $\Lambda$ CDM 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<sup>DIR</sup> mechanism ([23]: p24-31).

Thus, the quest was on to find the relationship between the CMBR and the vacuum permittivity ( $\epsilon_0$ ) and permeability ( $\mu_0$ ) 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:

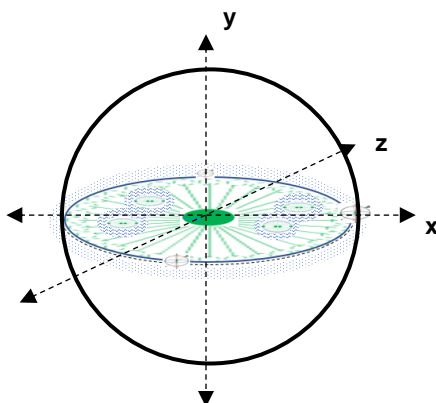
- TSU (time-space uncertainty) principle:
  - The idea of the time-points forming an uncertain cloud with a certain *central* time-point structure ([20]: p11-13).
- TSC (time-space context)
  - The use of a *relative* time-space frame of reference ([21]: p16-17).
- TSG (time-space groove)
  - The idea 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 4 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 5 and then joined in figure 6. 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 4**

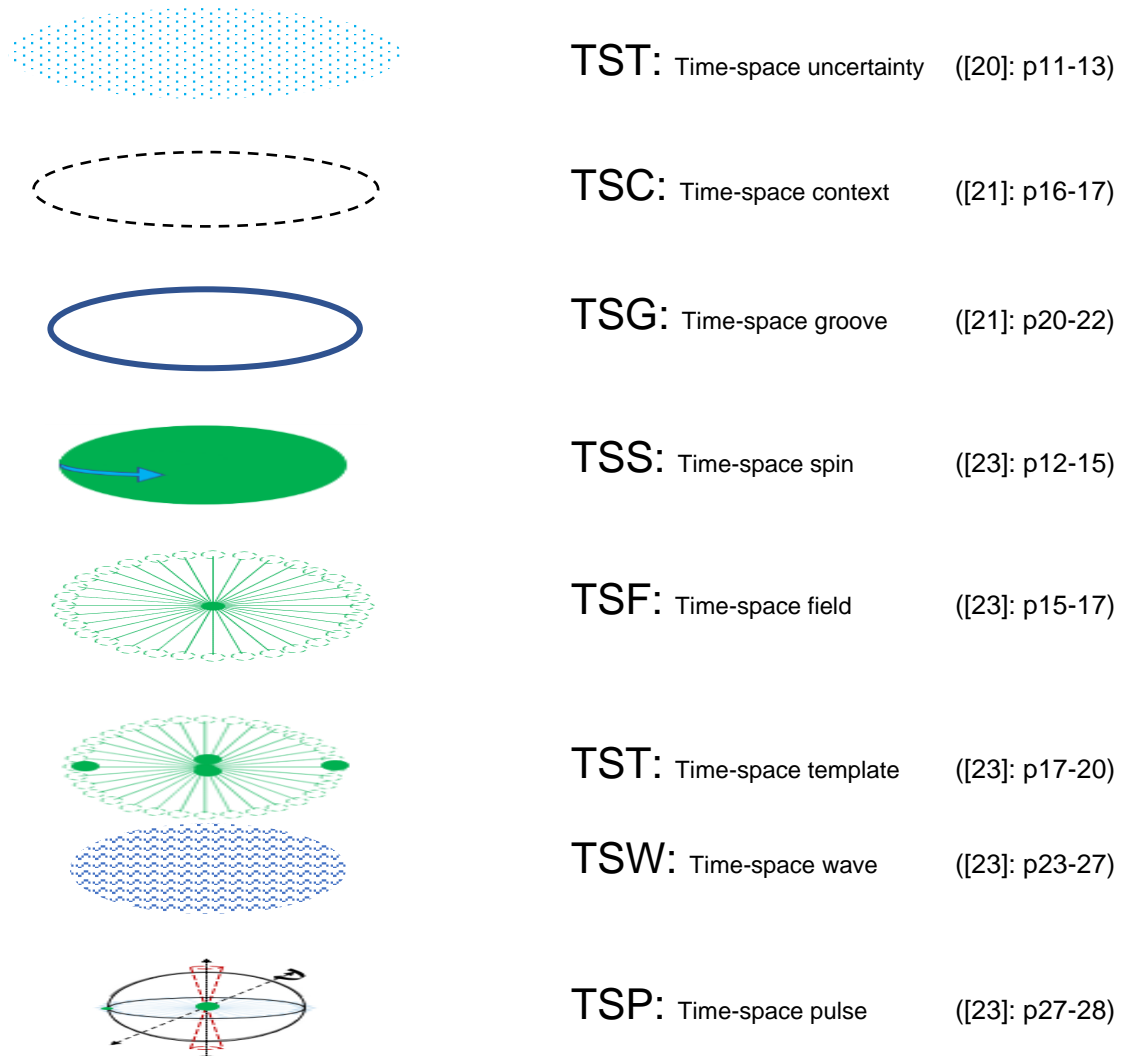


**Figure 4:** overall spherical context of 3-d space in regard to a proposed *locale* of time-points, here taking a sliced view in the  $x, z$  axis plane for figures 5 and 6.



Figure 5 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 4.

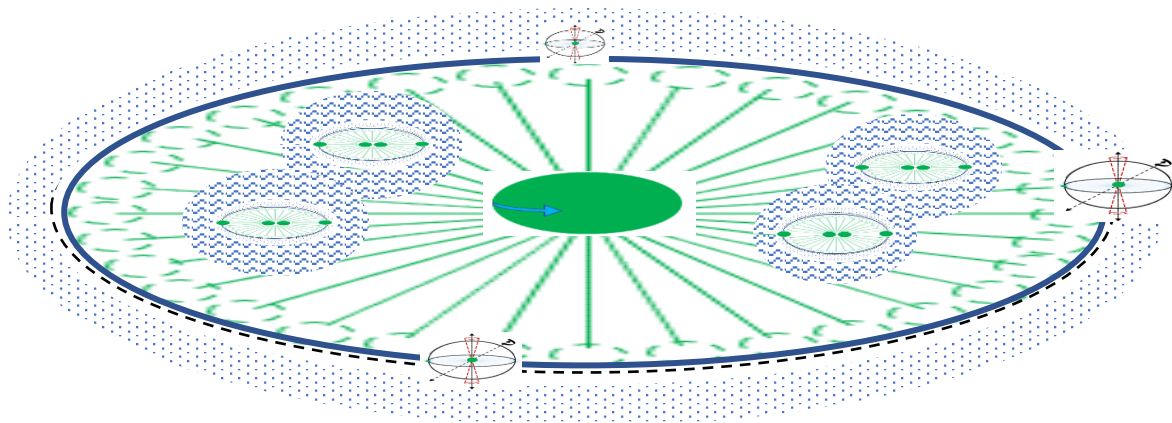
**Figure 5**



**Figure 5:** 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 6).

Figure 6 makes the attempt to arrange the *time-space principles and conditions* of figure 5 together in the one  $x, z$  plane.

**Figure 6**



**Figure 6:** amalgamation of figure 5, 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 6 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 3.

