The Temporal Mechanics XEMDIR field resolving zero-point energy, negative energy, anti-EM, anti-gravity, symmetry breaking, and Baryon asymmetry

Stephen H. Jarvis

ORCiD: http://orcid.org/0000-0003-3869-7694

web:www.equusspace.com

email: shj@equusspace.com

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Abstract: Here shall be presented the Temporal Mechanics derived XEMDIR (flatline EM destructive interference resonance) field theory for negative energy and its association to zero-point energy (ZPE), and how such is structured from a time-equation for space. Fundamentally, the ideas of symmetry breaking, CP violation, and Baryon asymmetry shall be described in the context of this proposed XEMDIR field effect, also describing the phenomenal features of quantum entanglement and a new proposal for gravitational entanglement. Through this description shall be detailed cosmological phenomena consistent with these proposals in ultimately resolving the cosmological "Axis of Evil" problem.

Keywords: temporal mechanics; zero-point energy; timespace; destructive interference resonance; EM-DIR; XEMDIR; Majorana fermion; Majorana field; Meissner effect; superconductivity; negative energy; dark energy; dark matter; anti-gravity; anti-EM; symmetry breaking; CP violation; baryon asymmetry; quantum entanglement; gravitational entanglement; axis of evil

1.   Introduction

In following on from the work of Temporal Mechanics [1-41], specifically paper 41 [41] where the value for G was derived as a factor of the neutrino's energy ([41]: p38, eq7), here the energy value of the

lightest neutrino (E_{MG}) is proposed to be intrinsic to the value of the gravitational field constant according to the equation $G = \frac{33}{2} E_{MG} \cdot c$, and that this equation is associated to three fundamental concepts of energy central to gravity, namely gravitational potential energy, gravitational negative energy, and zero-point energy (ZPE) [42], of course all of such not being one and the same yet linked via a particular association and fundamental process central to the time equation $t_B + 1 = t_A$ as proposed in paper 1 ([1]: p3-5).

To prove this particular association and fundamental process, comparisons to astrophysical phenomena and associated data shall be forwarded regarding how ZPE in being associated to the derived energy value for G (such via the generation of an EM-DIR (EM^{DIR}) field from ZPE) can thence be associated to a *flatline EM^{DIR}* field effect. The *flatline* field effect is the proposed XEMDIR (EM_X^{DIR}) field, a field proposed to be analogous to a Majorana fermion/field [43] which itself is able to demonstrate the Meissner effect [44], namely the expulsion of a magnetic field from a superconducting material.

The core process of proof here is central to how a temporal wave function (known in contemporary physics as an electromagnetic photon), as ZPE in its most basic form, when undergoing "destructive interference resonance" (EM^{DIR}), brings into effect a gravity-mass effect, an EM^{DIR} field which in thence reaching a fundamental state as an EM_X^{DIR} field is proposed to be a/the progenitor matter-antimatter field analogous to the Majorana fermion/field. This field is proposed as both a 0-gravity field (as shall be outlined as anti-gravity) and a 0-EM field (as shall also be outlined as anti-EM), and thus as a non-inertial field. Such then proposes a phenomenon of thrust per the magnetic field expulsion from the non-inertial EM_X^{DIR} field without any apparent effect on the EM_X^{DIR} field.

Simply, the temporal wave function as initially derived in paper 2 [2] is proposed to undergo destructive interference resonance bringing into effect one of two new fields (depending on the type of resonance) termed an EM^{DIR} field (partial resonance) or the more fundamental EM_X^{DIR} field (*flatline* resonance). As such, Temporal Mechanics derives that the properties of the EM_X^{DIR} field underwrite the current idea of black holes, together with the idea of the Majorana fermion/field, thence having this EM_X^{DIR} field possess features of superconductivity (and thence associated Meisner effects) that can be experimentally demonstrated as such.

The key and specific theoretic steps for this paper require a review of the following four previous papers:

- **Paper 38**: *Temporal Mechanics, and EM-DIR "particle pair production" [38]*
- **Paper 39:** *Temporal Mechanics, and the derivation of an electron degeneracy neutrino, Gravity constant (G), Fine structure constant (α), Planck constant (h), and the phenomenal values of Sol [39]*
- **Paper 40:** *Time-domains as the foundation for classical mechanics, the relativity of moving objects, and the known field forces, presenting the case for a unified field theory [40].*
- **Paper 41**: *A time-equation thought experiment deriving 3D space as timespace in forming the basis for particle and field phenomena [41].*

There, the process of particle pair production [38] is established with those required models/formulae of the EM^{DIR} field effect, leading to the derivation of the electron degeneracy neutrino [39], following which the classical mechanical gravity equation is derived together with the electric radius of the proton [40]. Following such, the fundamental flaw in the design of Special (SR) and General Relativity (GR) and Quantum Mechanics (QM) is revealed and resolved with the Temporal Mechanics *thought experiment* [41].

This paper is structured as follows:

1. Introduction
2. Temporal Mechanics, and the derivation of G
3. Gravity, entropic gravity, and negative energy
4. The EM^{DIR} field as gravity
5. Zero-point energy (ZPE), negative energy, and quantum gravity
6. The EM_X^{DIR} field
7. The EM_X^{DIR} field as a force
8. The EM_X^{DIR} field construction
9. The EM_X^{DIR} field as 0-gravity and 0-EM
10. The EM_X^{DIR} field as anti-gravity and anti-EM
11. The EM_X^{DIR} field mandating symmetry breaking and Baryon asymmetry
12. Conclusion

In short, here is resolved the current apex quest of physics in re-defining the quantum level and thence the sub-quantum level using the proposed time equation $t_B + 1 = t_A$ for space, requiring such underlying theory forwarded in papers 1-41 [1-41], now brought to attention in demonstration of this absolute *a priori* level for the energy of space and all its interactive features, both quantum (ZPE, EM) and sub-quantum (EM^{DIR}-gravity). By such, the EM_X^{DIR} field demonstrates in theory *the basis* for the conservation of energy, momentum, and mass principles, together with the fundamental phenomenal features of symmetry breaking and CP violation.

2.   Temporal Mechanics, and the derivation of G

Paper 41 [41] as a summary of papers 1-40 [1-40] asked *how* to fundamentally define a *thought experiment*, yet in more importantly asking what is assumed there in the *thought experiment* of physical phenomena in space, of the relative motion of objects in space, and the phenomena of bodies in relative motion. There it was explained how to create *absolute precision for time-now* by instituting that time-domain the value of $t_N = 1$, and to then have the time-domain values of *time-before* and *time-after* (of the time-equation) form callipers around such thence deriving the known equations of the physical constants. Conversely, the Lagrangian is a function between two values of time reaching an infinitesimal value locale

as a series of averages reduced to zero, a series of averages approaching an infinitesimal scale, a process though that is still not *exact*.

Temporal Mechanics considers the idea of *exact* to be defining the *time-now* time-domain of physical phenomena as "1" and then around such formulating the laws of physical phenomena as a flow of time with the time-domains of *time-before* and *time-after*. Through this entire process, the flow of time becomes integral to the physical constants and their associated dynamic equations of force and location as per defining "1" for *time-now (as a moment)*; defining "1" for *time-now* is basically stating "1" as a factor can apply to any value, namely *time-before* or *time-after*, as though there is that intrinsic loop of *time-now* to any potential number-value event that has happened (*time-before*) or will happen (*time-after*). Paper 40 ([40]: p9-19) explained this process in comparison to the Lagrangian process.

Ultimately therefore, Temporal Mechanics proposes that there is a basic mathematics at play with *time-now* as $(t_N) = 1$ that applies to *time-before* and *time-after* as much as 1 applied to "*any value*" still results in that "*any value*". To note is that with $t_N = 1$, "1" is not a *period* of time yet the *moment* as *time-now*, and is arbitrarily defined as such. Such is why the mathematics of Temporal Mechanics utilizes a *temporal calculus,* namely a *new process* of numbers using time as *a fundamental time-process* for space and not just fundamental time-process for space yet also a fundamentally new mathematics for that time-process for space. Of course, *periods* of time in space can be measured above this fundamental process of time with space such as with a Lagrangian, yet of importance is to *first account for this fundamental process of time with space*. The Lagrangian conversely deals with periods of time without properly specifying a spatial locale *through* that period of time the infinitesimal function it is applying itself to.

According to Temporal Mechanics, gravity as outlined in paper 39 ([39]: p32-37, p41-59) is proposed to be a derivative of the destructive interference resonance (DIR) of the temporal wave function as a specific DIR of the temporal wave function and the associated incursion event for electron mass (given the process of formulation of the G constant highlighted how this value was developed in the context of an *electron degeneracy* scenario). This paper here though explains the finer points of the gravity field force effect in the correct context of the "conservation of energy/mass/momentum" principles.

A list of the references for the temporal nature of the gravitational field force can be tracked as a theoretic Temporal Mechanics aetiology as follows:

- EM and G temporal analogue equations of force ([1]: p9-14).
- Provisional gravity constant G for the gravitational force equation ([4]: p5, eq1).
- Negative energy proposal for gravity ([7]: p2-3).
- Linking EM with G ([21]: p14-23).
- Gravity as entropy ([22]: p4-7, p13-17).
- Proton/neutron mass from electron charge ([23]: p22).
- EM^{DIR} field compared to EM ([23]: p23-28).
- G constant from neutrino mass ([35]: p28-29, eq3).
- Entropy and enthalpy as features of time's arrow ([37]: p14-18).

- Particle pair production ([38], p17-22).
- The derivation of G ([39]: p43).
- The features of gravity central to energy and momentum (section 5).

As presented in paper 40 ([40]: p9-19) Temporal Mechanics supports the known action (principle) equations (energy-momentum) for time by defining how bodies can be relative to one another in the datum reference solely of *time-now*, as what the *Lagrangian* system achieves, yet here as Temporal Mechanics via a broader if not more precise understanding of time and space in not incurring the same energy-momentum problems of General Relativity.

In short, the following has been derived to be in play:

(i)   Mass emerges a gravitational field as per $G = \frac{33\, M_{MG}\, c^3}{2}$ ([39]: p44, eq20)

(ii) The movement of mass in a gravitational field operates according to the time-domain *time-after* = 0, as per Euler's equation $e^{i\pi} + 1 = 0$, represented according to the time-equation ($t_B + 1 = t_A$) as $e^{i\pi}_{t_B} + 1_{t_N} = 0_{t_A}$, and thus a force of gravity seeking greatest entropy ([40]: p16, eq2-3).

(iii) Conservation of momentum is held in the mathematical feature of $G = v_G{}^2 c^2$ ([40]: p21, eq 10).

(iv) Gravity makes mass move as per the basic equation on a minimum movement scale of $v_G = \frac{\sqrt{G}}{c} = 27.23 \cdot 10^{-15}\, ms^{-1}$ ([40]: p21, eq11).

(v)   The movement of masses in a G-field is consistent in being scaled with c as per equation $G = \frac{33}{2} E_{MG} \cdot c$ ([41]: p37-38, eq7).

With those five conditions, the requirement of energy for gravity to influence the movement of mass is accommodated for as a sixth condition, namely:

(vi) The context of an electron-degeneracy process where $E_e = 2.78 \cdot e_c$ was derived in paper 39 ([39]: p42, eq13) with E_e as the proposed energy related to the electron degeneracy process, thus eliminating the need for inventing energy (dark energy) and thence eliminating the problem of the cosmological constant anomaly in correctly already deriving the isotropic $CMBR$ feature of *timespace* (as presented throughout paper 37 [37]).

Essentially, with these six conditions (i)-(vi), the *time-now* time-domain realm has been demonstrated to represent a more complete description for gravity than Einstein's General Relativity, in bringing into effect the ideas of energy, inertia/mass, and momentum, and thus force in order to factor in the requirements for both energy and c without incurring the cosmological constant problem and thus without requiring the ideas of dark energy or dark matter.

There's a 7th condition though, namely that:

> (vii)   All of such must concord with gravity being associated to negative energy, namely bodies becoming more kinetic in a gravitational field.

The proposal in this paper is that there exists a baseline EM^{DIR} field effect owing to (vii) as the EM_X^{DIR} field. The question is, "how, namely what is the basis of this proposed EM_X^{DIR} field?"

3.   Gravity, entropic gravity, and negative energy

Gravity is considered to be a fundamental natural phenomenon by which all things with mass or energy (mass and light for instance) gravitate toward one another. Gravity is considered to have an infinite range, although its effects become weaker as objects get farther away.

Gravity is currently described in physics by Einstein's General theory of relativity as the curvature of *spacetime*, not as a force per se yet as caused by the uneven distribution of mass, thence causing masses to move along geodesic lines, the most extreme proposed example of this spacetime curvature being the observed phenomena of a black hole.

Gravity is also considered to be *entropic*, also known as *emergent gravity*, as a theory in modern physics that describes gravity as an entropic force, namely as a force with macro-scale homogeneity yet being also subject to quantum-level disorder, and thus not being fundamental interaction/force per se. The emergence of gravity is proposed as a phenomenal emergence from the quantum entanglement of small bits of Einstein's *spacetime* information. With all of such, entropic gravity is said to abide by the second law of thermodynamics under which the entropy of a physical system increases over time, and thus resolve phenomenal issues currently handled by dark matter as a neat solution for dark matter as a form of positive dark energy proposed to raise the vacuum energy of space from its ground state value, thus resolving the "negative energy" issue of gravity.

