

# An Axiom of Time resolving Entropy, CP violation, and the isotropic CMBR

Stephen H. Jarvis

ORCID: <http://orcid.org/0000-0003-3869-7694>

web: [www.equusspace.com](http://www.equusspace.com)

email: [shj@equusspace.com](mailto:shj@equusspace.com)

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**Abstract:** Presented here is an axiom for time that underwrites a time-equation leading to the development of a temporal wave function for space and associated atomic locale temporal descriptors, together with forming the basis of entropy as time's arrow, a formalism of logic called Temporal Mechanics, delivering a more precise account of time as a new mathematical temporal wave function and associated calculus (presented here as temporal calculus), removing the need for probabilistic wave function mathematics (Schrödinger) and associated spatial mathematical transformation formalisms (Lorentz), delivering a temporal wave function that translates as an EM signature, able to derive all the key energy equations and constants for physical phenomena. Through this process, it can then be shown that the time-equation underwrites the process of entropy for time's arrow, while also delivering an explanation for CP violations and the isotropic CMBR.

**Keywords:** temporal mechanics; temporal calculus; axiom; time-equation; CMBR; CP violations; gravity; positron; entropy; enthalpy; Boltzmann constant; Avogadro's number

## 1. Introduction

In this paper a new philosophical axiom for time shall be forwarded describing how light as a wave and particle travels at a constant  $c$  while upholding the principle of time not passing at  $c$  while still being malleable to temporal incursions as a travelling temporal wave function in space for non-zero mass objects in relative motion to one another.

As this paper shall propose, although Einstein acknowledged  $c$  is the same for each reference in space for bodies in relative motion, he failed to recognise that “time” is also a *primary* constant for  $c$ , as a type of universal moment in each reference in space where **at**  $c$  time does not pass (despite  $c$  still conferring a wave function and particle propagation).

In short, Einstein merely described the idea of time as relative temporal incursions between non-zero mass inertial bodies in motion in regard to a  $c$ -based wave function propagation of light. Temporal Mechanics however addresses both concepts of time, the *primary* universal  $c$  time where “at  $c$ ” time does not pass, *and* the *secondary* inertial-based relative motion incursions of time for non-zero mass bodies in reference to the  $c$ -based wave function of light.

This paper follows on from the 36 previous papers [1-36] of Temporal Mechanics that bear reference to this new universal axiom for time. Presented in this paper are the following:

- (1.) Introduction
- (2.) The problem with time
- (3.) What is Temporal Mechanics?
- (4.) The time-equation and time-points
- (5.) The axiom of time
- (6.) The temporal wave function
- (7.) Entropy and CP violations
- (8.) Time as energy
- (9.) Temporal energy scales and metrics
- (10.) The isotropic *CMBR*
- (11.) Conclusion

The thinking here with Temporal Mechanics is that the right initial axiom and associated model should derive the known equations and values of physical phenomena, provided that the data exists to confirm or deny that new axiomatic base and associated derivation possibility.

As this paper shall demonstrate, our aim in studying physical phenomena should give our perception ability due credit, to accept we are a part of a physical reality that relays to us features of both space and time's arrow, time's arrow in-line with thermodynamics, and that ideally we need to arrive at a theory that concords with a translation of physical reality compatible with our ability to communicate events in time, events as they happen *in time* in a manner that is thermodynamically scripted and correct.

Here, if all physical phenomena are proposed to be based on an axiom of time, namely the time-equation and associated temporal wave function and associated temporal variables of the golden ratio, then all of such (the time-equation and temporal variables) *can only be involved* in the process of explaining physical phenomena. More fundamentally, in proposing the new axiom for time, the next step shall be to explain the arrow of time and entropy.

What is to be presented here is how from a proposed *axiom of time* a time-equation can be derived intrinsic to all generally known energy-based physical phenomena, fundamentally the CMBR, and why the CMBR is isotropic. To be explained here in executing such is the following:

- The time-equation,
- The axiom of time proposal,
- The temporal wave function
- The energy features of the time-equation and temporal wave function,
- The relationship of the time-equation and temporal wave function to microstate and macrostate energy processes,
- The relationship of those processes to entropy and enthalpy,
- The relationship of entropy and enthalpy to particle formation,
- The overall context of the CMBR to the time-equation.

In presenting such, it shall be demonstrated that an equation and associated axiom for time can sufficiently describe the idea of entropy and time's arrow.

First a contextual description of time in physics shall be presented, and what those problems of description used by physics for time may be.

## 2. The problem with time

"Time" is currently considered by physics to prescribe "*what a clock measures*". The following associated ideas for time are also considered:

- At a normal waking conscious reference, time is considered as a stream of perceived events from *time-before* through *time-now* to *time-after*, with the datum reference of reality as 3-d space existing in/with *time-now*.
- According to Einstein's relativity theory and associated data, the ultimate dynamic limit for phenomena is  $c$  at which speed time does not pass.
- Distance and time are related in that the speed of light,  $c$ , is the same for all frames of reference for bodies in motion, as first publicly demonstrated by Michelson and Morley, a result which led to the dispelling of the particle aether.

Thus, the next question is, "what is  $c$  and how is it related to *time*?"

The speed of light  $c$  in a vacuum is a universal physical constant as an exact value, considered as the upper limit for the speed at which conventional matter, energy, or any signal carrying information, can travel through space. Though this speed is commonly associated with light, it is also considered to be the speed at which all *massless* particles and field perturbations travel in vacuum ( $EM$  and  $G$ ), and

as such is proposed as a *speed limit* for all movement of particles and their field forces in space; non-zero rest mass particles can approach  $c$ , but can never actually reach it, regardless of the frame of reference in which their speed is measured.

As considered by Einstein's Special and General theories of relativity,  $c$  is considered to interrelate with space and time in the following manner:

- the speed at which the proposed light particles (or wave functions) *propagate* in a vacuum **at**  $c$  is independent both of the motion of the light (*EM*) source and of the inertial frame of reference of the observer,
- time is considered as being *secondary* to space as *temporal incursions* depending on the relative motion of objects in space, ultimately to the point of time not passing for a reference travelling at  $c$  as per  $1 - \frac{v^2}{c^2}$ , such that when  $v = c$  a "0" result is incurred for time,
- $c$  is tagged to space such that a metric expansion of space would result in a metric lengthening of  $c$ , thus proposing to solve a key cosmological problem, namely the redshift effect, by such a simple process of logic and axiomatic definition of space with light; in fact, the entire premise of General relativity is based on light being *curved* by space, and thus temporally dilated/elongated with an associated redshift, as a curvature of *spacetime* would require for that model of light with space (and time).
- Einstein's relativity theory considers that space and time are *connected*, considered as the one thing, as 4d *spacetime*, such that if time approaches a zero-value owing to a  $v$  reference approaching  $c$ , then space *bends* to handle this phenomenon, a "gravity" effect such that any  $v$  non-zero mass approaching  $c$  must require a huge amount of energy and thus become supermassive, thus incurring *gravitational effects*.

Here Einstein's *spacetime*, where all events would occur, requires that the mathematical description of phenomena satisfy a special symmetry called a *Lorentz invariance/covariance* [37] as a mathematical formulation containing the parameter  $c$ , a 4d mathematical tagging of  $c$  to the idea of 3d space to then allow for a mathematical description of events for inertial non-zero mass bodies in relative motion such that the closer a body gets to  $c$  (as  $v$ ) in respect to an absolute reference system (with isotropic *CMBR*) the slower time passes, as per the equation  $1 - \frac{v^2}{c^2}$ .

All that sounds very reasonable, yet it is quite simple in that as the term *spacetime* suggests, and not *timespace*, space is given priority with  $c$  primarily depending on the motion of non-zero mass objects in space.

The problem though with Einstein's description of time is that there is no explanation for how:

- time moves in one direction as time's arrow,
- time's arrow concords with the idea of increasing entropy,
- time's arrow is associated to CP violations,

- time's arrow would link the quantum arrow with the thermodynamic arrow.

Here Temporal Mechanics shall solve such issues.

### 3. What is Temporal Mechanics?

Temporal Mechanics proposes an improvement to the description (and associated mathematical priority) of time by the following steps of development:

- a definitive temporal observer reference as a temporal-perception based time-equation,
- a temporal wave function as the time-equation adapted to space according to a basic process of Pythagorean Algebra utilizing the temporal variables  $(\varphi, \frac{-1}{\varphi})$  of the time-equation,
- the temporal wave function resolving its  $\pi$  anomaly in scaling/*tuning* the atomic locale accordingly,
- establishing atomic particle phenomena and associated field force effects from that tuned atomic locale.

Such a development theme has been carried through from paper 1 [1] until it was considered later in the work of the theory that it would be sensible to also propose a *theoretic grid of time-points* in space to chart the temporal wave function [20]. Such then became the "non-local *time-before* time-point" *paradigm* which could then better assist in deriving the features of *EM* and gravity in the one mathematical context, in the one mathematical formalism.

In short, *Temporal Mechanics* is a name that describes a physics that presents the case for a primary universal paradigm of time that can explain, as the name suggests, *primarily* the interoperation of that paradigm with space and thence accurately account for particles and their field forces in space without the need for spatial transformation mathematics (Lorentz-*c*) nor probabilistic wave function equations (Schrödinger).

To achieve such, Temporal Mechanics develops its own *temporal calculus* based on a time equation applied to space according to a Pythagorean Theorem *Algebra*, a common, simple, and basic underlying mathematics, common to all the discipline streams of physics, all according to an *intended phenomena design (IPD)* process ([34]: p10), or quite simply, according to known data.