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 thus, mass equated to  $\cong 5.3 * 10^{-28}kg$
- Factor this by  $\pi$  and the mass of a proton (or neutron) can be calculated.
  - Why a factor of  $\pi$ ?
  - The mass of the electron would have been “per”  $\pi$ , 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  $\pi$  and thus the  $5.3 * 10^{-28}kg$  value needs to be factored with  $\pi$ , 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<sup>DIR</sup> (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 ( $\epsilon_0$ ) and permeability ( $\mu_0$ ) 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 $\leftrightarrow$ 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):

$$\epsilon_0 = \frac{1}{4\pi} \times \frac{1}{Q_C \cdot c^2} = \frac{1}{4\pi \cdot k_e}$$

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: 
$$e_e = \frac{m_e}{\varepsilon_0 \cdot \mu_0} \quad (1)$$

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 (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 thing 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  $\pi$  length in each direction (eq. 3), the other as  $t_B^2$  result extending  $22\pi$  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  $\pi$ .*

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

$$t_B^2 = \frac{m_e}{\varepsilon_0 \cdot \mu_0} \quad (2)$$

Thus:

$$t_B = \sqrt{\frac{m_e}{\varepsilon_0 \cdot \mu_0}} \quad (3)$$

Knowing those values produces the following:

$$t_B = \sqrt{\frac{9.11 \cdot 10^{-31}}{1.11 \cdot 10^{-7}}} = 2.86 \cdot 10^{-12} \text{ s} \quad (4)$$

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  $\varphi$ ; we can say that it appears the value for  $\varphi$  offers the idea of “10”  $\pi$ -steps (eq. 6), and thus what would appear to be  $10 \left(\frac{-1}{\varphi}\right)$ , (the true value for  $\pi$ ) steps*

to arrive at the almost exact value for  $\pi$ . Yet of course this is a value for a  $t_B$  value of magnetism ( $\varphi$ ) by considering using  $10\pi t_A$  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:

$$t_B = \frac{21.8}{10} \cdot \sqrt{\frac{9.11 \cdot 10^{-31}}{1.11 \cdot 10^{-7}}} = 6.235 \cdot 10^{-12} \text{ s} \quad (5)$$

As a value of frequency, this represents

$$t_B^{-1} = 160 \text{ GHz} \quad (6)$$

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  $\Lambda$ CDM 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 2.
- (iii) The temporal value of this energy, as per the vacuum constant ( $\epsilon_0$  and  $\mu_0$ ) and the energy of an electron, as per equation 1,  $e_e = \frac{m_e}{\epsilon_0 \cdot \mu_0}$ .

Such eliminates the  $\Lambda$ CDM 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 2). 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 calculated 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 ( $\epsilon_0$ ) and permeability ( $\mu_0$ ) 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:

$$\frac{m_e}{\varepsilon_0 \cdot \mu_0} = \frac{21.8 \cdot V_A}{N_A} \quad (7)$$

$$N_A \cdot m_e = 21.8 \cdot V_A \cdot \varepsilon_0 \cdot \mu_0 \quad (8)$$

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  $\Lambda$ CDM 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]-[23], 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  $\sim 1.1 \times 10^{16}m$ . Thus, the factor level for distance regarding  $E^2$  for space would be:*

$$\frac{0.2}{19.8} \times \frac{V_A}{1.1 \times 10^{16}} \quad (\text{paper 14, eq8})$$

*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:*

$$\sqrt{\frac{0.2}{19.8} \times \frac{V_A}{1.1 \times 10^{16}}} \cong 10^{-9} \text{ Jm}^{-3} \quad (\text{paper 14, eq9})$$

*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 Temporal Calculus Relativity.

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 even more relevant*. 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





structure, it would be something else entirely as a perception entity (as a different temporal perception grade), 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 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.

### 3.7 Temporal Calculus: addressing **all** the papers.

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* “ $\pi$ ”, 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 quite the opposite approach to standard physics, as it only could be, in not treating space as the fundamental metric, yet time.

### 3.8 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  $45^\circ$  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.

## 4 Conclusion.

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 database at best of what has actually happened in that "now" spatial context. There is no bias there, which is why it works 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  $\Lambda$ CDM 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  $\Lambda$ CDM model, in refuting it rather thoroughly.

If mathematical cosmology as the metric expansion of space can never be actually physically proven, namely the  $\Lambda$ CDM (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]-[23] 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, 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 papers presented here hopefully have demonstrated such is possible.

### Conflicts of Interest

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

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