Associated to the phenomenon of gravity is the concept of negative energy. *Negative energy* as a concept is primarily employed to explain gravitational field (and some quantum field) effects. The contemporary explanation for *negative energy* associated to gravitational energy can be expressed as simply as follows:

> *As the strength of the gravitational attraction between two objects represents the amount of gravitational energy in the field which attracts them towards each other, then when two objects are infinitely far apart the gravitational attraction and hence energy is close to zero. Yet, when the two objects move towards each other, their motion accelerates by their mutual effect of gravity which causes an increase in the positive kinetic energy of the system whereby at the same time the gravitational attraction (and thus energy) also increases in magnitude.*

The problem here is that the net energy of the system cannot change. Therefore, the change in gravitational energy must be negative to cancel out the positive change in kinetic energy. Paradoxically, as the gravitational energy is *getting stronger*, this decrease can only mean that it is *negative*. Indeed, problems arise with this positive-negative energy interplay, namely that in a universe in which positive energy dominates everything will eventually collapse in a "big crunch", while in an "endless" universe where negative energy dominates everything will either expand indefinitely or cause a "big rip". In a zero-energy universe model ("flat" or "Euclidean", the model proposed here), the total amount of energy in the universe is exactly zero where the amount of positive energy in the form of matter is exactly cancelled out by its negative energy in the form of gravity.

Temporal Mechanics presents a theory for gravity related entirely to the primary derivation of the lightest known particle (*which seems sensible*, namely relating gravity to the lightest known mass-particle). Temporal Mechanics then asks what the greatest known mass value would be, as based on the particle pair production process and the theoretic constraints there. Fundamentally, Temporal Mechanics asks why there is a force of gravity between mass objects as an emergence from the EM^{DIR} particle pair production process.

So, how does Temporal Mechanics resolve the issue of gravity, emergent gravity, and negative energy?

4. The EM^{DIR} field as gravity

Temporal Mechanics presents the case that gravity should be associated to the lightest known particle, the neutrino, namely with the mass of the neutrino being inclusive to the gravitational constant G. To achieve such, the lightest known particle needs to be derived. How was this achieved?
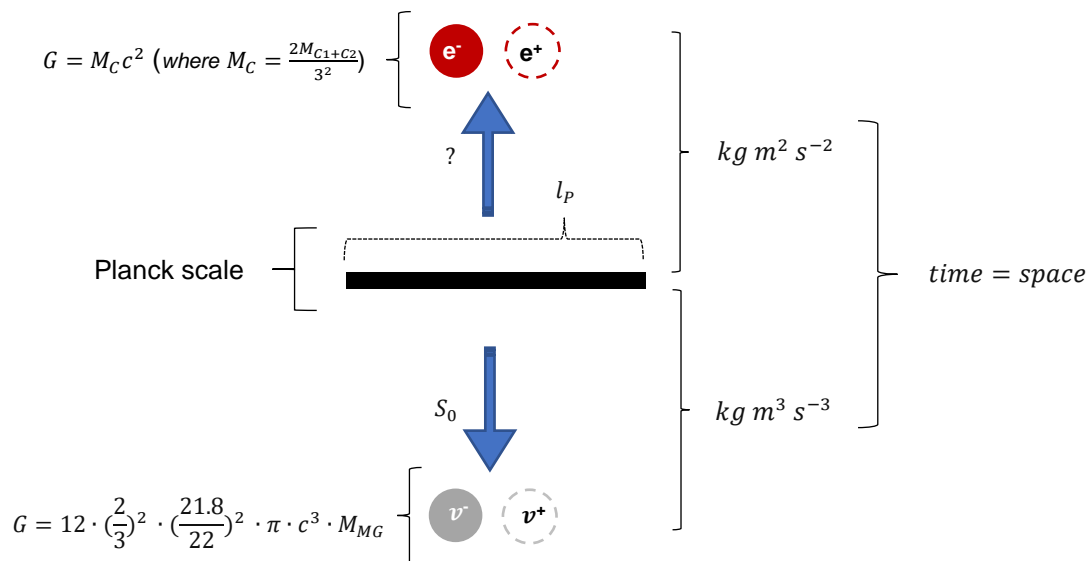
Primarily, the Temporal Mechanics theory of mass formation is proposed to be circumscribed by what is termed EM "destructive interference resonance" (EM^{DIR}). This was explained throughout paper [38] in deriving and detailing the phenomenon of *particle (particle-antiparticle) pair production*. Once particle formation was explained and matched with known data, the value for G could then be calculated.

In the process of deriving the mass of the fundamental particles, Temporal Mechanics was able to derive G according to **_two_** different pathways and thence their combined $time = space$ dynamic, namely the construction of *timespace*, as follows:

- Gravity constant G (initial proposal) for the gravitational force equation ([4]: p5, eq1)
- G constant from neutrino mass ([35]: p28-29, eq3)
- $Time = space$ equation ([36]: p19-21, eq3)

Temporal Mechanics, in presenting the case for two equations for the gravitational constant G, was able to consider that the relationship for those two equations for G would be central to *time* equating

to *space*, seconds to metres, given the same underlying time-equation was being used to derive both values for G, namely $kg\ m^2\ s^{-2} = kg\ m^3\ s^{-3}$, as per paper 36, figure 3 ([36]: p21, fig3):

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

$$? \quad l_P$$

$$kg\ m^2\ s^{-2}$$

Planck scale

$$time = space$$

$$S_0 \quad kg\ m^3\ s^{-3}$$

$$G = 12 \cdot \left(\frac{2}{3}\right)^2 \cdot \left(\frac{21.8}{22}\right)^2 \cdot \pi \cdot c^3 \cdot M_{MG}$$

Paper 36, figure 3: highlighting the $s\ (seconds) = m\ (metres)$, $time = space$, feature of the equations for G.

The proposal thence was to formulate a third equation for G based on the premise of *time* equating to *space*, as *timespace* (and not Einstein's *spacetime*) where *time* and *space* would equalize as $time = space$, such as a fundamental basis for physics theory in-line with the proposed time-equation for space.

For $time = space$ to exist on a fundamental level, Temporal Mechanics as detailed in paper 39 ([39]: p34-37) proposed:

- that there must be the smallest mass limit, say the combined mass of the neutrino given the elementary particle would exist as a lightest particle "set" of 3 in the context of a subatomic particle as proposed in paper 25 ([25]: p40-44), a proposal substantiated by the idea of S_0 ([35]: p27-28) being the average of a triple prime-number set and thus in theory a set of 3 neutrino descriptions, as m_{3v},

- and that this set of 3 neutrinos m_{3v} would exist within its parent subatomic particle *realm* which would form a maximum mass that could influence any subsidiary singular elementary neutrino particle sets, a maximum mass say M_X,

- and that the condition for $time = space$ would exist as a fundamental condition for when time is represented by $t_N = 1$,

- and therefore to satisfy the condition of $time = space$ while also recognizing $t_N = 1$, then the *scale* of distance between m_{3v} and M_X would feature this "1" factor for distance, as a factor of an absolute limit of temporal wave function *incursion*.

The issue being presented there was that in recognizing that the gravity equation was primarily *being derived on the sub-Planck scale, the elementary scale*, as per paper 35 ([35]: p28, eq3), namely $G = 12 \cdot (\frac{2}{3})^2 \cdot (\frac{21.8}{22})^2 \cdot \pi \cdot c^3 \cdot M_{MG}$, then at what point would there be a maximum field influence found between the elementary particle level and the subatomic particle level to the point of incurring *maximum instability (and thus gravitational compression, and thus also heat)* for the status of the temporal wave function otherwise keeping the atom together and functional?

The question was, "what would represent a *maximum mass scenario*, *an incursion level event*, for the temporal wave function and associated integrity of the atom, and what would be the phenomenal result for this?".

Here is how the idea of the Schwarzschild radius was superseded, here not considering the idea of a radius, yet actually calculating *what the maximum mass of a structure could be* in *timespace* (analogue of *spacetime*) in asking how it would relate as a force with the lightest known particle without corrupting the integrity of the atom.

It was proposed that an incursion of the temporal wave function (phi-quantum wave function, $PQWF$) in a maximum mass event would represent an overall factor of "1", namely one whole quantum step for a Bohr radius atom being compromised. Simply, to lose that "1" amount for the temporal wave function in the process of gravitational temporal wave function compression in the context of a maximum mass scenario is considered to be catastrophic for the atom (and thus presumably the electron-shell integrity together with the integrity of electrons), and thus an incursion event scenario.

Therefore, in considering the classical Newtonian equation of gravitational force as F_{3vX} for masses m_{3v} (lightest mass) and M_X (heaviest mass), as $F_{3vX} = G \frac{m_{3v}M_X}{d^2}$, the question now is, "what is the value of d, namely the distance between the heaviest mass (M_X) and the lightest mass (m_{3v}) despite the $time = space$ condition where distance would seemingly equate to "1"?

It was considered that the value of d must consider the four following concepts:

- Firstly, that the metric of distance here is as the metric of time (as per $time = space$), and thus if time must represent the value of $t_N = 1$ for the temporal wave function, then distance must represent the value of 1 (namely, the scale of compression being proposed for this maximum level incursion for $time = space$).

- Secondly, it must be considered that this proposed "1" incursion *is for the atomic scale wave function*, and therefore is for a factor of the temporal wave function *steps* ([2]: p15), steps which then needs to be factored with the value of π for each wave function step, as here distance is being calculated in equality with the wave function as the atomic *radius*, and thus

in its basic uncompressed state as 22π (as the task here is to calculate the new compression).

- Thirdly, a doubling of the 22π factor, as a measure of the overall *atomic diameter* of the proposed *timespace* template atomic limit being compressed by an overall scale of "1" (as the incursion).

- Thus fourthly, this atomic wave function using the compression scale of 22 must be brought in ½ a wave function step, 0.5 for each radius, as a value of "1" as a *maximum* allowable incursion of the atomic diameter, and thus as an atomic diameter on this level (a double radius) a complete *incursion/compression* value of $d = 1$, as the proposed maximum incursion here, thus revealing a scale compression of 21.5, namely $\underline{22 - 0.5 = 21.5}$.

Therefore, the following equation applied for d as d_{3vX}, namely the proposed distance between m_{3v} and M_X, as an atomic radius where the condition of $time = space$ exists for $t_N = 1$:

$$d_{3vX} \ = \ 2 \cdot 21.5 \cdot \pi = 135.088 \, m \qquad (1.)$$

It was thence proposed that the classical equation for gravity for the smallest mass as m_{3v} and greatest mass as M_X would be as follows:

$$F_{3vX} = G\frac{m_{3v}M_X}{(2 \cdot 21.5 \cdot \pi)^2} \qquad (2.)$$

Such was considered as an equation for $time = space$ in the context of $t_N = 1$, and so the value of d as d_{3vX} would follow suit. To visualize this is to consider the value of 135.088 representing a scale of measuring the condition of $time = space$ for the time-equation as a theoretic $time = space$ measure of distance between a neutrino and a supermassive subatomic particle structure and how such would represent a systematic breaking-point causing (presumably) systematic collapse of the temporal wave function and thus time and space. In other words, this is the proposed scale (as equation 1) for that breaking point between a neutrino and maximum mass event.

The idea there though was to derive the value of M_X, namely maximum subatomic mass, given the mass of the neutrino had been derived, so the next issue there was to address the value of F_{3vX} to find the value of M_X. The approach there was to consider what the energy value would be for $time = space$, namely by applying the equation $energy = force \cdot distance$.

The value of F_{3vX} is easier to resolve in considering what the maximum distance m_{3v} and M_X are limited to in encountering one another, such as a value of allowable energy.

Quite simply, the distance m_{3v} and M_X could move (to each other by gravity) would be $\frac{d_{3vX}}{2}$, namely ½ the distance of d_{3vX}, logically in their approaching one another at the same rate despite their difference in mass.

The energy limit there was proposed to be a measure of the gravitational constant G yet **per** c, as an absolute consideration for the energy for gravity, noting that there c is being used as a scaling process, a *constant*, needing to be factored in with G on this absolute level of consideration (namely, a maximum and minimum mass). Thus, the following equation applied for force, here as equation 3:

$$F_{3vX} \cdot \frac{d_{3vX}}{2} = \frac{G}{c} \tag{3.}$$

This then proposed the value of F_{3vX} to be as follows, equation 74:

$$F_{3vX} = \frac{2G}{c \cdot d_{3vX}} \tag{4.}$$

Therefore, in applying equation 3, and in using the value for M_{MG} as $1.5055 \cdot 10^{-37} kg$ from paper 35 ([35]: p28), and thus a value of $4.5165 \cdot 10^{-37} kg$ for m_{3v}, then the following resulted for M_X:

$$M_X = \frac{(2 \cdot 21.5 \cdot \pi)}{m_{3v}} \cdot \frac{2}{c} = 1.9954 \cdot 10^{30} \text{ kg} \tag{5.}$$

This value was considered to represent the *maximum* value of mass on an accumulated subatomic scale that can exist in regard to the *minimum* elementary particle scale (triple neutrino, m_{3v}), a different concept if not more precise than the Schwarzschild radius, as it represents a scale from a maximum mass to a minimum mass, and not a theoretic maximum mass alone (see equation 1).

The conclusion there was that if this value matched the known mass value for the *solar system* then it would appear that gravity and mass are localized to a star system, namely in the case here, this solar system. Consider this proposal as cosmological principle 1 (CP1), namely:

CP1: gravity and mass are localized to the solar system.

The next question was, "what therefore is the phenomena of stars as compared to both each other as stars (and thus how do galaxies relate with gravity) and SOL, especially regarding gravity?".

In continuing with the mathematics to address this issue, in taking equation 3 then $F_{3vX} \cdot \frac{d_{3vX}}{2} = \frac{G}{c}$ as a maximum energy read for the electron becomes:

$$F_{3vX} \cdot d_{3vX} = \frac{2G}{c} \tag{6.}$$

Regarding the electron as a maximum energy E_e, such would represent the following equation:

$$E_e = \frac{2G}{c} \tag{7.}$$

Temporal Mechanics proposes that the energy of an electron is directly proportional to its charge, e_c in proposing the provisional Planck equation in paper 3 ([3]: p3, eq1) as per the provisional Planck-analogue equation of $E = (\frac{19.3}{c})^2 \cdot e_c \cdot f$ (noting the more precise Planck constant value was thence derived in paper 39 [39]). Thus, consider the following equation:

$$E_e = \frac{2G}{c} = e_c \cdot "K" \tag{8.}$$

The value of this energy component "K" is thus given by the following equation:

$$"K" = \frac{2G}{c \cdot e_c} \cong 2.78 \tag{9.}$$

Note, the more precise value of K as 2.779103. Consider this precise value as the incursion temperature, as T_I.