The *temporal calculus* Temporal Mechanics [1-36] started from an initial consideration for a new algorithm for time as the initial "*time-equation*" [1], which then became a formal *temporal calculus* at paper 20 [20], which then became a *Temporal Mechanics* per-se at the stage of paper 27 [27], only to then finally present the case of the general new 5-point *postulates* for time at paper 30 ([30]: p12-13), yet each stage still a subsidiary stage to the next, as follows:

Time-equation:	papers 1-35 [1-35]
Temporal Calculus:	papers 20-35 [20-35]
Temporal Mechanics:	papers 27-35 [27-35]
Non-local time-points:	papers 30-35 [30-35]
Summaries:	papers 31-35 [31-35]

Initially, paper 1 [1] presented the time-equation ( $t_B + 1 = t_A$ , where  $t_A = t_B^2$ ) setting the basic features in play for that time-equation relevant to human temporal perception. That time-equation then assumed the shape itself of the golden ratio algorithm as a natural derivation.

Paper 2 [2] then developed upon this golden ratio algorithm in having it represent a temporal wave function in space, called the *phi-quantum wave function (PQWF)*, that had both particle and wave features. In other words, a process of modelling was set upon for that time-equation.

A series of papers were then developed up until paper 8 [8] where the time-equation was formally reviewed again, fine-tuned, using a different derivation approach.

Consequently, it was not until paper 30 [30] (having analysed the entire issue itself of Bell's Theorem in paper 29 [29] and how that can be resolved using the time-algorithm) that a non-local time-point paradigm was considered as the fundamental basis for the new proposal for time.

Following paper 30 [30] were papers 31-35 [31-35] as 5 general summary papers of the Temporal Mechanics work. Through that summary process it became evident what Temporal Mechanics could explain, namely a grand link between the idea of the atomic reference and a universal microscopic-macroscopic energy scale.

#### 4. The time-equation and time-points

Two key themes became apparent, namely the primary time-equation, and the secondary non-local *time-before* time-point realm (or theoretic time-point *aether*).

The time-equation as presented in paper 1 ([1]: p3-4, eq1-6) forms the basis of the phi-quantum wave function (*PQWF*) (replacement of the Schrödinger equation) with its already intrinsic transformation spatial play, as presented in paper 2 ([2]: p3-11), and then re-derived via another process in paper 8 ([8]: p2-4):

*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's 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  $t_N$ .*

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

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).

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

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.)

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

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

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

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

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.)

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

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

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

This time-equation explains the golden ratio being integral to the arrow of time.

By such, the idea of  $c$  as a constant for all relative observers became mathematicised and thus mathematically axiomatic.

To assist in the description and plotting of temporal events in space as “points” relevant to particles, a “non-local *time-before* time-point” realm was proposed. Here, space is considered as local, and if time is not space, time as a point is presumed to be non-local if it is out of the *time-now* datum reference, and thus *time-before*, a definition reached in paper 30 ([30]: p10-15) after descriptively comparing the *temporal calculus* of Temporal Mechanics to Bell’s Theorem, paper 29 [29]. Subsequently, in paper 30 were proposed 5 principles of simplicity ([30], p12-13):

- (A) *Space is an infinite void, a nothing, that when considered alone has no in-built ruler or measurement mechanism to measure its dimensional scope or size, other than time.*
- (B) *Time, or Temporality, is the concept of a uniform “time-now” event in space that is preceded by a pre-now (time-before) event of time-points and followed by an unknown time-after realm; the time-before realm in being non-local as an infinite array of infinitesimal time-points in symmetry with one another, a non-locality of time-points (time-before) in a uniform field of time-after*

*potential time-points via time-now, creating an arrow from time-before into time-after via a perceptible local datum reference time-now realm.*

- (C) *A datum frame of reference in the time-now realm, namely a locality, is what our consciousness naturally assumes, within this entire structure, as how there becomes the idea of a measurement process in space by identifying a network of non-spatial (non-local) time-points to prescribe a locality in space (reference in space), as upheld by the perception-based time-equation (arrow) leading to a mandate for 3-d space.*
- (D) *Energy, the concept of transmission of a time-point datum-reference from one time-point datum-frame of reference to another at a "fixed"/constant speed, is how one datum reference acknowledges another via this transmission of energy, as the arrow of time, as non-local time-point energy transmission at a constant rate (commonly understood as light).*
- (E) *Mass being the result of a time-point pairing, as one time-point joined to another as a new datum reference, as a destructive interference resonance (DIR) energy transmission (folding-over of data-transmission), as a time-point DIR interference producing the idea of a unique locality in space by this interference of time-points, a destruction of non-locality to produce locality, a locality which as mass associates with space to present with the need for itself to represent a uniform drive of spatial homogeneity as thus a general mass-force of attraction as the force of gravity (as shall be explained).*

Now can be scripted an axiom to acknowledge that such phenomenal features for time are in fact well known enough to our perception ability to be considered as an axiom.

## 5. The axiom of time

An axiom, as defined by Meriam Webster [38], is as follows:

- 1:** *a statement accepted as true as the basis for argument or inference*
- 2:** *an established rule or principle or a self-evident truth*
- 3:** *a maxim widely accepted on its intrinsic merit*

An axiom is quite simply a postulate, or even more simply an assumption, a starting point of proposal for further reasoning to be developed upon. It is thus considered as a basic premise.

In philosophy, an axiom refers to what is categorically true, entirely self-evident.

The *primary philosophical axiom* proposal for time can be reached in considering that time (as is self-evident to human perception) as *an arrow* is based on three basic concepts, namely *time-before*, *time-now*, and *time-after*, where *time-before* is the past, *time-now* is the universal datum-reference of perception, and *time-after* is the future as a type of unknown paradigm, all as our perception holds to be



self-evident and true. From that primary philosophical proposal, as an axiom, can be derived the mathematical axiom, the time-equation.

Fundamentally therefore, the universal time axiom proposed by Temporal Mechanics is based on fundamental and self-evident features of human temporal perception, namely that the arrow of time has three features, time-before, time-now, and time-after, where the datum reference of perception is held in time-now.

What does such have to do with universal time for being a mathematical or physical process?

Universal time is the key physical *axiom* here, namely that from that initial philosophical axiom is an associated mathematical axiom, a time-equation, as  $t_B + 1 = t_B^2$  where  $t_B$  is time-before, time-now as  $t_N$  is the value of "1", and time-after as  $t_A$  is  $t_B^2$ , and that the idea of universal time as time-now is as "1", as though time here is a constant, as "1", harbouring passage from time-before to time-after, yet time-now being a universal moment. In other words, there exists a "constant" for time in the *time-now* realm, and as a constant, it suggests the passage of time in *time-now* is universal, or more simply, for any and every reference in *time-now* space, there exists a moment, a unit concept of time, a *time-now*, such that there exists a basic paradigm where time is a constant **for separate references of space**, thus conveying a type of *symmetry* in time that would imply that all physical processes in *time-now* are equitable, *whenever* they are measured, an idea proposed by Emmy Noether [39].

From those first two axioms comes a third, namely that the speed of transmission between any two time-now datum-references is "c", or in other words, in the context of a universal time paradigm as a moment where time does not pass, time **does** pass "between" different datum-references in space in the context of c.

Such are the universal time axioms, neatly as follows:

- (i) *That the arrow of time has three features, time-before ( $t_B$ ), time-now ( $t_N$ ), and time-after ( $t_A$ ), where the datum reference of perception is held in time-now.*
- (ii) *From that initial philosophical axiom (i) is an associated mathematical axiom, a time-equation, as  $t_B + 1 = t_B^2$  where  $t_B$  is time-before, time-now ( $t_N$ ) is "1", and time-after ( $t_A$ ) is  $t_B^2$ , and that universal time as time-now is as "1", as though time here is a constant, as "1", harbouring passage from time-before to time-after, yet time-now being a universal moment where time does not pass.*
- (iii) *From those first two axioms comes a third, namely that the speed of information transmission/communication between any two time-now datum-references is "c", or in other words, in the context of a universal time paradigm as a moment where time does not pass (ii), time **does** pass "between" different datum-references in space in the manner of c.*

To further describe this process, the idea of time as time-points in space was developed, given the time-equation primarily relied on  $t_B$  as per the time-equation; thus *time-before* time-points were

envisaged as a *field* of time-points, a “potentiality” of points for *time-now*, held in a *time-before* realm, as a *non-local* realm compared to space in the *time-now* datum reference.

From this *time-before* time-point realm the idea of time-points inter-relating with each other was developed upon, and how they would do such with the idea itself of space using Pythagorean Theorem Algebra ([2]: p3-11), noting the following simple definitions for points and lines as proposed by Euclid in carrying the work of Pythagoras, as presented in “*God Created the Integers: The Mathematical Breakthroughs that Changed History, edited by Stephen Hawking, p7*”. [40]

1. A **point** is that which has no part
2. A **line** is breadthless length
3. The extremities of lines are points
4. A **straight line** is a line which lies evenly with the points on itself.

Using those basic Pythagorean principles, the concept of space in *time-now*, in the datum reference, was thus derived from the time-equation ([2]: p3-11).

The next step was to propose how time-points relate in space, and this was achieved using the concept of a *speed for transmission* between references in space, a speed of information transmission held at a constant value despite the reference or relative motion of those references, as the value of  $c$ , a level at which, a speed at which, care of axiom-(ii), time would not pass.

Therefore, from the most basic philosophical axiom, axiom-(i), came a mathematical axiom, axiom-(ii) for the universal moment of time *for each reference in space*, and then a combination implying that information transfer between time-points through the datum reference of time-now is held at  $c$  as axiom-(iii).

The subsequent steps from the initial philosophical axiom, axiom-(i), that Temporal Mechanics makes is in establishing how the time-equation, axiom-(ii), leads to a *time-now* wave function in space deriving the value of  $c$ , axiom-(iii), as the speed of wave function development/progression between different spatial datum references, **at** which speed nonetheless time does not pass, axiom-(ii).

Papers 31-35 [31-35] presented a general overview of this process, with paper 31 [31] representing the primary account of time-space-circuits, as strings of time-points forming circuits that describe the behaviour of  $c$  with particles, whereby the known values for particles and field forces are derived.

By comparison, what did Einstein propose? Technically, Einstein presented postulates, not philosophical and mathematical axioms per se. The two key postulates he presented are as follows:

- *The laws of physics take the same form in all inertial frames of reference.*
- *The speed of light in free space has the same value  $c$  in all inertial frames of reference.*

Note here Einstein’s focus being on “inertia” in holding that light carries the concept of inertia via its energy, and that light as  $c$  is a “constant” for all inertial frames of reference.

Philosophically regarding time, if not mathematically, Einstein stated that “*time is what a clock measures*”. Such is not an axiom, as an axiom cannot rely on the invention of something such as a clock. Indeed, the concept of a clock has been used to uphold Einstein’s relativity theory for time while so very delicately not confronting the idea of time not passing at  $c$ . Simply, *Einstein failed to properly define time*, and subsequently failed by a factor of  $10^{121}$  to calculate the energy of space (cosmological constant problem).

Here Temporal Mechanics has gone beyond the postulates of Einstein towards defining the idea of time in regard to space, as per based initially on a philosophical axiom (i), and then a mathematical axiom (ii), and then both (iii), thence correctly deriving the value for the energy of space, the vacuum energy, avoiding the need for dark energy and dark matter.

## 6. The temporal wave function

The answer Temporal Mechanics has found is that “light” is indeed not a *particle* “primarily”, despite having particle features, yet a *wave function* in a hypothetical time-point paradigm, “*primarily*”, and should not be equated as a mass analogue as a particle “*primarily*”, and that to resolve the measurement of particles is space the idea of light as  $c$  needs to be primarily grounded with “time” as a communication between points in a time-point aether-type paradigm, and not *primarily* space yet a primary theoretic non-local *time-before* time-point paradigm which nonetheless must derive particle behaviour from the association of “time”, “space”, and  $c$ , which Temporal Mechanics thoroughly executes; as Temporal Mechanics can demonstrate, the “*particle*” feature of light is an *effect* of a more primary wave function, as initially presented in paper 2, pages 4-11 ([2]: p4-11),

*Note the following five key points:*

- *The two possible wave function outcomes for the x-axis (nominated here as the spatial axis) in space represent the two directions the temporal wave function would move along each axis in space, one needing to be the opposite direction of the other in space, and thus inverse wave-sign value (y-axis -ve, and +ve) at the “0” point of the x-axis and y-axis in recognition of this basis.*
- *Therefore, along those two directions of space (along the x-axis) for this wave function would represent two temporal phase alignments, one positive (y-axis +ve), the other negative (y-axis -ve), suggesting a type of paradoxical condition of time-forward and time-reverse for the wave function moving along either direction of the x-axis from 0.*
- *Paradoxically therefore, this wave function, having both positive and negative temporal features, would appear to have time stand-still, not*

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

- Along each directional x-axis from 0 we must also nonetheless satisfy each wave function step to having traversed along each directional axis (here the x-axis) the value of " $\pi$ " as a "unit" wave function length in space.
- The question to ask is how well this wave function is able to prescribe the value of  $\pi$  based on how it is mathematically defined from the temporal realm and associated time-equation in its application to space (here as the x-axis).

On simple observation, we can suggest that we have developed a sinusoidal time-wave along a spatial axis given that time must move a value of  $\pi$  in each directional axis from the 0-scalar spatial reference point "0".

Yet is such a standard sinusoidal wave as mathematics/physics knows it? No it is not. The important features to note here are that:

- this is **not** a simple linear wave in space,
- this is a time-wave in space with both positive and negative temporal features,
- the implication being that time forward is positive and time-reverse is negative (y-axis).

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

This feature will ultimately play a key role in explaining the particle nature of light and how at c time does not pass, to be presented in subsequent papers. Consider nonetheless an adaptation of figure 8, here as figures 8a and 8b:

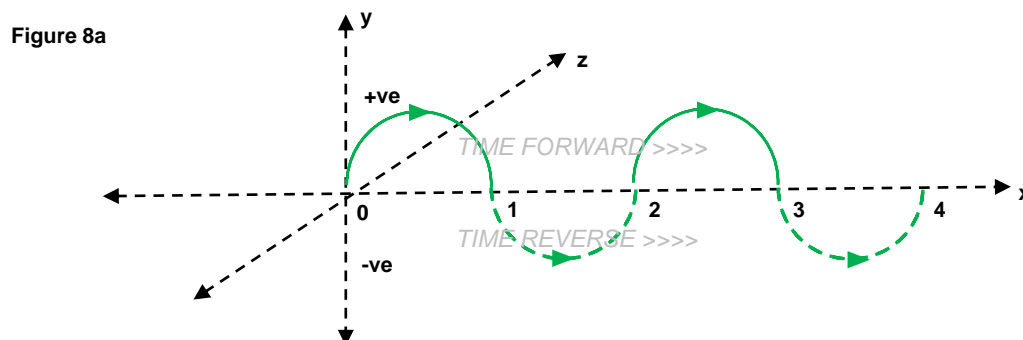
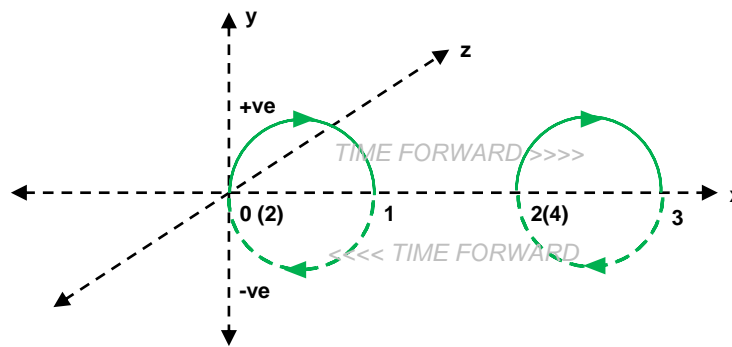


Figure 8b



**Paper 2, Figures 8a-8b:** note the primary temporal wave function as figure 8a, and the secondary time-circle “particle” effect of that wave function as figure 8b, both wave functions demonstrating the idea of time being an overall loop (not passing) as the progression of the temporal wave function, yet figure 8a being the primary focus for this paper and subsequent papers. Note also in figure 8b the time-reverse feature of values in brackets for the x-axis, as from figure 8a.

Note the time-circles in figure 8-b, how the negative region of the y-axis as time-reverse brings that part of the x-axis wave function back a step (in being time-reverse), twisted backwards, creating a time-circle as a type of time-now “virtual particle-ring”, giving light an almost particle-hopping nature as it would progress along either direction of the x-axis from 0, almost like the light particle-ring is tunnelling as it trains along each direction of the x-axis from 0.

This particle feature though is a secondary effect of light and as such is not considered part of the primary focus of examining the temporal wave function, yet will be pursued as a discussion point in subsequent papers.

In short, the focus primarily here is how well this temporal wave operates primarily from first principles, and subsequently here how it must deliver  $\pi$ , and this will be a consistent theme through this paper and subsequent papers, namely focussing on the primary temporal wave function and not its secondary apparent particle effects, which without understanding the fundamental processes at play would be a misleading investigation.

Indeed therefore, the issue with  $\pi$  is the question of, “why assume that time as this wave would “move” through the axes of space continually as though beyond the length of  $\pi$ , extending outwards to infinity from 0, as opposed to just going back and forth along a “0.5” and “-0.5” x-axis grid presuming to trace  $\pi$ ?”.

Note therefore the following:

- It is all about the time equation and how we have installed time into space.
- Yet installing time into space requires the time equation to be modified, adapted, given space is a different creature to time, as per equation 2.
- To note is that we cannot modify  $t_N$ , only how time as  $\varphi$  or a  $\frac{-1}{\varphi}$  entity is applied to space as an “after” and “now” event.

- We do know though that  $t_A$  must aim (as a mechanism of a spherical wavefront in time, a future placement of the wave function, a  $t_A$  event) to ultimately most basically for one axis (here the x-axis) **equal the value of  $\pi$ , the length in space time has moved along an axis (as per equation 2).**

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

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

## 7. Entropy and CP violations

The arrow of time is the idea of a "one-way direction" or "asymmetry" of time. This asymmetry may have seemed apparent as the time-equation presented in paper 1 ([1]: p3-6) as  $t_B + 1 = t_A$  (where  $t_A = t_B^2$ ), yet the arrow of time is primarily a feature of entropy; technically therefore, the idea of time-before and time-after connotes an arbitrary reference for causality (before) and effect (after) in the context of a unidirectionality of time. The question is, "why is there a unidirectionality as increasing entropy **AS** the run of the time-equation?"

The answer is that the run of the time-equation is a defined construct, a defined condition that describes the idea of increasing entropy with time's arrow, apparent as time-before going to time-after via the datum-reference of time-now **AS** the run of the time-equation in view of the non-local time-before time-point realm.

How can this time-equation "increasing entropy" feature be further defined? There is only one real way of explaining entropy, and that is as two processes, namely on the microstate level and on the macrostate level where the internal energy of a macrostate is the mean overall number of microstates of that macrostate's energy.