Thus, equation 10:

$$E_e = T_I \cdot e_c \tag{10.}$$

This value of T_I is considered as a maximum incursion factor which proved to be integral in calculating the core temperature value of *timespace*, of the sun, Sol as was derived in section 10 of paper 39 ([39]: p61, eq37).

Another feature to note from equation 9 is that the following is in order for a new equation of G, equation 11:

$$G = \frac{T_I}{2} \cdot e_c \cdot c = 1.38955 \cdot e_c \cdot c = T_G \cdot e_c \cdot c \tag{11.}$$

Consider this value of 1.38955 as the temperature for gravity, namely T_G where $T_G = \frac{T_I}{2}$.

Ultimately this equation represents an *electron degeneracy limit for gravity* at the maximum allowable mass for $timespace$, here though incorporating e_c *at that* proposed limit. The issue of interest there though is how the electron would break down at the point of collapse.

Temporal Mechanics proposes that four conditions would be at play there, namely:

- the upper-level electric atomic coupling ***limit*** of 32.7, as per equation 16 of paper 2 ([2]: p19, eq16) which is proposed to define the maximum number of states an electron can exist within,

- the mass gap value of $m_{MG} = 1.5055 \cdot 10^{-37} kg$ ([35], p28) which is proposed to represent a basic value the electron would collapse to, here as the value of the lightest particle, the neutrino,

- and the atomic scaling value of $\frac{21.8}{22}$, yet here as a value of $(\frac{21.8}{22})^{-1}$ (given this is not electron formation, yet the inverse process, and thus the implicit compression scale of $\frac{21.8}{22}$ needs to be factored out), and thus a factor of $\frac{22}{21.8}$,

- the fundamental feature of quanta being released due to this electron degeneracy/destruction process.

The proposal is that the mass the electron would collapse to as m_{ex} would represent a basic feature of a new lightest particle scenario, as per the following, equation 12:

$$m_{ex} = 32.7 \cdot \frac{22}{21.8} \cdot M_{MG} = 33 \, M_{MG} \qquad (12.)$$

In testing this proposal, in taking equation 7, namely $E_e = \frac{2G}{c}$, and then combining this with the mass-energy equivalency equation of $e = m \cdot c^2$ as derived by Temporal Mechanics in paper 14 ([14]: p26, eq18), then the following equation results in proposing $E_e = m_{ex} \cdot c^2$, equation 13:

$$m_{ex} = \frac{2G}{c^3} = 4.9542 \cdot 10^{-36} = 33 \cdot (1.50127 \cdot 10^{-37}) \qquad (13.)$$

Essentially, M_{MG} as $1.50127 \cdot 10^{-37} kg$ would be another representation for the mass of the neutrino, here as a proposed _electron degeneracy neutrino_.

Although in paper 35 the value of $M_{MG} = 1.5055 \cdot 10^{-37} kg$ was an averaged value ([35]: p27, eq1), here the proposal is for the electron to degenerate to a value of $M_{MG} = 1.50127 \cdot 10^{-37} kg$.

In _further test_ of this idea and associated value, in paper 24 ([24]: p25-26) the following was proposed for the energy of an electron as e_e:

From paper 23, equation 5 ([23] p30, eq5):	$\varepsilon_0 = \frac{1}{4\pi} \times \frac{1}{Q_C \cdot c^2} = \frac{1}{4\pi \cdot k_e}$
From paper 23, equation 7 ([23]: p30, eq7):	$\varepsilon_0 = \frac{1}{\mu_0 \cdot c^2}$
Then, from paper 14, eq 18 ([14]: p26, eq18):	$e = m \cdot c^2.$
Therefore, the following applies:	$e_e = \frac{m_e}{\varepsilon_0 \cdot \mu_0}$

Here, e_e is proposed as the energy of the electron as E_e, where $e_e = \frac{m_e}{\varepsilon_0 \cdot \mu_0}$.

Therefore, in applying that equation, equation 1 paper 24 ([24]: p26, eq1) to equation 10, namely $E_e = T_I \cdot e_c$, in considering $e_e = E_e$, the following becomes apparent, equation 14:

$$T_I \cdot e_c = \frac{m_e}{\varepsilon_0 \cdot \mu_0} \tag{14.}$$

The proposal here is that the value for m_{ex} for this electron degeneracy/incursion event (electron limit) here *should be* the same value as what is calculated above, namely as $m_{ex} = 33 \cdot (1.50127 \cdot 10^{-37} kg)$, thus as the following, equation 15:

$$m_{ex} = T_I \cdot e_c \cdot \varepsilon_0 \cdot \mu_0 \tag{15.}$$

The result of this equation is the value $4.9542 \cdot 10^{-36}$ as compared to $4.9542 \cdot 10^{-36}$ for equation 16, an exact match.

Another equation for G to consider is based on equation 15, here as equation 16:

$$G = T_G \cdot e_c \cdot \varepsilon_0 \cdot \mu_0 \cdot c^3 \tag{16.}$$

Therefore, if this value for m_{ex} can be accepted, namely $33 \cdot 1.50127 \cdot 10^{-37}$, it suggests the electron as a subatomic particle can in theory break down to an elementary particle scale, here of course with the required inclusion of the atomic electric coupling limit as derived in paper 2 [2], essential to the electron shell structure (MQS) as per paper 30 [29].

The phenomena of the stars was thence proposed to play a key part in this *electron degeneracy* process, namely as light being released in the process of the electron becoming degenerate given stars are intimately associated with the black hole phenomena and thus an "*incursion event scenario*" (which is what a black hole is proposed to be, namely an incursion event of a maximum mass and thence collapse). Consider this as cosmological principle 2, namely:

CP2: the phenomena of the stars is considered to be a part of the electron degeneracy process, namely as light being released in the process of the electron becoming degenerate.

The next question was, "how does quanta from this electron degeneracy process *appear*?"

In addressing this issue, one equation for G to consider in this *electron degeneracy* context is based on equations 12-15-16, as equation 17 in using the incursion value of $M_{MG} = 1.50127 \cdot 10^{-37} kg$:

$$G = \frac{33 \, M_{MG} \, c^3}{2} = 6.6743 \cdot 10^{-11} \, kg \, m^3 \, s^{-3} \tag{17.}$$

Here therefore gravity is defined _most accurately_ as a more perfect number representation in the context of a temporal wave function collapse-incursion event using the value of $G = \frac{33\ M_{MG}\ c^3}{2} = 6.6743 \cdot 10^{-11}\ kg\ m^3\ s^{-3}$ where $M_{MG} = 1.50127 \cdot 10^{-37} kg$

From this equation, in applying the formula $E_{MG} = M_{MG}\ c^2$ (as derived in paper 22 ([22]: p17-19), then the following is in order:

$$G = \frac{33}{2} E_{MG} \cdot c \qquad (18)$$

Here therefore represents a specific energy value E_{MG} for G according to the energy value of the lightest particle, the neutrino (labelled here as M_{MG}, namely the "_mass-gap_" mass), and so here E_{MG} is the _mass-gap_ energy value, bearing in mind how the $\frac{33}{2}$ was derived in paper 39 ([39]: p43-44, eq15-20). The feature here nonetheless is that the equation 18 resolves the aetiology of gravitational energy, **not** as gravitational potential energy (as described by classical mechanics), yet the actual _field_ energy of gravity.

Beyond such an energy description for G, paper 40 ([40]: p20-25) presented how "momentum-energy" tensors can be annexed by G, thus solving General Relativity's dilemma of mass becoming super-massive in approaching c. The core problem paper 40 [40] found with General Relativity is its use of momentum-inertia-mass incorrectly as mv, _as_ an _independent_ entity, when momentum is more correctly derived (specifically v and thus also energy) to be contained in the G constant holding $G = v^2 c^2$ ([40]: p21, eq10) which by that process resolves Einstein's local _spacetime_ geodesic problem and associated energy requirements (which lead him to his cosmological constant problem requirement of energy).

To note, paper 40 ([40]: p20-22) presents the basis for Newtonian mechanics, and how with the time-domain scheme the value for proton speed of cosmic rays can be calculated, repairing the momentum-inertia-mass issue of Einstein's theories of relativity. As paper 40 proposes ([40]: p20-22), G is still a constant (as "v" here is defined as a constant velocity value for a "time-domain" where _time-now=1_), yet has features of both energy and being a field effect at the value of c ([38]: p42, eq14), namely $G = T_G \cdot e_c \cdot c$.

As according to paper 39 ([39]: p41-42) and here as equation 11:

- the $1.39\ K$ (T_G) value is half of the $2.78K$ (T_I),
- the $2.78K$ _value being slightly above the baseline_ ZPE $2.725K$ _in this incursion-event maximum-minimum mass context ([38]: p42)_,
- the $2.78K$ representing _an incursion event background temperature value_ owing to a maximum-minimum mass-incursion (electron degeneracy) and associated absolute EM limit event in the context of the underlying derived EM^{DIR} field effect,

- thus making the $1.39\,K$ factor truly a *sub-EM* phenomenon of space, namely as *gravity*.

Essentially, the $1.39\,K$ (T_G) value is derived with e_c as though gravity is a sub-EM field, ½ the minimum temperature value scale for a temporal wave function (EM) incursion event ([39]: 41-46), as of course the process there is a proposed folding of an incursion quantum value of $2.78K$ (EM^{DIR} field effect), and thus a *halving*, therefore noting that Temporal Mechanics *derives* gravity to be sub-EM, and thus EM-dark.

Thus, EM phenomena of the electron degeneracy process details gravity with its known phenomenal feature of negative energy. Consider this as cosmological principle 3 (CP3):

CP3: the electron degeneracy process of the stars and thence associated quantum phenomena details gravity with its known phenomenal feature of negative energy.

To therefore properly explain the phenomena of the stars as the electron degeneracy phenomena, this negative energy feature of gravity needs further analysis.

5. Zero-point energy (ZPE), negative energy, and quantum gravity

According to contemporary physics, zero-point energy (ZPE) is defined to be the lowest possible energy that a ***quantum mechanical system may have***, a type of fluctuating field effect of space. Furthermore, according to contemporary physics theory, a Majorana fermion, also referred to as a Majorana particle, is a fermion that is its own antiparticle, thus a *quasi/virtual* particle-antiparticle pair.

Temporal Mechanics here will define ZPE as the "lowest possible energy that a ***quantum mechanical system may have***". The issue here is that that Temporal Mechanics has derived space to have a certain ***quantum*** temperature ($2.725\,K$) and energy ($\sim 10^{-9}\,Jm^{-3}$) values ([14]: p17-25, eq9-10, eq13), and that anything below these values is by definition sub-quantum, and thus sub-ZPE. This issue and how it is further defined and resolved will become apparent forthwith.

As presented in paper 14 ([14]: p17-25, eq9-10, eq13), the energy field density value for space was derived as $\sim 10^{-9}\,Jm^{-3}$ (ZPE) leading to a $CMBR$ value of $2.725\,K$ (see figure 1, C), yet a maximum electron degeneracy temperature value for space was derived to be at $2.78\,K$ (see figure 1, D, see also equation 10). Yet the gravitational energy is derived to be below these temperature and energy values (see figure 1, B, see also equation 11). As such, in being sub-ZPE, negative energy is really negative-ZPE as the energy of the gravitational field, not its potential energy yet energy intrinsic with space as per the EM^{DIR} field effect producing mass, a field effect that primarily explains particle pair production as presented in paper 38 [38].

As such, this sub-ZPE is proposed ***not*** to be responsible for the negative energy feature of gravity, namely how it gives energy to masses in motion. The mechanism of how energy is delivered to mass is

proposed to be due to the $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ effect (see figure 1, A), an equation proposed in paper 15 ([15]: p11, eq6) and thence further explained in paper 40 regarding the time-now Lagrangian of the time-equation ([40]: p15-17):

Temporal Mechanics has found [1-39] that what happens in the datum-reference of time-now ultimately is a code of relative motion for objects in space, and thence those associated phenomenal attributes in time-now.

Why time-now as the datum-reference?

Temporal Mechanics has found that particle formation is a result of the temporal wave function undergoing "destructive interference resonance" (DIR), as explained in paper 38 ([38]: p17-22), and as a process of destructive interference resonance it represents a "naught" (0) event for the temporal wave function, as though the time-equation is requested to consider time-after=0.

The effect this has is pushing physical phenomena out of the datum-reference of time-after.

If though time-after=t_B^2, it also pushes physical phenomena out of the datum-reference of time-before.

Thus, the result is physical phenomena in the datum reference of time-now.

The idea of gravity therefore has its requirement of time-after=0, and thus is a process of time-before and time-after holding physical phenomena in time-now.

Thus, to properly explain gravity, the datum-references of time-before, time-now, and time-after all need to nonetheless be considered.