The macrostate level, as per classical thermodynamics, considers entropy as:

- demonstrating how an extensive thermodynamic variable can show that heat transfer is proportional to the temperature of a system,
- that of an isolated system which always increases for irreversible processes,
- characterized by plainly observable average quantities,

- a primarily *experimental* definition.

On the *microstate* level, as per statistical mechanics, *entropy* is considered as:

- the statistical behaviour of the microscopic components of the system as the measure of *uncertainty/randomness/disorder*, which remains about a system after its observable macroscopic properties (temperature, pressure, and volume) have been accounted for,
- the degree to which the probability of the system is spread out over different possible microstates (molecular details), the more such states available to the system with measurable probability, the greater the *entropy*.

The proportionality between the microstate and macrostate is given by the Boltzmann constant as *energy per temperature*. How does Temporal Mechanics deliver an explanation for the microstate and macrostate levels?

The microstate level is considered to be primarily a measure of the time-equation, of the temporal wave function, and associated *time-before* time-points. The macrostate level is considered to be a measure of the overall resultant compression scales in play (temperature) related to the temporal wave function of the atom.

Essentially, with a greater activity of microstates there is a greater effect of temporal wave function compression incursions (and thus temperature) in play, the limit of which is described in paper 36 ([36]: p22-29) in its derivation of the maximum general heat-temperature limit (compression scale, macrostate) allowable for a temporal wave function condition (microstate) in calculating the maximum *SOL* mass, directly linking the idea of *entropy* to a quantum mechanical (here as the temporal wave function) phenomenon, yet not only a temporal wave function event, yet that of gravity as the run of the time-equation.

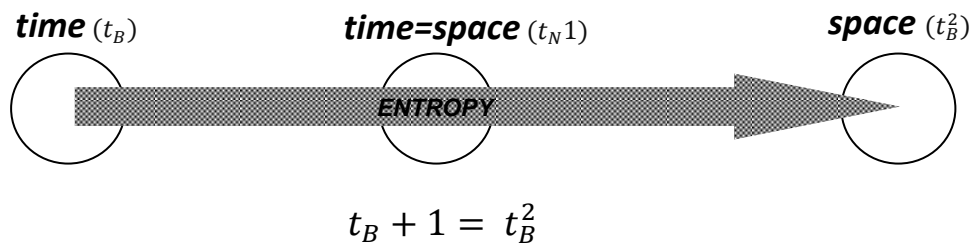
In short, Temporal Mechanics presents 2 key ideas central to the idea of energy as associated to the temporal wave function and non-local *time-before* time-point aether:

- the conveyance of *information* as this temporal wave function **as** *c* (and thus the run of the time-equation) between the time-points as the basis for the idea of energy (presented throughout papers 2 [2] and 3 [3]),
- the primary run of the time-equation, of *time-before* to *time-after*, being the idea of *time-after* as  $t_B^2$  representing *increasing microstate randomness* of the *time-before*  $t_B$  time-point realm, namely  $t_B > t_B^2$  and thus *entropy*.

Consider figure 1 demonstrating the run of the time-equation, noting the process derived in paper 36 for gravity regarding *time = space* ([36]: p22-29):



Figure 1



*Time's arrow as entropy as "time = space" as gravity*

**Figure 1:** a basic portrayal of time's arrow and associated time-equation as the process of entropy noting from paper 36 ([36]: p22-29) is explained the association of *time = space* as gravity and thus time's arrow, and thus *entropy*.

To now note is that the idea of *enthalpy* must be incorporated into the temporal wave function process, and how this is proposed to happen is through a process of *destructive interference resonance (DIR)* of the time-equation and associated temporal wave function (*PQWF*), a process Temporal Mechanics proposes to be instrumental in *particle pair production*, primarily (yet not necessarily exclusively), as a dual process of entropy and enthalpy, as per the following:

- The formation of matter as a process of *enthalpy* is capped by the maximum-minimum mass limit, as presented in paper 36 [36]: p22-29), fundamental to the absolute limit for the gravitational field force viability, gravity as a process of *entropy*.
- *Entropy* and *enthalpy* despite being two different processes are *related* to each other as the *overall* time-equation agenda with space, an overall steady-state system ([36]: p26-28).
- Gravity is thus an *apparent* concept of *negative energy* in that it is *entropic*, having mass therefore under its influence *become more kinetic*, namely put in a higher energy state context.
- The formation of antimatter is a capped process in being a process of *entropy* per-se.

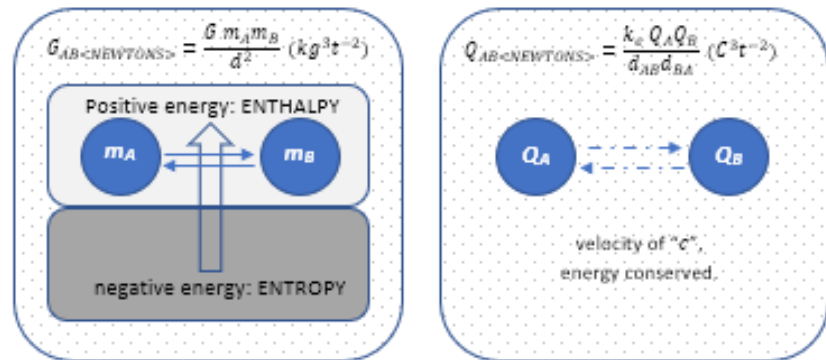
Here, Temporal Mechanics proposes that matter *formation* represents an *enthalpic* process, and that *antimatter* formation represents an *entropic* process.

Once again, Temporal Mechanics finds that the concept of gravity is a concept of *negative energy* in that it is *entropic*, having mass under the influence of gravity become more kinetic, compared to mass-formation being *enthalpic* [21-22] given that *gravity* is a concept of *time-before* seeking *time-after*, as though a *DIR* of the *PQWF* (*time-before*) abiding by the idea of space (*time-after*), as though *time-before* abiding by *time-after* primarily, as the axioms prescribe, and thus namely that gravity is a



consequence of a *DIR* effect of the *PQWF* behaving according to  $t_A$ , to the *time-after* paradigm, being *entropic*. This is formulated in paper 21 ([21]: p16-17), and then further explained in paper 22, figure 1 ([22]: p6, fig1), comparing the energy dynamics of mass and charge:

**Paper 22, Figure 1:** highlighting the difference of energy transfers in space in regard to  $G <m_A-m_B>$  and EM  $<Q_A-Q_B>$ .



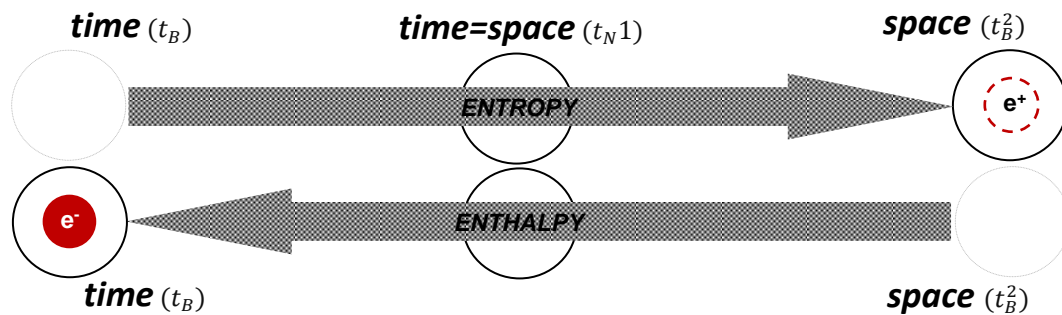
Temporal Mechanics therefore finds gravity to be a *primary process* of the time-equation. Further to this, as presented in paper 35 ([34]: p26-30), Temporal Mechanics derives the value for  $G$  as a sub-Planck spatial mathematical effect of mass needing to equalize itself with time as per  $G = 12 \cdot \left(\frac{2}{3}\right)^2 \cdot \frac{21.8}{22} \cdot \pi \cdot c^3 \cdot M_{MG} = 6.67 \cdot 10^{-11} kg m^3 s^{-3}$  ([34]: p29, eq3).

In short, Temporal Mechanics proposes that the time-equation is intrinsic to known phenomena and data for mass, gravity, and light, except that the description by General relativity regarding those phenomenal entities differs to Temporal Mechanics in Temporal Mechanics being based on the new axiomatic inclusion of universal time at  $c$  where time does not pass as per the time-equation and associated temporal wave function.

As noted, there is a key exception regarding antiparticles, namely antiparticle entities proposed to represent an *entropic* process of formation ([25]: p48, fig15) intrinsic nonetheless to *particle pair production*, a process though that is consequent of the *breaking of inherent symmetry of the time-equation through the DIR process*, leading to a state of asymmetry central to particle pair production, responsible for the energy and thence location asymmetry between particles and antiparticles in their formation (to be further discussed in a subsequent paper).

Simply, the proposal is that *particle pair production* is an entropic-enthalpic event that leads to two key particle results, standard particle formation as being *enthalpic* (the resultant mass) and antiparticle formation being *entropic* (and thus proposed to be absorbed by the time-equation process given the time-equation is primarily *entropic* as the run of time); such is as though the antiparticles themselves (and their entropic status) are proposed to fuel the process of the time-equation in their being absorbed by the time-equation process, the process of *entropy* and thus gravity itself, fuelling the so-called force of the time-equation and thus *entropy* itself. Consider figure 2:

Figure 2



**Figure 2:** a basic portrayal of time's *arrows* as the entropic and enthalpic processes of antimatter and matter formation respectively in the process of particle pair production.

Here, the description is central to *entropy* being a process of antimatter ( $e^+$ ) formation, and *enthalpy* being a process of matter ( $e^-$ ) formation. Note that electron formation ( $e^-$ ) is the fundamental basis for a  $t_B$  result ([23]: p13-14).

The key implication here with this proposal is that matter ( $e^-$ ) would be favoured over antimatter ( $e^+$ ) as a resultant particle datum reference, simply because the process of *entropy* represents a  $t_A$  result with an increasing microstate load ( $t_B^2$ ). Such a process is proposed to resolve CP violations, namely that in the process of *particle pair production* (as a general *entropy-enthalpy* event in a steady-state reality) “matter” is preferred over antimatter ([25]: p48-49, fig15).

## 8. Time as Energy

If therefore the arrow of time can concord with the idea of *entropy*, and the arrow of time can represent an equation per se, then there would exist with that equation a process of explaining how energy operates, if not exist equations related to the time-equation describing processes of energy and temperature for physical phenomena both on the microscopic scale and macroscopic scale. Such has been one of the most difficult plays for Temporal Mechanics, namely not just correctly describing how the time-equation can represent an energy process, yet to properly describe the varying energy processes in play with physical phenomena using the time-equation (and its associated temporal variables) and associated temporal wave function (and its associated temporal variables).

For instance, the first attempt of relating the time-equation to the concept of energy was by first *establishing* the time-equation [1], then relating that time-equation to space as a temporal wave function [2] with those specific golden ratio temporal variables of  $\varphi$  and  $\frac{-1}{\varphi}$  for  $t_B$ , and then establishing how pixilated that temporal wave function could be and according to what scale of error would exist with the

derivation of the Planck scale [3]. Following this in paper 4 [4] was presented an account of how particles could form in the atomic locale as per a process of temporal wave function *folding*, or more precisely *destructive interference resonance (DIR)*, thus presenting an overall package of ideas for time, *EM*, particles, and then gravity, all central to an atomic locale.

In paper 4 [4], Temporal Mechanics took the idea of the error inherent in the temporal wave function in its (the temporal wave function) seeking to trace  $\pi$ , and then married such up with the idea of a macroscopic-scale to determine what the error in the value of mass there would be, accounted for by considering that the temporal wave function compression relevant to the  $\pi$  error of the wave function in not precisely matching  $\pi$  represents a compression and thus temperature scale, namely a natural process of energy. To demonstrate such, Temporal Mechanics then derived *Avogadro's number* and related such to a temperature scale (temporal wave function compression scale) for the atom. Basically, here was the first real suggestion that the time-equation could be related to an energy scaling system (as temperature) that results in gross-scale anomalies as proposed to be executed by Avogadro's number ([4]: p12-13).

Temporal Mechanics then in that same paper [4] took a step towards establishing what the temporal variable in the time-equation would be in play with Avogadro's number, establishing an estimate for the frequency of that resultant temporal feature based on the temporal variable of the time-equation involved in the process of deriving Avogadro's number, a frequency relating to the *CMBR* ([4]: p13). It was not until paper 14 where that value for the *CMBR* frequency and associated temperature value were correctly associated to Avogadro's number ([4]: p24-25) as initially derived in paper 4 ([4]: p12-13) via such a precursory process. Nevertheless, at the stage of paper 4 [4], Temporal Mechanics considered that there was a chance that the *CMBR* was related to atomic phenomena as an energy process central to the time-equation and associated temporal wave function compression (temperature). Such was proposed initially in paper 5 ([5]: p9). In other words, the whole idea of cosmology had changed from a  $\lambda$ CDM big bang scenario presumed responsible for the *CMBR* to something more steady state and atomic based, and thus the focus for Temporal Mechanics was to consider proposing new ideas along that path.

In paper 5, titled "Time as Energy" [5], Temporal Mechanics sought to establish how the temporal variables of the time equation and associated features thereof (intrinsic to the temporal wave function) would play a role of *energy exchange* between the atom and the macroscopic scale in knowing that the *CMBR* (according to contemporary data) is an isotropic pan-space extra-atomic phenomenon. The basic consideration there was to tackle that proposition with the energy labels of *entropy* and *enthalpy*. Moreover, on top of such there was the case of needing to understand how the *CMBR* would be a relatively uniform/isotropic phenomenon in space.

The way Temporal Mechanics decided to consider a solution was to discuss the idea of a pan-space event of *quantum entanglement* between the two temporal variables of the time-equation, namely between the  $\varphi$  and  $\frac{-1}{\varphi}$  golden ratio temporal variables derived from the time-equation. Simply, the clandestine proposal there was to create a basis for a uniform *CMBR* event that was not necessarily localised to an atomic event leading to a non-isotropic *CMBR* yet a process of energy *transferred*

through space via a universal quantum entanglement process for any location in space for a temporal (and thus time-equation, and thus temporal wave function) event. Although that was a key proposal, it was not followed up further until here in this paper, section 10.

To note is that the basis for this quantum entanglement feature is per the time-equation itself and associated process of relating with space as the temporal wave function ([2]: p8-10), delivering the feature of time not passing at the speed of the temporal wave function, derived to be  $c$  ([2]: p15-16).

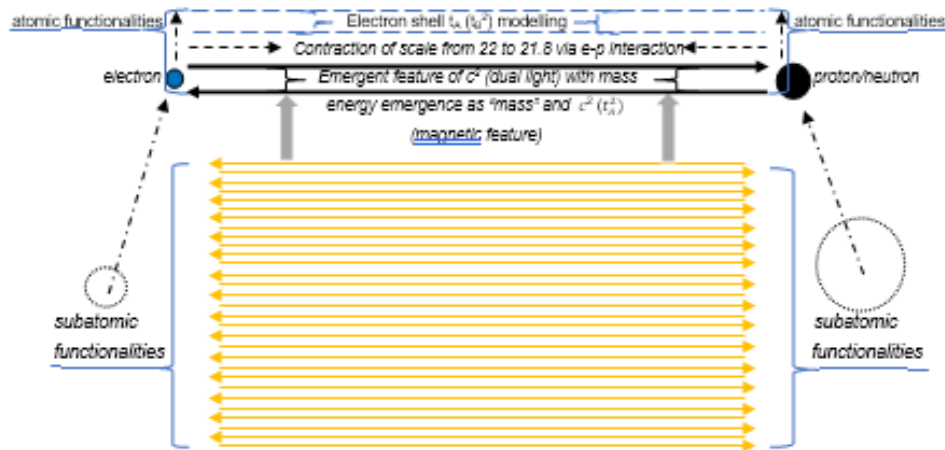
Nonetheless, the difficulty with paper 5 [5] was that it faced a completely new tapestry for cosmology theory in standing on the shoulders of paper 4 [4], paper 4 which derived Avogadro's number in the application of an energy scaling process as a process of temporal wave function compression on the atomic scale and relating such to the *CMBR* value.

The scripting of paper 5 [5] is therefore written in a way to cover as many possible bases and outcomes as possible, clearly needing to be refined upon with subsequent papers. There was though a key proposal in paper 5 [5] nonetheless regarding the performance of energy in regard to the time-equation and associated temporal wave function equations, and that was how the time-equation was proposed to relate to the idea of energy as *entropy* and *enthalpy*.

To properly grasp the difficulty paper 5 [5] faced, the following are the key equations of the temporal wave function and associated time-equation variables for the two possible values for  $t_B$ , namely  $\varphi$  and  $\frac{-1}{\varphi}$ , as the golden ratio equation:

$$\begin{array}{l}
 \textit{Time-equation} \\
 \textit{Temporal wave function}
 \end{array}
 \left\{
 \begin{array}{ll}
 t_A = t_B^2 & ([1]:p4, eq3) \\
 t_N = 1 & ([1]: p4, eq4) \\
 t_B + 1 = t_B^2 & ([1]: p4, eq6) \\
 (\frac{-1}{\varphi} \cdot -2\sqrt{3}) + 1 = 3.140919 & ([2]: p10, eq3) \\
 (\varphi \cdot -2\sqrt{3}) + 1 = -4.605020 & ([2]: p10, eq4) \\
 (\frac{-1}{\varphi} \cdot -2\sqrt{3})^2 = 4.583533 & ([2]: p12, eq5) \\
 (\varphi \cdot -2\sqrt{3})^2 = 31.416253 & ([2]: p12, eq6)
 \end{array}
 \right.$$

By the amalgamation of those equations was formed a temporal wave function with demonstrable temporal wave function *compression factors* ([2]: p13-14), *compression factors* which have been interpreted as being synonymous with a temperature scaling system, the basic compression factor being  $22 > 21.8$  wave function steps between the proposed locations of the electron and the proton-neutron for an atomic locale. This compression factor feature was further refined in paper 14 ([14]: p23, fig 6), presented further here in section 9. Coupled with that compression scale was considered/derived to be electrodynamic "subatomic functionalities" intrinsic to the derivation of  $K_e$ . Such was presented in figure 16, paper 2 ([2]: p19, fig16):



**Paper 2, Figure 16;** “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.

The question posed to paper 5 [5] was how to then link the equations for the temporal wave function to the process of the atomic and subatomic functionalities, and to then link those equations to (what is proposed to be) an extra-atomic domain of energy.

The way paper 5 [5] handled this was to define which temporal wave function equations would represent either an *entropic* or *enthalpic* process and why. To be remembered here is that the temporal wave function and associated time-equation are proposed to be intrinsic to all phenomena, and thus the description for the type of temporal wave function and associated time-equation processes in play needs to be established for all the different types of phenomena at play.