Paper 40, figure 4: the idea of gravity being a part of an entropic process where $t_A = 0$, and to accommodate for such t_B primarily represents a complete representation of the golden ratio as $\varphi \cdot \frac{-1}{\varphi}$ together with an emergent representation of $e^{i\pi}$.
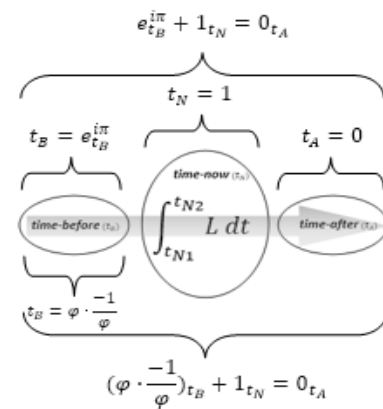
In figure 4, the process is of describing how physical phenomena is confined to the datum-reference of time-now, yet how gravity in that same process came to be represented as two proposed basic equations, one as the primary temporal wave function folding equation (DIR process) as equation 2, and the other as an emergent/associated Euler equation as equation 3, as follows:

$$(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A} \qquad\qquad \text{([40]: p16, eq2.)}$$

$$e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A} \qquad\qquad \text{([40]: p16, eq3.)}$$

The time-domain of time-now though still depends on, must, the basis of time-before as the key descriptor for the time-equation, and thus the situation becomes apparent of a new accessory time-equation in regard to gravity and thence the energy required for gravity, namely a new feature of time-before when added to $t_N = 1$ resulting in a "0" event. This equation was derived to be the following, effecting a steady energy state scenario, a conservation of energy scenario, paper 15 ([15]: p11):

Note therefore the following two key equations for a proposed baseline phenomenal effect for energy and temperature, here as equations 19 and 20:

$$(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A} \tag{19.}$$

$$e^{i\pi}_{t_B} + 1_{t_N} = 0_{t_A} \tag{20.}$$

Thus, in all, the following is proposed regarding the energy for gravity as entropic gravity (figure 1, B) and how thence negative energy functions, namely via a fundamental baseline equation (figure 1, A), figure 1:

D — Electron degeneracy temperature (T_I) — — — — — — — $2.78\ K$ — $+ve$

C — CMBR temperature, ZPE temperature (quantum) — — — $2.725\ K$ — $0: ZPE$

Sub-quantum ⬇

B — EM^{DIR} Gravity temperature (T_G) (mass-gap energy) — — — $1.39\ K$

Negative energy: ⬆ *energy released to mass as kinetic energy*

A — EM^{DIR}_X Entropic Gravity basis (T_0) — $e^{i\pi}_{t_B} + 1_{t_N} = 0_{t_A}$ — $0\ K$

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

$-ve$
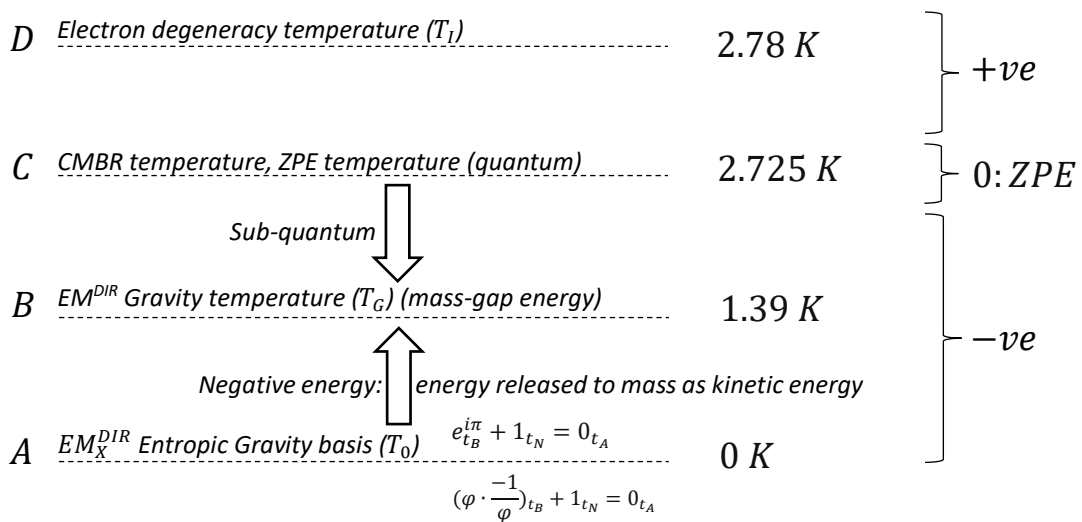
Figure 1: EM^{DIR}_X entropic gravity basis as T_0 (A), EM^{DIR} gravity temperature T_G (B), $CMBR/ZPE$ temperature (C), electron degeneracy temperature T_I (D).

The association of ZPE with negative energy becomes apparent, noting the underlying EM^{DIR} gravitational field interplay between ZPE (figure 1, C) and the EM^{DIR}_X proposed basis of $e^{i\pi}_{t_B} + 1_{t_N} = 0_{t_A}$ (figure 1, A) as the sub-quantum energy-temperature dynamic basis for the gravitational field (figure 1,

B), namely gravity approaching a "0" value, as 0-gravity, as per its entropic nature guided by the equation $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$.

Simply, the energy of the gravitational field scaled at c is proposed to be the energy of the lightest neutrino at T_G EV (namely $G = T_G \cdot e_c \cdot c$), a temperature (and thus associated energy) value which is negative compared to the known $CMBR$ (2.725 K), the $CMBR$ being zero-point energy (ZPE). Thus, in the context of ZPE, gravity is derived to have a negative energy component, noting that such is not why gravity is entropic, for the entropic nature of gravity has its own basis from the $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ equation, the proposed EM_X^{DIR} field.

There is further enquiry required for equation 11, namely $G = T_G \cdot e_c \cdot c$, for in paper 2 ([2]: p16, eq11) the following equation was established:

$$e_c = \frac{19.8 \cdot \lambda}{c} \qquad \text{([2]; eq11)}$$

There, λ represented the Compton wavelength, and 19.8 represented the basic *electric* temporal wave function atomic radius scaling factor, noting the 21.8 scale as the standard *magnetic* temporal wave function atomic radius scaling factor, also noting the Bohr radius being the value of $21.8 \cdot \lambda$ ([2]: p15-16).

Consider therefore the standard Bohr radius (a^0) more correctly as the notation a_m^0 as the *magnetic* component of the temporal wave function where $a_m^0 = 21.8 \cdot \lambda$, and the *electric* Bohr radius as a_e^0 where $a_e^0 = 19.8 \cdot \lambda$.

The interesting feature of λ is that it represents the wavelength of a temporal wave function (photon analogue) whose energy is proportional to the mass of the particle (mass-energy equivalency).

Thus, in applying equation 11 of paper 2 ([2]: p16, eq11) to equation 11 of this paper here, we have the following:

$$G = T_G \cdot a_e^0 \qquad \text{(21.)}$$

Here, the gravity constant G is directly proportional to a_e^0, namely proportional to the proposed basic *electric* atomic radius scale, tighter than the standard *magnetic* Bohr radius calculated at $21.8\,\lambda$, as per the theory in paper 2 ([2]: p15-16) together with the proposed sub-EM EM^{DIR} temperature value of $1.38955\ K$ (T_G), a value which in itself forms the basis for the idea of gravity and the atom according to the *electron degeneracy T_I* value, highlighting (converse to General Relativity) the <u>*fundamental force nature of gravity*</u>, here as a description of gravity in regard to the wavelength of light and how that association is made, thus pointing to how EM would manifest from a degenerate electron. Let this be the 4th cosmological principle:

<u>*CP4: the EM phenomena of the electron degeneracy process resulting in a neutrino and associated value for G is related to the equation $G = T_G \cdot a_e^0$.*</u>

Another interesting feature of equation $e_c = \frac{a_e^0}{c}$ to note is how such is a way of using the idea of distance (namely a_e^0) "per" c to arrive at e_c itself. In other words, c is being used as a *denominator quotient* scaling utility, and not only such, yet that the electron degeneracy phenomena would register as a quantum atomic-sized (a_e^0) event and <u>not</u> an electron scaled event, *highlighting a natural parallax issue in play with the electron degeneracy (and thus presumably starlight) phenomena*.

To note is that light with a wavelength of a_e^0 represents of frequency of $10^{18} \sim 10^{19}\, Hz$, namely *X-rays*. Such matches known data [45], namely the relatively uniform presence of X-rays coming from space, from outside the *apparent* confines of this solar system. The derivation here in alliance with the proposed electron degeneracy phenomena is that the X-ray astrophysical phenomena would be relatively uniform in space and appear to originate from point sources of light (electron degeneracy phenomena), as Temporal Mechanics shall derive ahead, from apparent galaxies and their associated apparent black hole phenomena, utilizing a subatomic/atomic scale (a_e^0) in size, a natural parallax error it seems.

Via this derivation of equation 21 presenting such a scenario, the idea of c being a denominator quotient scaling utility was also considered for the proposed idea of $E = hf \rightarrow E = f$ as presented in paper 13 ([13]: p11, eq5-8) where the idea of light behaving extra-atomically was derived to follow the scale of $E = hf \rightarrow E = f$, namely as light travelled through space, as a proposal. This proposal then calculated how far light would travel from the sun (Sol) at $E = hf$ to reach its $E = f$ proposition. That distance was calculated to be the distance from Sol to the Oort cloud, namely $\sim 73{,}500\, AU$ ([13]: p11, eq8).

From that $E = f$ scale was thence accurately derived the $CMBR$ temperature and energy values in the following paper ([14]: p20-25).

The next proposal for that $E = f$ Oort cloud limiting scale was to consider the equation $e_c = \frac{a_e^0}{c}$ as an electric limit for $E = f$ and then therefore scaling that distance back (as a volume of space) by a factor of c. Such was calculated in paper 32 ([32]: p15, eq1-5), deriving the known distance of the Heliopause from the sun $\sim 110\, AU$, together with the type of phenomena that would be apparent there, confirmed by the Voyager space crafts ([33]: p12), namely a static-type plasma field. Further to this, it was derived that at the Heliopause would be a scaling *outwards* to the $E = f$ level by a factor of 12, thence deriving the distance of the Bow shock from the sun at $\sim 250\, AU$ ([32]: p16-17, eq6-9), noting the 12-factor describing the maximum redshift of light of stars at $z11$ ([33]: p14-18). Interesting to note also is that scaling inwards (towards Sol) by a factor of 12 from the Heliopause results in the distance of Sol to the *Kuiper cliff*.

Thus, *four* key solar system manifolds/levels are derived by this mechanism, namely the Kuiper Cliff, Heliopause, Bow shock, and Oort cloud, while incorporating a redshift $z0 \rightarrow z11$ (12-factor) scale of star/galaxy phenomena.

It was thus considered that this scaled back (at c) volume-distance from the $E = f$ scale, namely for the electric limit of the solar system (noting cosmological principle 1, CP1) at this scaling back level, would represent the placement of the *electron degeneracy* phenomena, namely at the Heliopause where electrons are proposed to naturally become degenerate (*yet give off an atomic-sized scale quantum phenomena as X-rays, as described*) and where also cosmic radiation would equalize (as derived in paper

40 ([40]: p20-25) regarding the electric radius of the proton and maximum speed of cosmic radiation in the context of an electron degeneracy process.

With those findings, two extra cosmological principles become apparent regarding the electron degeneracy process, as CP5 and CP6:

CP5: the solar system scale extends to a value of $E = f$ as the proposed Oort cloud from the solar reference of $E = hf$.

CP6: the electron degeneracy phenomena is scaled at the Heliopause and extends to the Bow shock ($z0 \rightarrow z11$) as the basis for a phenomenon of light at a sub-atomic/electron scale (X-rays) detailing a natural redshift effect.

Linking all of such by such is the derivation of the Planck scales (constant, length, energy, and temperature) in paper 39 ([39]: p52-59).

Thus, although an electron dropping an energy shell in an atom releases a quantum of light, the quantum effect of an electron becoming degenerate (annihilated) at the Heliopause is proposed to have an added feature, namely X-ray phenomena.

How would this show as stars, namely as visible light? The *visible light* feature would be due to an atomic process incumbent to an electron degeneracy process; even though $e_c = \frac{a_e^0}{c}$ is the electron degeneracy result, the process there is still one of an electron in an atomic shell becoming degenerate. This would manifest locally in the Heliopause region and associated Hydrogen wall as a plasma field becoming less intense the closer to the Bow shock, as all the data confirms. Yet in this Hydrogen wall would be a redshift $z0 \rightarrow z11$ effect.

The magnification effect of this phenomena as the stars *as we perceive the stars from Earth* is proposed to occur according to a manifold relevant to the Earth reference at $1ly$ from the sun (Sol), underwriting a particular clockwork to the entire phenomenon. Such was presented in paper 34 ([34]: p23-32), and will be further expanded upon in a subsequent paper.

The issue at hand now though is providing further detail to the electron degeneracy phenomenon, namely how the electron degeneracy phenomenon (T_I and T_G) can be identified as a field effect and thence constructed as a field in regard to $EM\ (ZPE, 2.725\ K)$ as per the proposed EM_X^{DIR} field.

6.   The EM_X^{DIR} field

According to contemporary physics, zero-point energy (ZPE) is defined to be the lowest possible energy that a **_quantum mechanical system may have_**, a type of fluctuating field effect of space. Furthermore, according to contemporary physics theory, a Majorana fermion, also referred to as a Majorana particle, is a fermion that is its own antiparticle, thus a *quasi/virtual* particle-antiparticle pair,

proposed here to be analogous to the EM_X^{DIR} field, noting that the Majorana particle/field is still a theoretical idea lacking in much detail.

Here Temporal Mechanics will demonstrate the theoretical link between ZPE (figure 1, C) and the proposed EM_X^{DIR} field (figure1, A), noting that they are not proposed to be the same.
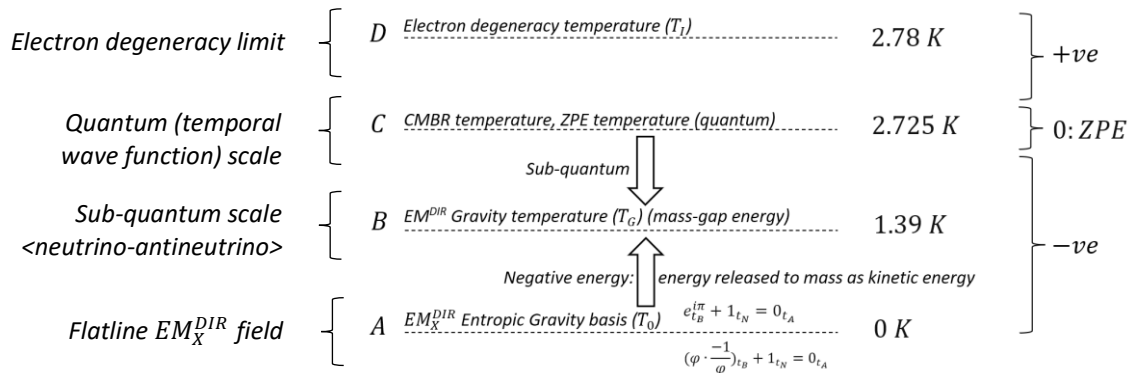
Consider figure 2 as an adaptation of figure 1:

Figure 2: flatline EM_X^{DIR} field (A), the sub-quantum EM^{DIR} scale as the neutrino/antineutrino level (B), the EM quantum temporal wave function scale (C), the electron degeneracy temperature limit (D).