Given this was the first time such an equation process and association with energy characters had been proposed [5], the process was one of hypothesis, the key hypothesis there being that *entropy* would be a process of *the run of the time-equation*, as increasing disorder, which would represent a microstate temperature scale conforming with a macrostate temperature scale, and thus a process that would be emergent from the atomic level. Conversely, the *enthalpic* process was considered to be intrinsic to *subatomic* particle formation, its microstate feature.

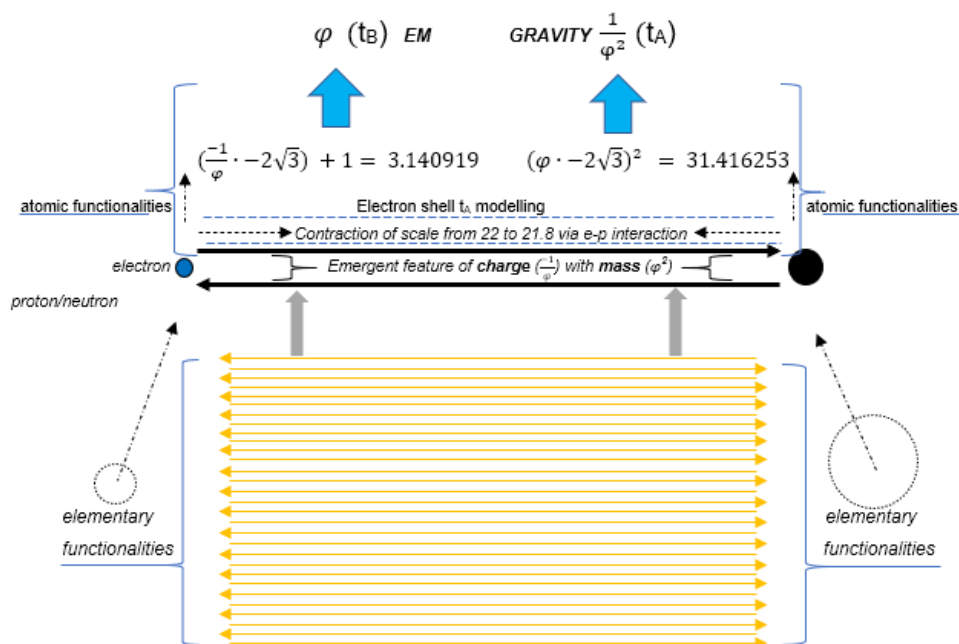
Those hypotheses were fashion in considering such to be the most practical path given how *entropy* is defined as a microstate-macrostate play, with the following equation considerations:

- $\left(\frac{-1}{\phi} \cdot -2\sqrt{3}\right) + 1 = 3.140919$  as the *electric* temporal wave function basis for *enthalpy* given the proposal that such would be intrinsic to subatomic *particle formation*.
- $(\phi \cdot -2\sqrt{3})^2 = 31.416253$  as the *magnetic* temporal wave function basis for *enthalpy* also given the proposal that such would be intrinsic to subatomic *particle formation*.

- Therefore, emerging from the atom would be both an *EM* (electric and magnetic) temporal energy process and a gravity (subatomic particle-based gravity) temporal energy process, both as *entropy*.
- The emergent temporal energy process would represent a primary time-equation process, not equations associated to the atomic based temporal wave function.
- The temporal variable of the time-equation that emerges would be of the  $t_B[\varphi]$  and  $(\frac{-1}{t_B})^2[(\frac{-1}{\varphi})^2]$  variable variety, given that  $-\frac{1}{t_B}$  and  $t_B^2$  are being utilized on the subatomic *enthalpic* level already.
- The emergent feature of *EM* and gravity would primarily be according to the  $\varphi$  and  $(\frac{-1}{\varphi})^2$  temporal variables respectively as *entropy*.
- Therefore, the emergent feature of *EM* and *G* would each represent their own specific type of time-equation run, namely  $\varphi + 1 = \varphi^2$  for *EM*, and  $\frac{-1}{\varphi} + 1 = (\frac{-1}{\varphi})^2$  for gravity.

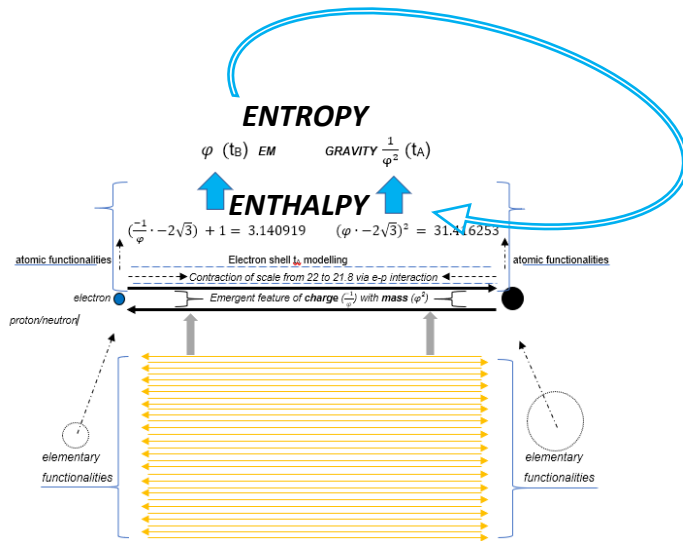
In short, paper 5 [5] made the proposal that *EM* would represent the  $\varphi$  temporal variable feature of the time-equation, and *G* the  $(\frac{-1}{\varphi})^2$  temporal variable feature of the time-equation, as a proposal.

The following diagram was proposed in paper 5 as follows ([5]: p4, fig1):



**Paper 5, Figure 1;** Note the emergence of time as  $t_B$  and  $t_A$  different to the manifestation in the phi-quantum wave function.

The next key step there was in realizing that the  $t_B$  process for  $EM$  could still nonetheless represent a  $t_B^2$  ( $\varphi^2$ ) process on the emergent level, provided that such could link its own time-equation  $\varphi^2$  feature with the  $\varphi^2$  value on the subatomic level of " $(\varphi \cdot -2\sqrt{3})^2 = 31.416253$ " and thus the notion of  $\varphi^2$  somehow linking with  $12\varphi^2$ . The thinking there was that somehow an  $EM$  energy process as  $\varphi^2$  extra-atomically would need to feedback to the general overall subatomic temporal wave function functionality of the atom of " $(\varphi \cdot -2\sqrt{3})^2 = 31.416253$ ". Such was presented in paper 5 figure 3 ([5]: p9, fig3):



Paper 5, Figure 3: THE CMBR entropic/enthalpic event.

Such is where the proposals had to stop and take measure of where those proposals were headed on a broader macroscopic scale given that paper 4 [4] presented the case of a  $CMBR$  related to this process of emergent energy from the atom as a process of temporal wave function compression (as per the derivation of Avogadro's number). Paper 5 [5] then attempted to propose how the  $CMBR$  would be related to this overall  $\varphi^2 > 12\varphi^2$  process in the absence though any demonstrable data at that time of theoretic construction.

Once again to note in paper 5 ([5]: p3-5) is the feature of how it tried resolve the idea of a uniform quantum entanglement from the temporal wave function level between the electric ( $\frac{-1}{\varphi}$ ) and magnetic ( $\varphi$ ) features for  $t_B$  of the temporal wave function ([5]: p10-11), to a general overall  $\varphi \cdot \frac{-1}{\varphi}$  quantum entanglement feature in space, as presented in paper 5 ([5]: p3-9).

Thus, in many ways paper 5 [5] presented a list of ideas that could not be assembled as one at that time of theoretic development, simply because certain levels of theoretic development were missing, key ideas relevant to what it was trying to solve, thence requiring the number of subsequent papers that followed [6-36].

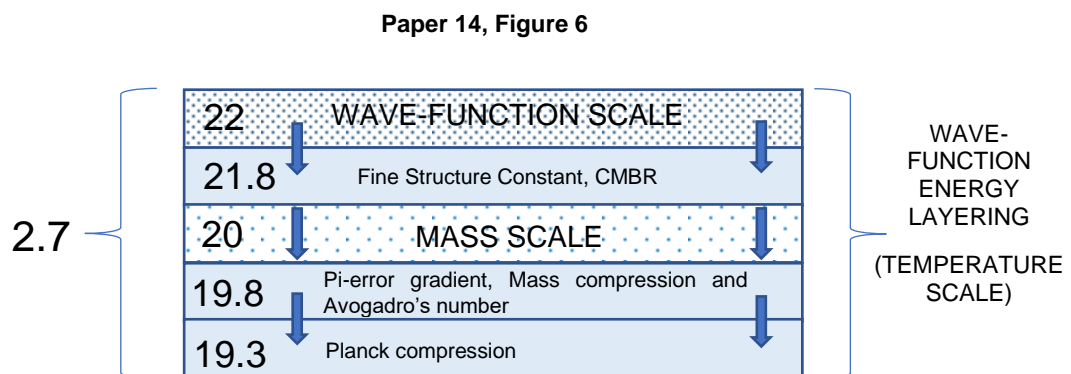


## 9. Temporal energy scales and metrics

To resolve the proposed temporal energy equations with each other and associated known phenomena, it is now important to present how the  $\phi^2 > 12\phi^2$  proposal was employed by the papers after paper 5 [5], in what regard, and with what measure of success in explaining what it proposed to, namely the *CMBR*.

Here, from paper 5 [5], the next step was to further refine the temperature/compression scales of the atom to get a clearer idea of what the *CMBR* value is and why. This was eventually executed in paper 14 [14]. There, the atomic temporal wave function locale/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]: p23-25, 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.*



*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).*

Quite simply, the "2.7" value represents an *amount* of temporal wave function incursion (erasure), proposed to represent a/the fundamental scale of temperature (Kelvin). To support his proposal, there in that paper the *CMBR* temperature value and associated frequency were correctly derived, together with the Boltzmann constant ([14]:p25):



As a refinement to the value of the CMBR, it only seems necessary to alter equation 10 from paper 4 ([4]: p17, eq10) to factor in the value of  $V_A$ , and thus as per equation 11:

$$t_A = \frac{21.8 \cdot V_A}{N_A} \quad ([14], \text{eq11.})$$

Through the same calculation process as per paper 4 ([4]: p17)

$$t_B = \sqrt{\frac{21.8 \cdot 1.079}{N_A}} = 6.25 \cdot 10^{-12} \text{ s} \quad ([14], \text{eq12.})$$

Once again, in the context of  $t_N = 1$ , as the spatial reference, as defined by the time-algorithm,  $t_N = \frac{1}{f}$ , we have a value of  $1.60 \cdot 10^{11} \text{ s}^{-1}$ , 160 GHz (per time-now), the correct observed value of the CMBR.

#### 6.2.4 TEMPERATURE SCALING AND THE BOLTZMANN CONSTANT

The concept of temperature in the phi-quantum wave-function scaling system employed here would represent a scaling system of energy according to the phi-quantum wave-function scaling system, **and thus a scaling factor of that part of the phi-quantum wave-function that is being perturbed**, and here this value would represent a value of 2.7 (figure 6) factored with the maximum length of the scaling system of the phi-quantum wave-function (22) **per** the CMBR related scaling reference (21.8), the amount from the 22 reference of the wavefunction to the 19.3 level, factored to the overall length (22) per each CMBR (21.8) scale, as a scaling of energy release from the general phi-quantum wave-function. Simply the scale **as a scale** would need to represent the "amount" perturbed in total (2.7), while being directly proportional to the overall scale (22), "per" the level of scaling the effect is being measured from (21.8). Such would represent the basic scaling of energy as a component of energy scaling, **as temperature**, in regard to the phi-quantum wave-function. Here a value of 2.725 for the (21.8) level, as per equation 14.

$$2.7 \times \frac{22}{21.8} = 2.725 \text{ (temperature)} \quad ([14], \text{eq13.})$$

Such would be a basic level of temperature measurement as according to the idea of the CMBR. So, what is the energy level of the CMBR per this scaling system? The value of energy for the CMBR as  $t_A$  would be a value according to equation 11, and thus, as per equation 14:

$$t_A = \frac{21.8 \cdot V_A}{N_A} = 3.906 \times 10^{-23} \text{ J} \quad ([14], \text{eq14.})$$

The ratio therefore of this value to the temperature scaling system (for conventionality, let us give the units of Kelvin) would be as follows, equation 15:

$$\frac{3.906 \times 10^{-23} \text{ J}}{2.725 \text{ K}} = 1.433 \times 10^{-23} \text{ J K}^{-1} \quad ([14], \text{eq15.})$$

However, the negative energy of space needs to be subtracted from this value, energy associated to space “beyond” the standard scaling system. What is the value of this negative energy of space? The energy of space as the negative energy vacuum of space would represent a “negative” value. This value can be simply extracted from equation 10,  $E \sim 10^9 \text{ Hz}$ , and applied to  $E = hf$ , as a representation of what can be measured of this energy in regard to a particle reference, despite this value not being related to the article scaling system reference, as by definition it represents space. Thus, the following equation 16 applies for a unit scaling system of space:

$$E = 6.624 \times 10^{-34} \times 10^9 = 6.624 \times 10^{-25} \text{ J} \quad ([14], \text{ eq16.})$$

*This is a negative value.*

*In taking the positive value, and subtracting the negative value, the following results in equation 17:*

$$t_A - E = 1.433 \times 10^{-23} - 6.624 \times 10^{-25} = 1.37 \times 10^{-23} \text{ J K}^{-1} \quad ([14], \text{ eq17.})$$

*This would be a measure of the energy in joules per this energy scaling system of measurement in terms of volume of space and associated scaling (temperature). This value is similar to the value of the Boltzmann constant value of  $1.38 \times 10^{-23} \text{ J K}^{-1}$ , which is not surprising, as it represents the very same concept, as the characteristic of space and thus volume for the wave-function **is the scaling system**, which can thus only represent a mechanism of **temperature/energy/heat release measurement** according to a fundamental scaling system for space regarding time and thus a wavefunction for light, as presented in paper 2 ([2]: p2-11).*

As highlighted above, the microstate is proposed to comply with the macrostate, given the microstate would underwrite the macrostate, and thus the microstate and macrostate must uphold a “constant” relationship. That relationship was derived to be the value of the Boltzmann constant. This constant value (Boltzmann) was then further refined to the exact value in paper 20 ([20]: p20):

*In the striving of the PQWF to reach  $\pi$  (as space) there can only be an **uncertainty** of the idealistic  $\pi$ -time **as “space”**, as explained, the TSU; time pursuant of space, time seeking  $\pi$  as seeking space, like light aiming to reach the pure limit of reality, **is the time-space uncertainty (TSU) principle**. In terms of “energy” therefore (as per equations 1-3), **if in time entropy is in order, of an increase in energy of the system, then this energy can only ultimately be used in conjunction with concept of enthalpy, of the PQWF (that required compression factor of  $\frac{19.8}{20}$  as presented in equation 8, paper 15 ([15]: p11, eq8), which when applied to the derived Boltzmann constant ([14]: p26, eq.17) of  $1.37 \times 10^{-23} \text{ J K}^{-1}$  gives the correct value of  $1.38 \times 10^{-23} \text{ J K}^{-1}$** , as a steady-state manifold of energy for time and space, a concept which is entirely missed by current physics and thus considered not to exist owing to contemporary physics remaining idle on spacetime theory, unfortunately relying on the sole notion of energy release with time as an increase of randomness in a reality of increasing disorder and therefore general indeterminism, which as this paper presents, is limited in its design as a theoretical proposal in a greater steady-state time and space scheme and can be better explained with the TSU.*

Basically, the above refinement is stating that the initially derived constant-relationship ([14]: p25, eq17) needed to be re-applied to the microstate atomic complex, and thus factored by  $\frac{19.8}{20}$  as per the basic compression scale for the temporal wave function, namely in using  $10\pi$  as the basic atomic magnetic microstate step ([2]: p12, eq6), simply as  $12\varphi^2$  and how such would be compressed, namely as  $\frac{19.8}{20}$  temporal wave function steps. So although the initial process factored the background temperature (macrostate), what was then required was factoring in the *overall microstate*, thence leading to the correct value of the Boltzmann constant.

The next step was to marry these known data metrics for the *CMBR* per the time-equation with the  $\varphi^2 > 12\varphi^2$  idea, namely to address the question, “what actual physical phenomena and processes are in play here with the  $\varphi^2 > 12\varphi^2$  feature?”.

Paper 25 ([25]: p40) took direct aim at paper and the  $\varphi^2 > 12\varphi^2$  feature with the following:

*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 as a time-space template (TST) on this new elementary level (TSET). Accordingly, 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.*

In accounting for this “12-factor”, in that same paper Temporal Mechanics proposed the following for the “mass gap” ([25]: p51):

*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:*

- a. The “12” factor, as presented.

- b. The fact that a new charge level is being encountered as a new electron analogue (as TSET-e<sub>1</sub>), and this would therefore invoke a new “c” factorial according to fundamental property 2.
- c.  $m = \frac{e}{c^2}$  ([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<sub>1</sub>, the value of the mass gap  $m_{MG}$ , would be as follows:

$$m_{MG} = \frac{e_c}{c} \cdot \frac{1}{12} \cdot \frac{1}{c} = 1.5 \cdot 10^{-37} \text{ kg} \quad ([25], \text{eq10})$$

To note is that the value for the lightest neutrino was derived/calculated in paper 25 ([25]: p51), precisely as  $1.486 \cdot 10^{-37} \text{ kg}$ . There, the 12-factorial was used as a feature of *mass creation*, namely  $\varphi^2 > 12\varphi^2$ , as though the charge of the electron  $e_c$  equated to the value of  $12m_{MG}c^2$ , and thus an idea of  $t_B$  (as  $e_c$ )  $> 12t_B^2$  where  $t_B^2$  is the idea of  $m_{MG}c^2$ , and that essentially the charge of the electron equates to a value of 12-times the rest energy of the mass of a neutrino  $m_{MG}$ .

What was then needed was a way to further confirm this proposal with a furthered use of the 12-factorial, not for mass, yet for gravity. Such was achieved in paper 35 in deriving the value for gravity on the scale of the neutrino, as follows ([35]: p28-29):

The next question therefore is, “what is the most **fundamental equation for gravity on this scale**”?

Given that each of the facets of the cube of the each of the first three primes are connected in having them averaged together, such represents a proxy for a **force of attraction** itself, namely the force of gravity, here as the gravitational constant (given gravity would naturally represent a proportionality between mass, and inversely proportional to distance squared), requiring the following key factors:

- How a basic particle is held together, namely as the value of  $M_{MG}$  (mass gap value, mass of the lightest neutrino @  $\sim 1.5055 \cdot 10^{-37} \text{ kg}$ ), as a force of attraction.
- How a particle exists in the context of the temporal (time-point aether) nature of space:
  - (a) The  $(\frac{2}{3})^2$  factor, per paper 4 ([4]: p6-7), namely 2 results per 3 dimensions squared.
  - (b) The value of  $\pi$ , given such is what mass is proposed to achieve, namely the general balance for the folding of a phi-quantum wave function (PQWF), as presented in paper 2([2]: p5-12).
  - (c) The 12-factor, as the mass-gravity factor for the phi-quantum wave function (PQWF), as proposed in paper 5 ([5]: p7-9, fig2-3).
  - (d) A c-scaling for each spatial dimension in play (intrinsic to  $S_0$ ) and thus a value of  $c^3$ .
  - (e) The overall atomic spatial compression factor of  $\frac{21.8}{22}$  which also must be squared, as according to (a), and thus  $(\frac{21.8}{22})^2$ .