The Majorana fermion is a particle proposed by Ettore Majorana (@ 1937) whereby it was suggested that neutral spin-½ particles can be described by a real-value wave equation (the Majorana equation) and would therefore be identical to their antiparticle. The reasoning there was that the wave functions of both the particle and antiparticle in being related by complex conjugation can thus also share the same wave function process as the one complex (number) locale descriptor.

Such was the basis for equation 2 in paper 40 ([40]: p16, eq2) as $(\varphi \cdot \frac{1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$, and thence equation 3 ([40]: p16, eq3) as $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$. Simply, in a very similar manner except via a different theory for time and thence the EM wave function description itself (termed by Temporal Mechanics as a *temporal wave function*), Temporal Mechanics as per its body of work [1-41] considers the Majorana particle idea to be more accurately and fully described by the EM_X^{DIR} field description, namely where t_A (the *time-after* time-domain) approaches the value of "0" for time (and thus energy) in conjugating the two values of the golden ratio for the time-domain of *time-before* and then relating this value (-1) to that same value for $e^{i\pi}$ as the time-domain of *time-before*, namely $e_{t_B}^{i\pi}$.

The EM^{DIR} field generation process (and associated proposed *particle pair production* process) is explained throughout paper 38 ([38]: 14-22), here though in this paper is the proposal of making the next step to the <u>*baseline/flatline*</u> EM_X^{DIR} field ($e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$). Although paper 38 [38] presented the case for *particle pair production*, the proposal here is to not remain at the *particle pair production* process yet to reach a more *baseline/flatline* EM destructive interference resonance field effect, presumably a pure-vacuum effect, as per level A of figures 1-2, namely a *flatline EM* destructive interference resonance field

without therefore producing a *particle pair production* effect (a partial EM destructive interference resonance effect). The question is "how is this achieved?".

In paper 38 [38], Temporal Mechanics presented the theory behind the proposed EM^{DIR} field, a field which given enough energy is proposed to lead to the formation of particle-antiparticle pairs. In the most basic state of the EM^{DIR} field , namely the EM_X^{DIR} field, such is proposed to have dual potential (quasiparticle) properties of both particle and antiparticle, thus similar to the idea of a Majorana particle, yet more precisely here as a Majorana *field* as more accurately prescribed by the EM_X^{DIR} field.

If we can consider the Majorana particle-field to be comprised of two types of particles as one, namely a particle and antiparticle, proposed mathematically as φ and $-\frac{1}{\varphi}$, as prescribed by equation 19 and also proposed in paper 25 ([25]: p47-49, fig15) whereby these particles also have their own field effect yet combine as one to cancel out as equation 19, then we have what was derived in paper 7 figure 2 ([7]: p5, fig2), here amended as figure 3:
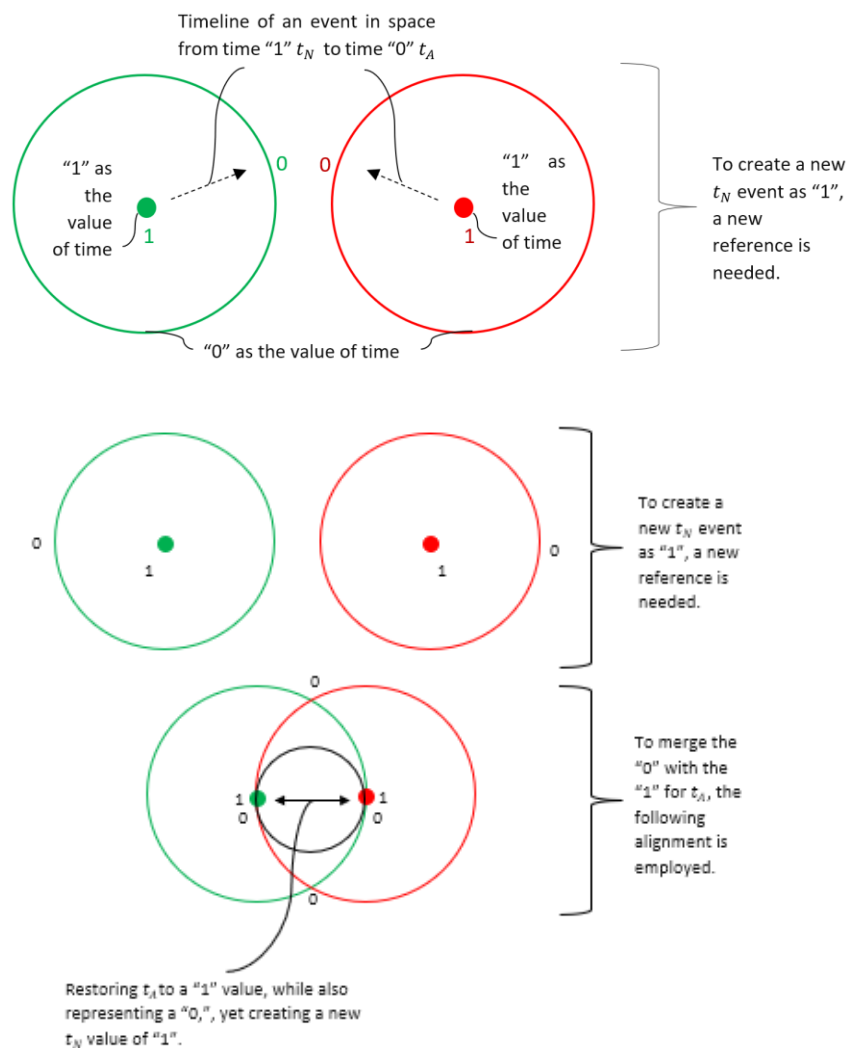
Figure 3: a basic schematic description for the Majorana particle/field, as the amalgamation of the properties of φ and $-\frac{1}{\varphi}$

Paper 7 [7] was able to reach this conclusion for negative energy and gravity given the preliminary theory of papers 1-6 [1-6], which has remained consistent through the current paper set of 42 papers (including this paper), however at that stage of theoretic development (paper 7 [7]) the masses of the subatomic and elementary particles had not yet been derived, nor the values for G, α, and h.

Here now upon the derivation of the masses of the subatomic and elementary particles, and the derivation of G, α, and h, namely as per paper 39 [39], we have a proposed particle-antiparticle and field, as a type of progenitor particle-antiparticle and associated field as the primordial level A (figures 1-2, A) for levels B and C (figures 1-2, B-C).

What therefore are the features of this field and how is this field constructed?

7. The EM_X^{DIR} field as a fundamental force

Quantum entanglement is regarded as a physical phenomenon that occurs when a group of particles share spatial proximity (through generation or interaction) such that the quantum state of each particle of the group of particles cannot be described independently of the quantum state of the other particles, even if the particles are separated by a large distance. Here, the real feature of the EM_X^{DIR} becomes apparent, namely in it being representative of a baseline equation and associated phenomena for space bringing into effect the process of negative energy, yet not just negative energy for gravity, yet a φ and $-\frac{1}{\varphi}$ linkage/entanglement (and thus quantum entanglement) for EM. In the case here as such, the idea of quantum entanglement can be explained with the following diagram as from figure 3, here as figure 4:
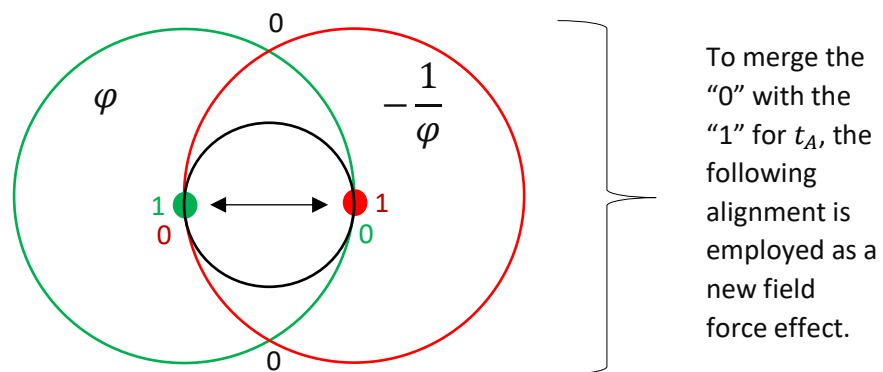
Figure 4: a basic schematic description of the proposed EM_X^{DIR} setting a precedent for "quantum entanglement".

Here, the field associated to the particles (as quasiparticles in existing together) as regions φ and $-\frac{1}{\varphi}$ as a spatial size can be of any scale, potentially, and the speed of association for the field effects there is "0", in other words, infinite speed, as per equation 19, namely $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$.

Simply, as per equations 19 and 20, namely $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$ and $e^{i\pi}_{t_B} + 1_{t_N} = 0_{t_A}$ respectively, the feature of the time-domain of *time-before* in the time-equation $t_B + 1 = t_A$ as $(\varphi \cdot \frac{-1}{\varphi})$ represents a fundamental character of time in regard to the proposed time-domain of *time-after*, namely *time-after*=0, as per $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$.

Thus, there would exist a field effect in space as the process of both equation 19 and equation 20 that presents the case for a potential field effect *linking* the φ and $-\frac{1}{\varphi}$ qualities of EM (figures 1-2, C) in an *immediate* fashion (0-time as t_A), yet not only linking these qualities yet also presenting the case that these qualities would be *non-local* (features explained in paper 29 [29]) namely not described in quantum terms yet in terms of this proposed baseline EM_X^{DIR} field effect, this *flatline* EM^{DIR} field effect. Not only this, yet the *kinetic energy related to mass as per gravity* would also be an *immediate* event as much as quantum entanglement is for EM.

The idea of this baseline $0\,K$ level $((\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A})$ as a force field effect (EM_X^{DIR}) is based on the fundamental idea of the anchoring effect it has with gravity to produce the negative energy effect, not the gravitational field itself, yet how it renders itself down to $0\,K$ by the $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$ equation providing masses with kinetic energy.

In terms of the general set of field forces therefore, the field forces of EM, gravity, strong, and weak were derived in paper 40 ([40]: p6-28) yet now here is presented a general underlying 5th force itself, noting that the time-equation $(t_B + 1 = t_A)$ itself would not be a force per se, yet a fundamental condition of the relationship between time and space as *timespace*.

To be proposed therefore is that not only is the operation of this EM_X^{DIR} force primarily in regard to negative energy, *yet also as according to the proposed electron degeneracy phenomena*, which as a process of imparting kinetic energy in a gravitational field would also play this event with features of quantum entanglement, namely as a quantum effect *as light released from the electron degeneracy process* (leading to neutrino formation, as described in paper 39 ([39]: p41-46). Such therefore proposes four key things:

- Release of quanta from the electron-degeneracy process.
- Neutrino formation with the electron degeneracy process ([41]: p41-46, eq9-21).
- Neutrinos becoming kinetic in their gravitational influence with one another (*in an immediate fashion*).
- Quantum entanglement of the released quanta associated to neutrino formation (*in an immediate fashion*).

Thus, what is proposed to eventuate is a general *flatline EM_X^{DIR}* backdrop with both *quantum entanglement* and *gravitational entanglement* effects in play, a backdrop of particle behaviour becoming more kinetic as though in an immediate (entangled) fashion, and thus a type of fixed (caused by the entanglement) structure *with kinetic features* <u>for the electron degeneracy phenomena</u>.

The only phenomenal solution to this overall effect is a framework that in being kinetic yet held together must spin/spiral, and thus *a proposal spiral/spinning appearance* <u>for the electron degeneracy phenomena and associated particles in play there</u>. Basically, the effect of holding the spiral together would be according to the <u>*interaction of light*</u> and <u>*electrons becoming degenerate*</u>, held in a basic electron palate (becoming degenerate in releasing quanta), subsidiary to which would be a kinetic association of the electron degeneracy neutrinos.

The formation of this spiral would be according to what was proposed in paper 40, namely how light and gravity are proposed to interact, page 31-33 ([40]: p31-33):

> In short, as light (a temporal wave function) collapses in the context of a maximum temporal wave function incursion event for, as presented in paper 36 ([36]: p22-26), a maximum mass event scenario (taken as a potential black-hole event scenario), the energy of the temporal wave function is conserved into the arena of the G field at play there, to drive the energy requirements of that G field, as a "conservation of energy" event, a process which (as presented in section 3) General Relativity finds itself in error with by needing to invent dark energy,
>
> The question here is how light is affected by gravity, mathematically. This issue is fundamentally handled by equations 2 and 3, namely equation 2 as the basic initial process of a destructive interference resonance (DIR) of a temporal wave function (light), and as equation 3 proposed as the gravitational feature having emerged from that event as its own unique mathematical representation, equivalent nonetheless, as per equation 15:

$$(\varphi \cdot \frac{-1}{\varphi})_{t_B} = e_{t_B}^{i\pi} \qquad (15.)$$

> Here, $e_{t_B}^{i\pi}$ is considered as the geodesic factor that instructs the performance of light as the standard time-equation t_B representation of φ or $\frac{1}{\varphi}$ when applied to Pythagorean algebraic space, as in the context of a gravitational field, and thus ultimately a complex plane circular effect at right angles to the gravitational field gradient strength, and thus a curvature (A) ultimately around the gravitational field strength (B) as follows with figure 6.
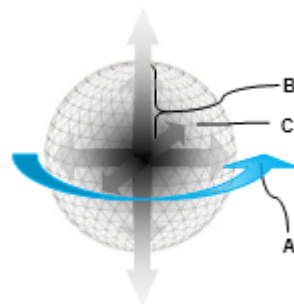
Paper 40, figure 6: proposing a plane for the temporal wave function (light) as **A** at right angles to the gravitational field strength as **B** (shaded *gradient* here as arrows) on the backdrop of a potential timespace geodesic alignment for light as **C** in the case of a spherical gravitational gradient.