Therefore, the following equation is proposed as a value for  $G$ , here as equation 3:

$$G = 12 \cdot \left(\frac{2}{3}\right)^2 \cdot \left(\frac{21.8}{22}\right)^2 \cdot \pi \cdot c^3 \cdot M_{MG} = 6.67355 \cdot 10^{-11} \text{ kg m}^3 \text{ s}^{-3} \quad ([35], \text{eq 3.})$$

The 12-factorial therefore ( $\varphi^2 > 12\varphi^2$ ) became considered as a mass-gravity feature, or more precisely, a particle-formation feature, and thus *enthalpic*.

The following thus can be considered for the process:

$$\begin{aligned} \varphi^2 > 12\varphi^2 &: \text{ENTHALPIC } (M_{MG} \text{ building as a 12-factorial}) \\ 12\varphi^2 > \varphi^2 &: \text{ENTROPIC } (e_c \text{ building as a } \frac{1}{12} \text{-factorial}) \end{aligned}$$

In all, the proposal is for the " $\varphi^2 > 12\varphi^2 > \varphi^2 \text{ etc}$ " cycle to represent an underlying *entropy-enthalpy* component of a general energy equation relevant to the *CMBR*. The question is how this relates to an isotropic *CMBR*.

## 10. The isotropic *CMBR*

The question now is, "how does the *CMBR* maintain its relatively even/isotropic value for this *entropy-enthalpic* " $\varphi^2 > 12\varphi^2 > \varphi^2 \text{ etc}$ " process?". Why must the *CMBR* be *isotropic*?

Indeed, the *CMBR* has been derived to represent a basic and key fundamental component of the compression scale of the atomic-based temporal wave function, and how those values of the *CMBR* (2.725K and 160Ghz) are directly related to Avogadro's number. The real question is, "why is the *CMBR* *isotropic* beyond the scale of the atom?".

The thinking here is that if the system is *flat* ( $\Omega_0$ ) in being at maximum density as proposed by paper 36 ([36]: p22-29) in deriving the maximum and minimum mass of the time-space system for  $G$  to be patent, then the energy density as the *CMBR* value must also be *flat*. The new question therefore is, "how is this flatness achieved through space?".

The answer is found in annexing the utility of time not passing at  $c$ , that key feature of the time-equation and associated temporal wave function, and those resultant features of quantum entanglement ([2]: p20-21) where the mechanism of a *systemic* quantum entanglement feature would be such that all features of the temporal wave function as  $\varphi$  and  $\frac{-1}{\varphi}$  would be in a potential immediate uniform (isotropic) entanglement with each other,  $\varphi$  in entanglement with  $\frac{-1}{\varphi}$ , as a process of  $t_B$  as  $\varphi \cdot \frac{-1}{\varphi} + 1 = 0$ , 0 being the establishment of a 0 result for time. In other words, the consequent effect for time at  $c$  where time is 0 is one of a uniform/isotropic background energy value.

Such a  $c$ -slipstream at which speed time does not pass for the conveyance of temporal variables of energy for the *CMBR* is proposed to keep the *CMBR* uniform, *flat*.

How would a temporal wave function choose to be in entanglement and by what mechanism would such entanglement happen in the context of perturbations/turbulence?

The process of temporal wave function quantum entanglement would abide by/within the following features/parameters/conditions:

- A constant  $c$  value ([2]: p15-16).
- An even  $CMBR$  value in line with the underlying common temporal wave function compression scale of atoms ([14]: p25).
- An even  $G$  value ([35]: p18-21).
- A maximum and minimum mass limit ([35]: p22-26).
- A maximum and minimum spatial scalar limit ([35]: p26-29).
- Intra-atomic  $E = hf$  ([2]: p3-4)
- Extra-atomic  $E = f$  ([13]: p10-11), [32-34].
- CP violations (entropic antimatter formation, enthalpic matter formation)
- $\varphi^2 > 12\varphi^2$ .

To note is that the  $E = f$  feature, initially presented in paper 13 ([13]: p9-13), then followed up in papers 32-34 [32-34], proposes the case of how light is proposed to behave extra-atomically, namely beyond the confines of the atomic-based  $E = hf$  condition. The evidence for the  $E = f$  proposal was in it correctly deriving the distances to the Heliopause ([32]: p15), Bow Shock ([32]: p16), and Oort Cloud ([13]: p11). This will be followed up in a subsequent paper in deriving the Kuiper Cliff and the spatial scalar value of  $SOL$ , yet to be noted here is that the quantum entanglement feature of the temporal wave function would serve all the key time-equation based phenomenal components in maintaining an isotropic  $CMBR$ . Essentially the quantum entanglement feature of the temporal wave function would ensure a steady state reality, a flat solar system reality ( $\Omega_0$ ), one in which the amount of matter present is just sufficient to halt its expansion, but insufficient to re-collapse it, as presented in paper 36 with the derivation of maximum solar mass, and how indeed  $SOL$  is at its maximum solar mass, as follows ([36]: p28-29):

*Essentially therefore, for the region of space defined by the  $d_{min}$  scale and  $d_{max}$  scale is a standard fixed propagation value of  $c$  at the speed of which time does not pass, namely dimensionless concepts of time and space, a 0, or as the theory here proposed, an “incursion event”, meaning mass would be prevented from reaching the  $c$  limit, yet of course as mass would approach  $c$ , time would slow to 0 at  $c$ . Further to this, as per section 7, it is understood that gravity would operate by the standard of time = space context, and so here the effect of a massive body incurring a greater gravitational field and thus time = space would result in the idea of approaching a functional limit of the system and thus time not passing, or in other words, the effect of time-dilation, time-slowness, for light in a strong gravitational field, despite  $c$  still being a constant.*

*Therefore, to explain the limits of time and space, as presented here with the  $SOL$  mass limit and that of  $c$ , is to ask why these limits are upheld and executed by the system of time and space, as they appear to be, as  $SOL$  hovers on its incursion mass level. Here, it is considered that the system of time and space, timespace, is pushed to its absolute limits to be complete, unified, with all its facets, primarily as*

*the temporal wave function accommodating for the condition of  $\pi$ , as presented section 4, a temporal wave function that must have in its construction a feature that allows it to have time being 0 at  $c$ , and thus not a standard time-linear wave function, yet a temporal wave function (section 4).*

In short, the quantum entanglement feature of the temporal wave function represents the harbinger of such a fine balancing act, acting as the platform for cosmological *flatness*, upholding the proposed *timespace* reality density parameter ( $\Omega_0$ ) at close to 1 given *SOL* is very close to its critical density, as demonstrated in paper 36 ([36]: p26-29).

There is an interesting resultant feature to an isotropic *CMBR* reality with a maximum density solar system model (based on a maximum-minimum mass density and associated maximum-minimum distance metric), and that is the phenomena of the stars. Although the general plasma manifolds of the solar system were derived in papers 32-34 [32-34], what was not described was the fine-tuned precision-scaled phenomena of the stars, and more precisely, how that would relate with a system executing a maximum density parameter. Such therefore is to be presented in a subsequent paper. There, the phenomena of the stars shall be more thoroughly and precisely explained than what they are with the current  $\lambda$ *CDM* model, without the need for dark matter, without the need for dark energy, in resolving the Flatness problem, the Horizon problem, and the "Axis of Evil" problem. Although such issues have been addressed by Temporal Mechanics in previous papers, what needs to be presented clearly is the precise phenomena of the stars, the exact parallax in play, and how Temporal Mechanics can precisely account for their current manifestation, including the phenomena of *black holes*, and most importantly how the phenomena of the stars are in a parallax relationship with the size of *SOL*.

## 11. Conclusion

Einsteinian and associated Lorentz mathematical formalisms, as with all contemporary streams of physics employing the photon model for light as a carrier of momentum, account for non-zero particle mass motion as inertial references, *primarily*. Temporal Mechanics accounts for *time primarily*, not inertia, and in doing so accounts for a true universal time where at  $c$  time does not pass despite  $c$  being a travelling wave function in time; Here in this delivery Temporal Mechanics takes into proper consideration a primary background of time not passing *at c*, a paradigm not dependent on the relative motion of non-zero mass objects, together with how such is related to a time-equation underwriting the arrow of time and its association to entropy, accounting for CP violations and the isotropic *CMBR*.

In comparison to Temporal Mechanics, *spacetime* theory and its use of the photon model detracts from a universal temporal reference in focussing instead on the idea of an inertial reference for the particle photon, creating unique temporal references for photons ultimately as ad-hoc temporal locales, promoting a quantum particle designed to be analogous to an electron (in an electron shell) seeking to explain the motion of non-zero mass particles, and thence the idea of gravity as a curvature of *spacetime*. The real problem with light as the photon particle therefore, as presented, is in trying to explain particles and particle behaviour using the idea of light as a construct of momentum, *angular*



momentum, and how that relates with particles, their motions and associated temporal relativistic incursions, and thence gravity, *limiting* the idea of light to that level of definition with time, namely non-zero mass relativistic temporal incursions, unable to reveal the true nature of time with energy, and thence time's arrow as entropy.

### Conflicts of Interest

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

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For ease of search functionality, the complete PDF of Temporal Mechanics containing all its current papers as listed here [1-35], is available from the following link (Non Open Access):

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