There, the idea of gravitational red shifting of light is explained by the geodesic requesting light to travel more of a distance than a straight line, as presented by the curvature of the geodesic caused by the gravitational field. Note that associated with the phenomenon of the gravitational red shifting (stretching of light) would be a time-dilation effect at fig6(A).

In the case of light moving directly away from a gravitational field source, the red shifting of that light would be accumulative from deep in the gravitational well to outside of it, appearing more gravitationally red shifted outside of the well compared to inside it, despite there being in theory a greater effect of red shifting deeper in the well (with that greater gravitational effect), and thus a greater effect for time-dilation deeper in the gravitational well; light leaving the gravitational well would nonetheless still appear more redshifted outside the well if the source of that light is from within the well. These features are highlighted in figure 7:
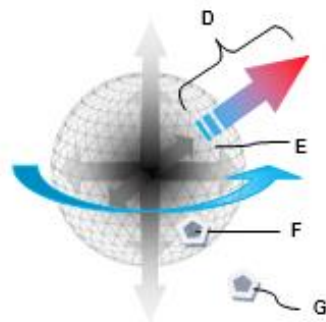
Paper 40, figure 7: presenting the various effects of light (and temporal effects) and a gravitational field, namely a general red-shifting of light (D) as it leaves a gravitational well (E), a general time-dilation effect inside the gravitational well (F) as opposed to outside it (G).

In a way, it is the $e_{t_B}^{i\pi}$ (equation 3) effect that gravity has, as an equation, on the temporal wave function equation, reducing the energy and thus frequency of the temporal wave function to an apparent "0" state (as per equation 3, namely $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$), and thus enhancing/lengthening its wavelength and temporal scale (time-dilation).

In an extreme case of a mass degeneracy scenario as according to modern cosmology being characterised by an astrophysical black hole phenomenon, and in the example here as the Quasar phenomenon, Temporal Mechanics proposes the accretion disc of a Quasar would be illuminated gas clouds, illuminated though by the path of light as a disc, as per figure 6(A), perpendicular to which ultimately would be a gravitational axis expelling free protons (cosmic radiation) at/near the speed of light, as per figure 6(B). Consider how this is proposed as an intense Quasar, a blazar, image 1:

Paper 40, image 1: in this artistic rendering, a *blazar* (intense Quasar) is accelerating protons that produce *pions*, which then produce neutrinos and gamma rays. (IceCube/NASA) [46].

Such is just one proposed example of this new process of deriving and examining astrophysical phenomena. Given the depth and scope of astrophysics, a subsequent paper shall more broadly address astrophysical phenomena through this Temporal Mechanics lens of theoretic derivation and phenomenal analysis.

In short, in the time-now datum reference, time is still the same for each reference, yet within the entire datum reference of a systematic time-now event for space, time can then appear differently in viewing the motion of another object, namely time can appear to be contracted or dilated. The bottom line here is if velocity is a fundamental constant for gravity in the time-now time-domain as v_G, then doppler is doppler regarding toward-away motion. How therefore any atom projects its phenomena is not like a mirror to doppler unless theorizing a reality of a house of mirrors. The exception here is the effect of gravity on light, as highlighted above.

In short, what is being proposed here is that the presumed large scale of the stars is actually a phenomenon generated in the context of an electron degeneracy event in the *Hydrogen wall* (Heliopause to Bow shock) region of the solar system which owing to the natural parallax in play (a_e^0) appears <u>supermassive</u>, noting the $z0 \rightarrow z11$ redshift (12-factor) scale in play there between the Heliopause and Bow shock. This was presented in papers 32-34 [32-34], specifically paper 33 ([33]: p8-9), and derived in paper 39 as the electron degeneracy phenomena ([39]: p41-46). Consider these as cosmological principles 7 and 8 (CP7, CP8), namely:

<u>CP7: the shape and movement of the electron degeneracy EM phenomena of the stars as spiral galaxies would be due to the EM_X^{DIR} field effect.</u>

<u>CP8: the Hydrogen wall would represent the primary/aetiological habitat of stellar phenomena as a process that scales the phenomena of stars and their associated spiral (galaxy) formations along a $z0 \rightarrow z11$ redshift.</u>

Thus, the proposal here is how the appearance of galaxies would undertake their spiral motions, as a framework, namely in behaving in a way implying the pan-presence of both dark matter and dark energy (as that fixed quantum entanglement backdrop), as much as dark matter is considered to be that "thing" that keeps galaxies together, and dark energy that "thing" responsible for the energy required for Einstein's General Relativity to "work" ([41]: p3-5). The added proposal is a description of the $z0 \rightarrow z11$ redshift effect in this Hydrogen wall zone.

To note is that neither negative energy nor the energy of a neutrino are being proposed as dark energy (in being sub-quantum) as here space is not undergoing a metric expansion. To say the EM^{DIR} field on the sub-$1.39\ K$ level, namely the EM_X^{DIR} field, is dark energy is suggesting a neutrino is dark matter, which it is not. Indeed, in proposing a case that this energy and mass of the neutrino is both dark energy and dark matter is proposing they are intrinsic to a metric expansion of space holding galaxies together, together with being the mechanism for a metric expansion of space, which is not the case here, hence a

new proposed model for cosmology and associated description of galactic redshift and associated stellar spiral-motion behaviour as forwarded in papers 32-34 [32-34].

The issue to now focus upon is the detailed structure, association, and proof of these proposed ZPE, negative energy, and $ZPE\ EM_X^{DIR}$ realms.

8.   The EM_X^{DIR} field construction

To explain the various types of temporal wave functions in this section, it is imperative to note that upon the x-y-z axes the described temporal wave functions are not typical sinusoidal wave functions yet <u>temporal</u> wave functions where the y axis (+ and – extensions) are either time forward or time reverse depending on how they are labelled in the figures. A basis for this modelling is presented in paper 2 ([2]: p3-14)

The idea of generating an EM^{DIR} field to bring into effect particle-antiparticle pair production was presented in paper 38 ([38]: p17-24). There though the EM^{DIR} field effect was such that a type of imbalanced EM^{DIR} field was formed to produce particles. As stated there:

> *The next question to ask is, "what happens when the temporal wave function reflects at a wall, say wall "W"?". Indeed, how can the temporal wave function reflect, what type of wall enables the temporal wave function to reflect, and what exactly reflects a temporal wave function?*
> *The first thing to be stated here is that what is proposed for particle pair production is a type of <u>uneven result as per reflecting a temporal wave function that is any quantum wave function length plus ½</u> <u>of its quantum wave function length, reflected at a hypothetical wall, producing a particle-field effect.</u> The reason for proposing such and not a full temporal wave function wavelength reflection is that such, namely a full-wavelength reflection, is another phenomena entirely, namely not a particle-field effect, and requires due explanation when all the requirements of that theoretic basis are properly derived, which is not the case here.*
> *In either case nonetheless, for a partial or full temporal wave function reflection, the reflection of a non-linear time temporal wave function has a number of things going on not according to a standard linear-time temporal wave function, and all of these features need to be investigated.*

Here therefore the case is presenting itself for a *flatline EM/EM^{DIR}* field, a EM_X^{DIR} field, especially now that from paper 38 [38-41] all the required theoretic pieces for that puzzle have been derived.

Therefore, in much the same manner as paper 38 [38], here shall now be presented the theoretic basis for a *flatline EM^{DIR}* field generation event, the proposed EM_X^{DIR} field.

In recapping the temporal wave function dynamic for the EM^{DIR} particle pair production effect, namely the reflection of a basic 1 ½ temporal wave function, the following should be considered, from paper 38 ([38]: p18-22):

In either case nonetheless, for a partial or full temporal wave function reflection, the reflection of a non-linear time temporal wave function has a number of things going on not according to a standard linear-time temporal wave function, and all of these features need to be investigated.

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

If it can be assumed that the Temporal Mechanics temporal wave function is an EM wave function (the evidence for which has been provided throughout paper 2 [2] with those analogous EM definitions, explained in temporal terms), then it would be logical to consider that the reflection of this wave function would abide by the same conditions as a standard reflection for a wave function, the same ideas of transverse polarization reflection protocols, as the mathematics of the wave function would hold, here more especially though in considering how the temporal wave function must reflect as a spatial direction in time, which needs particular note, namely how the temporal wave function would reflect as an x-axis in regard to the y-axis, both as scalar and vector principles of play.

Consider therefore figures 4a and 4b now facing wall W:

Paper 38, figure 4a
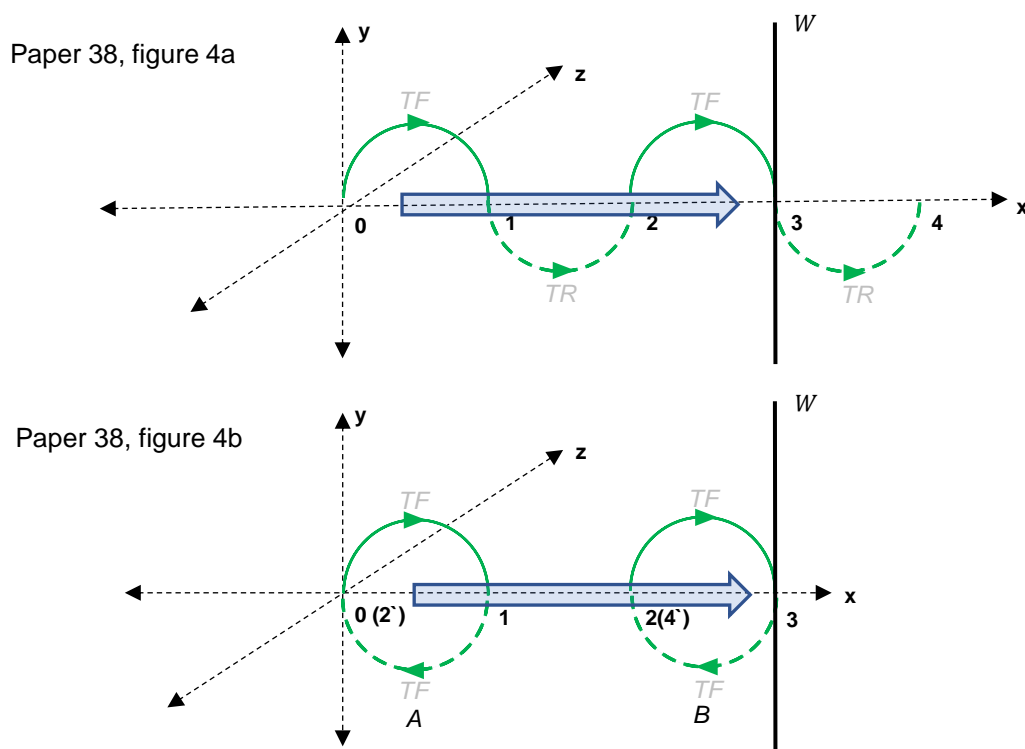
Paper 38, figure 4b

Paper 38, figures 4a-4b: the x-axis transverse temporal wave function from time-0 to time-4 in noting it is necessary to repair time-reverse with a time-forward aspect.

As a sidenote, consider in the above diagram how there is a portion of the wave function that is proposed to positions/tunnel ahead, as the region beyond W from time-3 to time-4 on the x-axis. Such is something similar to "quantum tunnelling", namely the quantum mechanical phenomenon where a quantum wave function can propagate through a potential barrier. This was explained in paper 2 along with the other associated features of this model for light, specifically "particle uncertainty" and "quantum entanglement" ([2]: p20-21). There are other features with the phenomena of "quantum tunnelling" though that rely on the

maintenance of the temporal wave function, and thus the barrier distance as a mass-phenomena reflecting the temporal wave function becomes the issue there, to be discussed in a subsequent paper.

Thus, for the purpose of mandating a reflection for the temporal wave function, presumably for instance in an EM resonance chamber, let us assume that quantum tunnelling is not in effect here at wall W, here that wall W is greater than ½ the wavelength of the temporal wave function.

Now consider the proposed reflection from wall W as a new y-axis yet the spatial direction now heading in a -ve x-axis direction, as time-forward nonetheless, and thus considering that the y-axis has also reflected with its functionality with time, namely that the $-ve$ region of the y-axis is now time-forward (TF) and the $+ve$ region is time-reverse (TR), as figures 5a-5b:

Paper 38, figure 5a
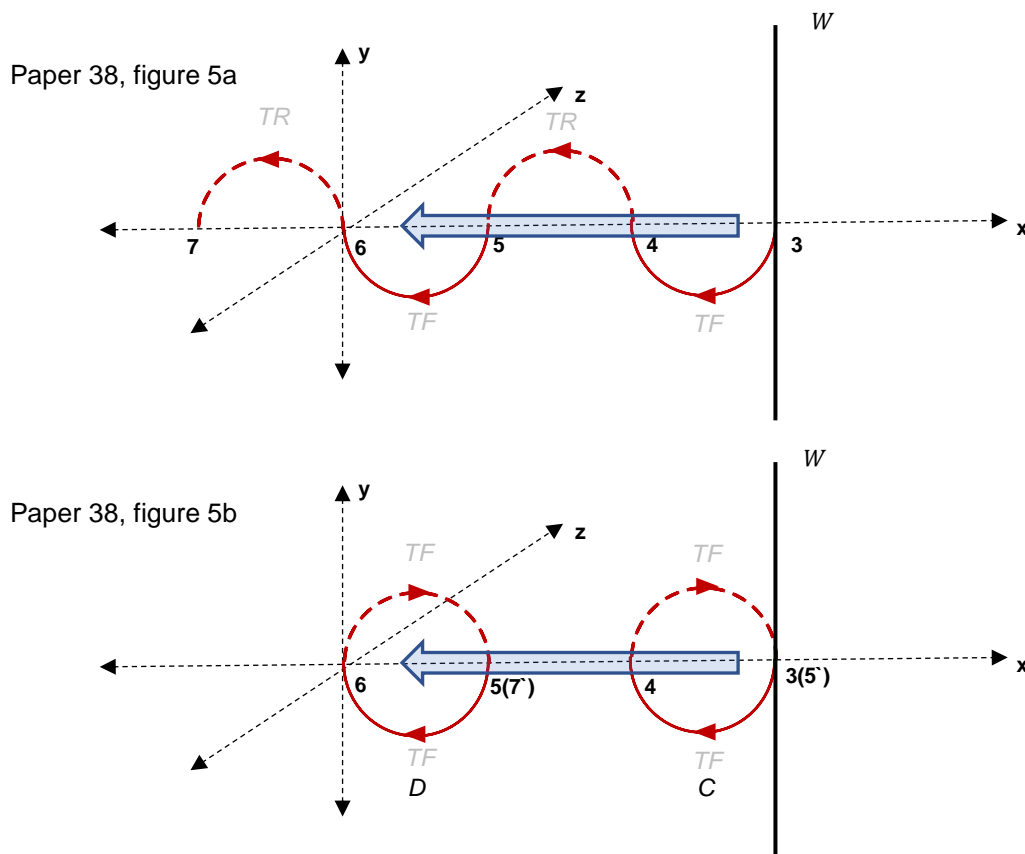
Paper 38, figure 5b

Paper 38, figures 5a-5b: the x-axis transverse temporal wave function from time-3 to time-7 in noting it is once again necessary to repair time-reverse with a time-forward aspect.

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

- *naming of the axes:*
  - *y (+) as time forward (TF) for the electric feature/polarization of the temporal wave function.*
  - *y (-) as time reverse (TR) for the electric feature/polarization of the temporal wave function.*

- *x (+) as the considered spatial direction of the temporal wave function progression.*
- *x (-) not considered here in this frame of reference discussion.*
- *z (+ and -) not considered here, although would be the magnetic feature/polarization of the temporal wave function.*

- *temporal direction:*
    - *the two components of temporal direction for the y-axis (as above).*
    - *the overall temporal direction as the blue-arrow.*

- *temporal polarization:*
    - *y-axis (+ and -).*

- *spatial direction:*
    - *x-axis (+).*

- *spatial polarization:*
    - *electric (not magnetic) polarization transverse wave as the primary feature.*

- *resultant temporal wave function particle locale (photon):*
    - *the reversed x-axis temporal features of time-5` and time-7` from time-5 and time-7 respectively.*
    - *quasiparticles C and D.*

Once again it must be noted that <u>what is proposed for particle pair production is a type of uneven result as per reflecting a temporal wave function that is any quantum wave function length plus ½ of its quantum wave function length, reflected at a hypothetical wall, producing a particle-field effect.</u> The reason for proposing such and not a full temporal wave function wavelength reflection is that such, namely a full-wavelength reflection, is another phenomena entirely, namely not a particle-field effect, and requires due explanation when all the requirements of that theoretic basis are properly derived, which is not the case here.

What therefore happens to the scalar and vector components of the temporal wave function when we combine both the temporal wave functions, of the x-axis forward temporal wave function (figures 4a-4b, quasiparticles A and B) with the x-axis reflected temporal wave function (figures 5a-5b, quasiparticles C and D)?

Consider figure 6 as an amalgamation of figures 4b and 5b:
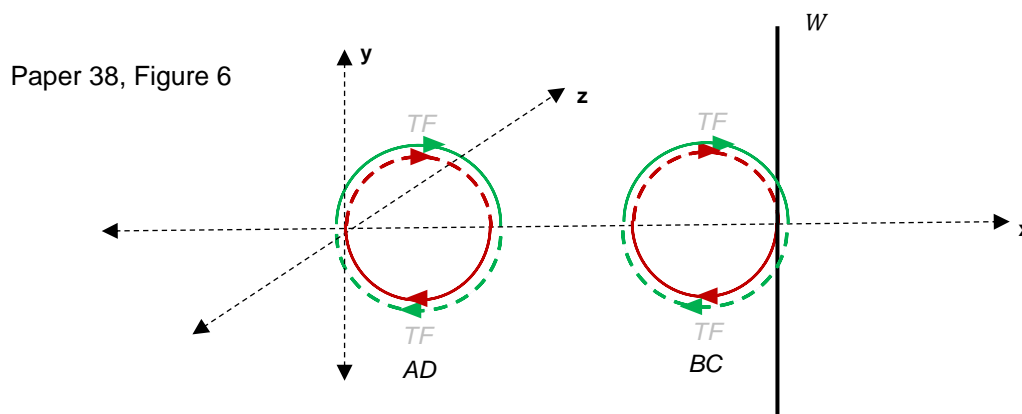
Paper 38, Figure 6

Paper 38, figure 6: the x-axis transverse temporal wave function from time-3 to time-7 in noting it is once again necessary to repair time-reverse with a time-forward aspect.

Here is demonstrated two sets of time-loops, a continuous-line (red-green) loop and a broken-line (red-green) loop for both AD and BC, proposed to be a particle pair as a particle and antiparticle pair, for both AD and BC, each particle having the same spin as the other (given by the direction of the arrows).

The issue therefore is the process of their splitting, as is known for particle-antiparticle pair production, namely the independent manifestation of electrons and positrons (or neutrinos and antineutrinos).

This splitting process is termed in physics as "symmetry breaking" and would appear to be a fundamental process of particle and antiparticle manifestation. This "symmetry breaking" process will be reserved for a subsequent paper given that the fundamental process involved there requires addressing a number of ideas fundamental to energy.

< Note, in the above description the *quasiparticle* labels of A, B, C, and D do not refer to the temperature/energy labels of A, B, C, and D of figures 1-2 of this paper >

The description above from paper 38 [38] proposed a temporal field dynamic for the particle (particle-antiparticle) pair production process. Here is the "subsequent paper" where the idea of symmetry breaking shall be explained.

In aiming such, what is to be considered now is applying that same process above as in paper 38 ([38]: p18-22, fig4-6) to a <u>full</u> temporal wave function reflection, yet not necessarily as a reflection outlined above ([38]: p18-22), yet what would happen when two temporal wave functions would approach one another like light beams (temporal wave function beams) approaching one another (facing off) to cancel each of the EM effects of each other out in a complete manner. This will set a baseline standard for the next step in deriving the EM_X^{DIR} field which will then explain the *symmetry breaking* mechanism.

To put this simply, let us consider two full double wavelength (2λ) temporal wave functions approaching one another as though they are in phase for their respective axial directions, thus presumably

cancelling each other out as they would meet (say for instance in a waveguide resonance chamber matching a factor of the length of their same wavelengths).
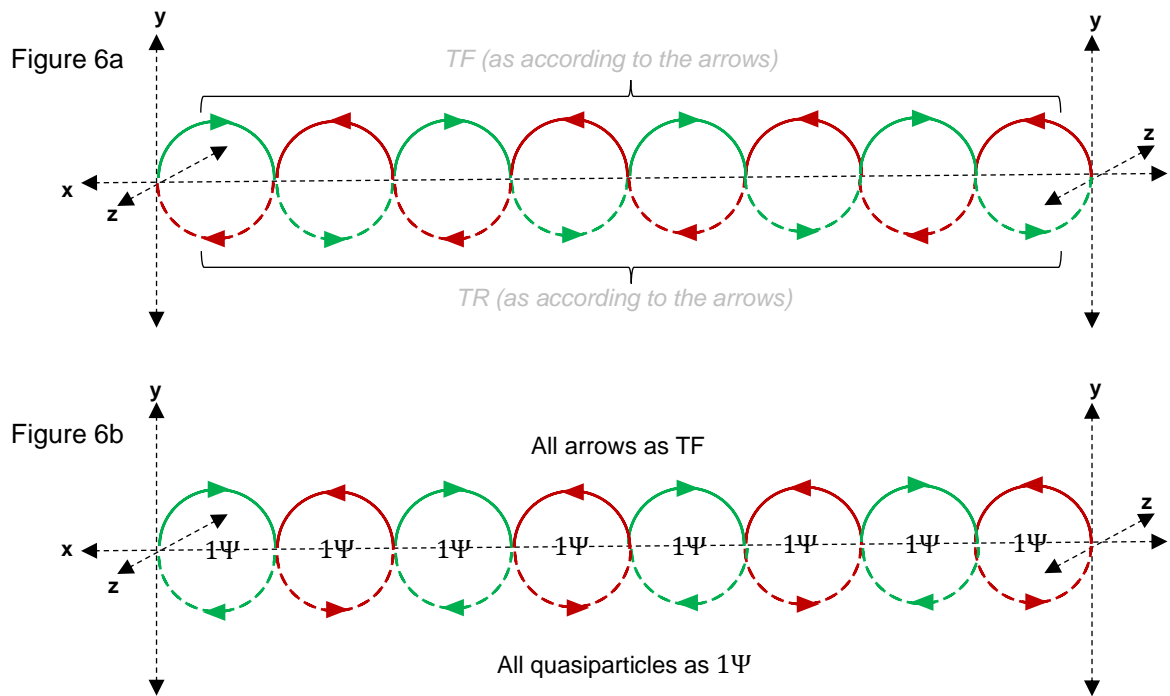
Consider figures 5a-5b as the first phase, phase-1 (as a double temporal wave function step), of the temporal wave function phase of initiation as an entire 2 wavelengths (2λ) from each end, green from left of page and red from right, the thinking being each wavelength set has a similar one come after it in time, logically:
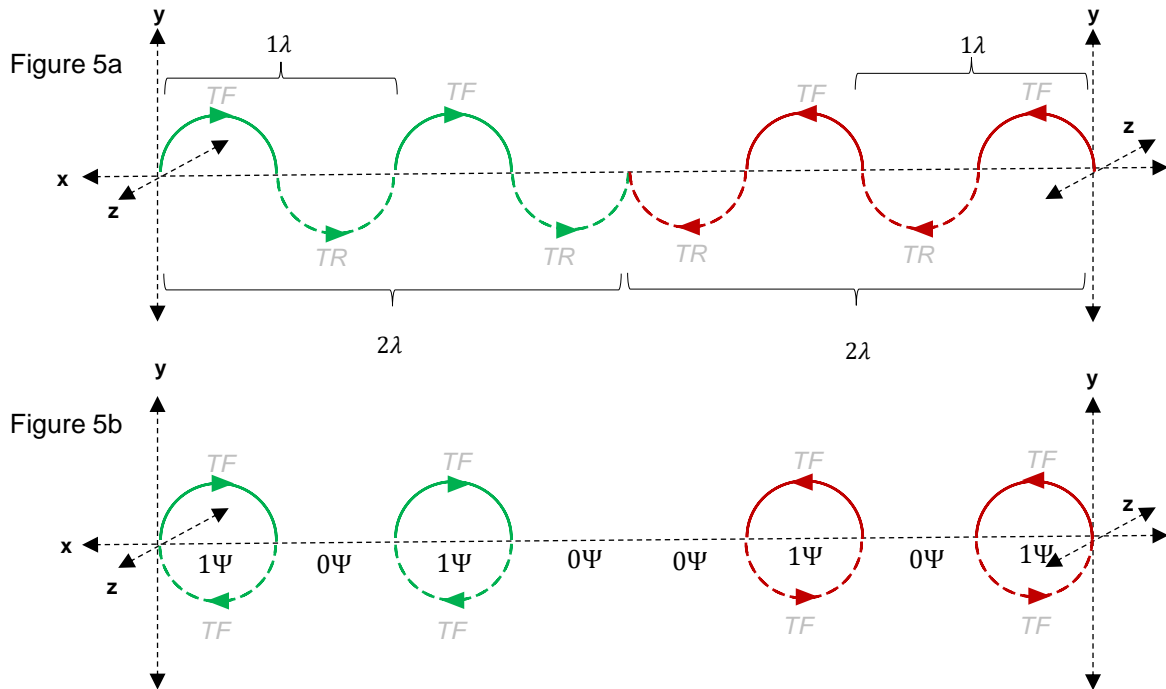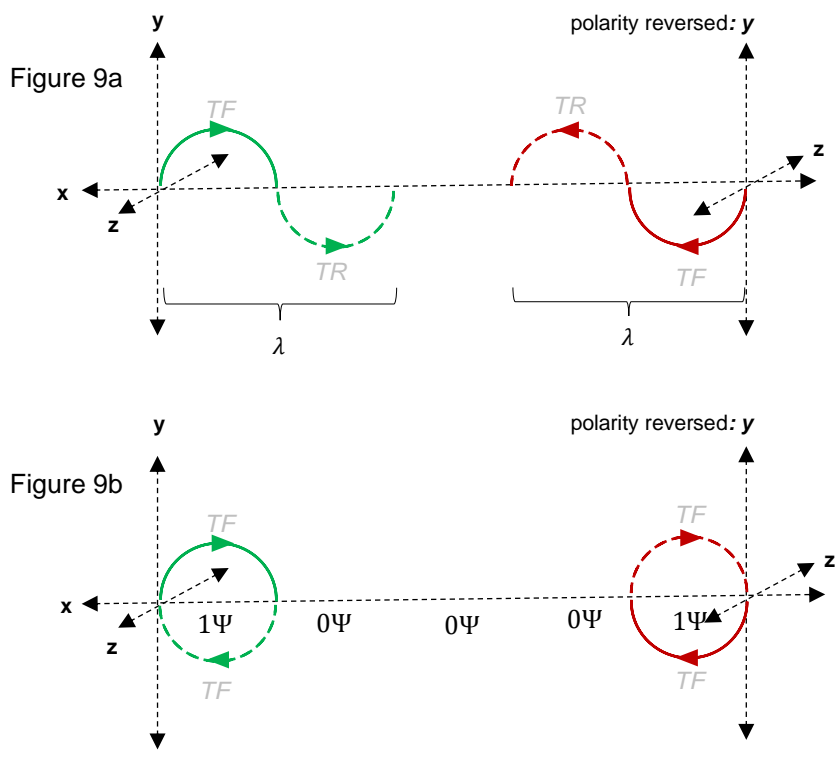

Figures 5a-5b: temporal "phase-1" as the green and red quasiparticles forming from their basic time-forward (TF) and time-reverse (TR) wave function (Ψ) components (5a) to their time-forward (TF) adjusted wave function (Ψ) components (5b).

To note in figure 5b are the active quasiparticle zones (marked as a 1Ψ) and the inactive quasiparticle zones (as a 0Ψ).

Now consider phase-2 when they interfere with each other as follows as the next 2 wave function steps, here as figures 6a-6b:

Figure 6a

TF (as according to the arrows)

TR (as according to the arrows)

Figure 6b

All arrows as TF

1Ψ 1Ψ 1Ψ 1Ψ 1Ψ 1Ψ 1Ψ 1Ψ

All quasiparticles as 1Ψ

Figures 6a-6b: temporal "phase-2" as the green and red quasiparticles forming from their basic time-forward (TF) and time-reverse (TR) wave function (Ψ) components (6a) to their time-forward (TF) adjusted wave function (Ψ) components (6b).

Note that such is a *full* quasiparticle field, not the partial quasiparticle field of EM, or the partial particle field of EM^{DIR} ([38]: p17-19).

The same effect would apply for fields facing off out of phase by reversing the y-axis polarity, namely time-forward (TF) for this y-axis polarity reverse is on the negative y-axis parameter, as follows, figures 7a-7b:

Figure 7a

polarity reversed: *y*

TF   TF   TR   TR

TR   TR   TF   TF

2λ 2λ
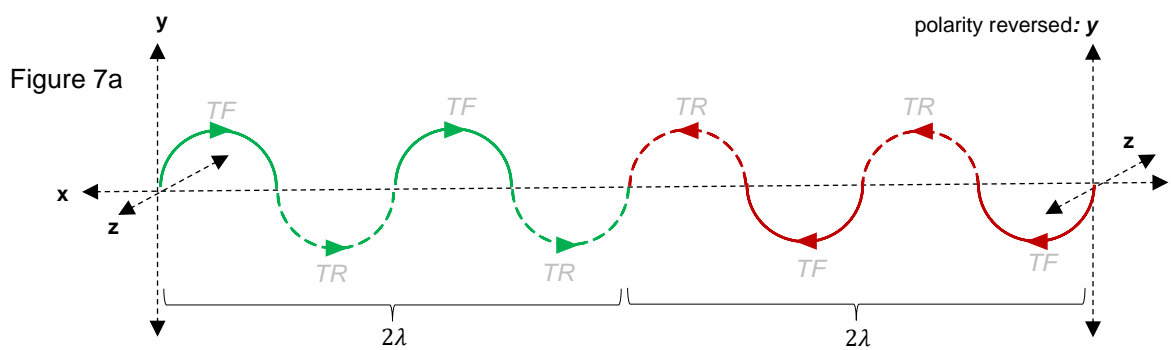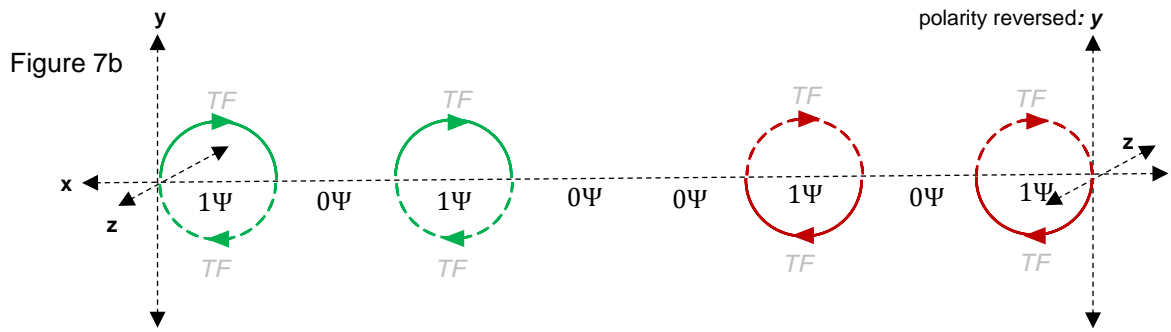
Figures 7a-7b: temporal "phase-1" as the green and red quasiparticles forming from their basic time-forward (TF) and time-reverse (TR) wave function (Ψ) components (7a) to their time-forward (TF) adjusted wave function (Ψ) components (7b).

Once again, to note in figure 7b are the active *quasiparticle* zones (marked as a 1Ψ) and the inactive *quasiparticle* zones (as a 0Ψ). Now consider phase-2 when they interfere with each other as the next 2 wavefunction steps, here as figures 8a-8b:
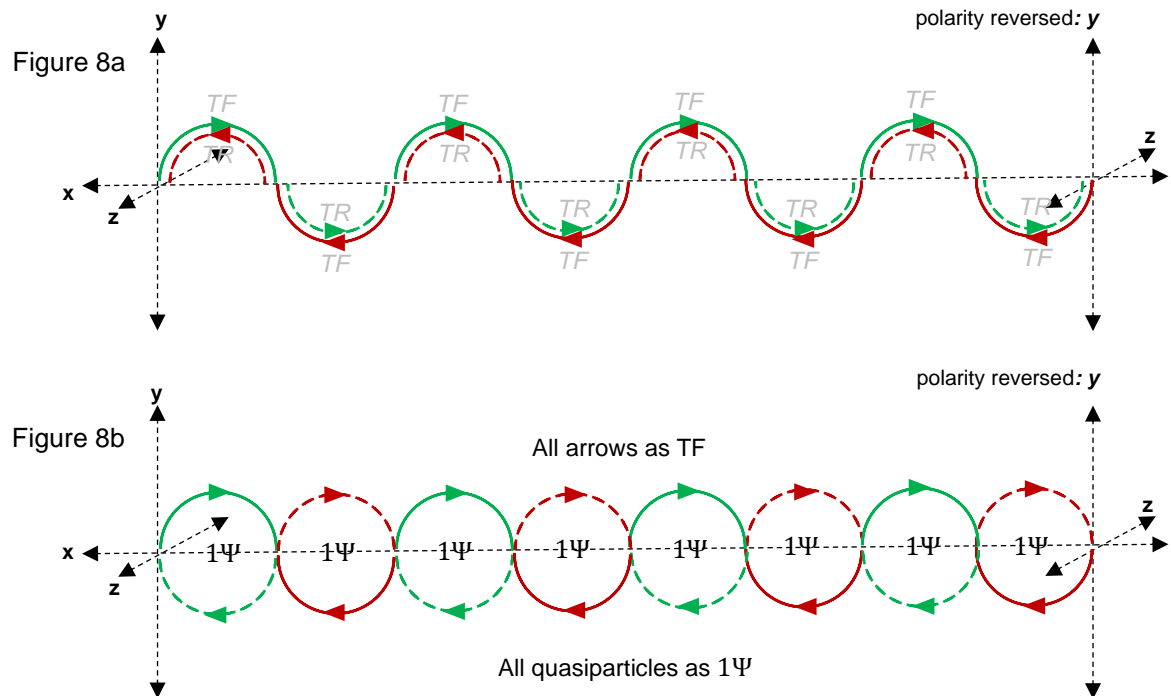
Figures 8a-8b: temporal "phase-2" as the green and red quasiparticles forming from their basic time-forward (TF) and time-reverse (TR) wave function (Ψ) components (8a) to their time-forward (TF) adjusted wave function (Ψ) components (8b).

Once again, note that such is a *full* quasiparticle field, not the partial quasiparticle field of a simple-single temporal wave function EM, or the partial particle field of EM^{DIR} ([38]: p17-19). To also note is that such is still a *quasiparticle* field effect, and thus an EM field.

The key to creating a *flatline destructive interference field* (DIR) and thus *no quasiparticle effect* is to consider figures 4-6 of paper 38 ([38]: p17-21, fig4-6) and with that consider EM fields facing off *in phase* and not *out of phase* (figures 4-6 described the particle pair production *out of phase* dynamic).

To highlight this, first shall be presented two temporal wave functions facing off *out of phase* in a resonance chamber that itself is also *out of phase (any factor of λ plus ½λ)* . Note once again that this *out of phase* dynamic is achieved by reversing the polarity of the y-axis, here as phase-1 (noting here as phase-1 only 1 temporal wave function step is being considered), figures 9a-9b:

Figures 9a-9b: temporal "phase-1" as the green and red quasiparticles forming from their basic time-forward (TF) and time-reverse (TR) wave function (Ψ) components (9a) to their time-forward (TF) adjusted wave function (Ψ) components (9b).

To note here is how the y-axis is inverted to attain the out of phase requirement.

Now consider phase-2 (the second temporal wave function step) with a continuation of the temporal wave function from the x-y-z source at either end of the x-axis, figures 10a-10b:

Figure 10a

Figure 10b
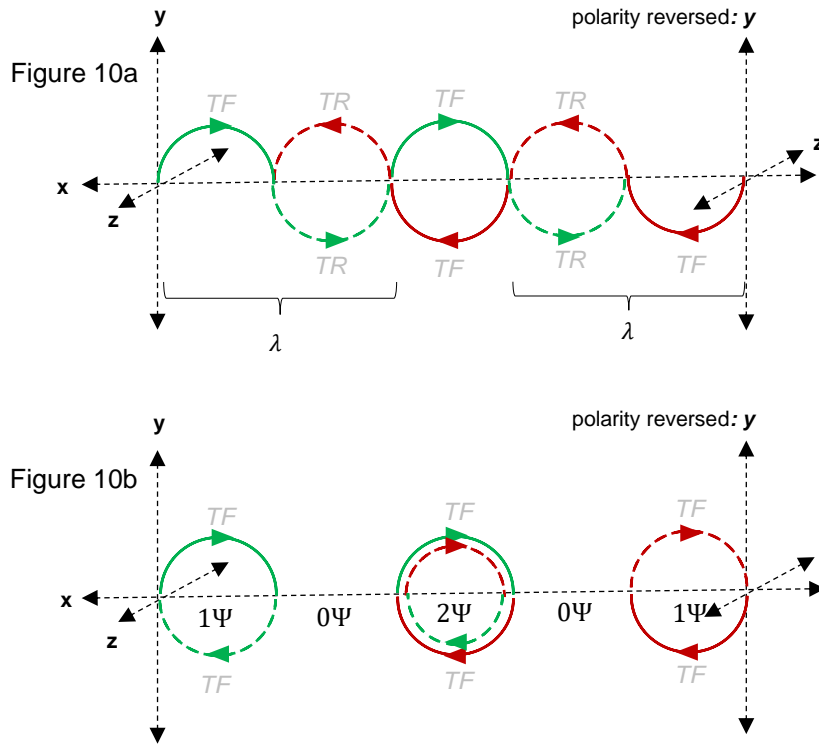
Figures 10a-10b: temporal "phase-2" as the green and red quasiparticles forming from their basic time-forward (TF) and time-reverse (TR) wave function (Ψ) components (10a) to their time-forward (TF) adjusted wave function (Ψ) components (10b).

Now consider phase-3 (a third temporal wave function step) as figures 11a-11b:
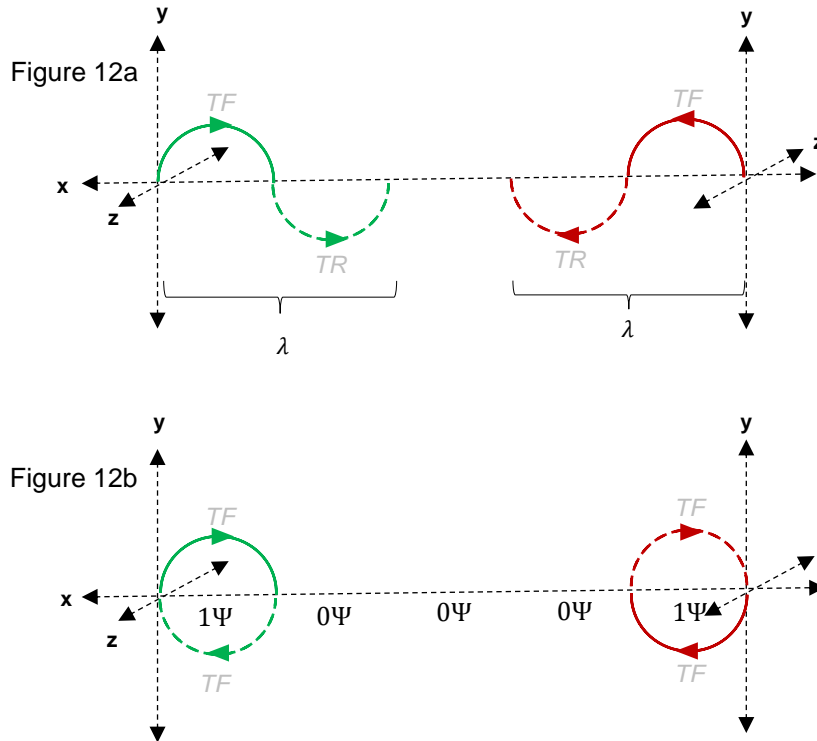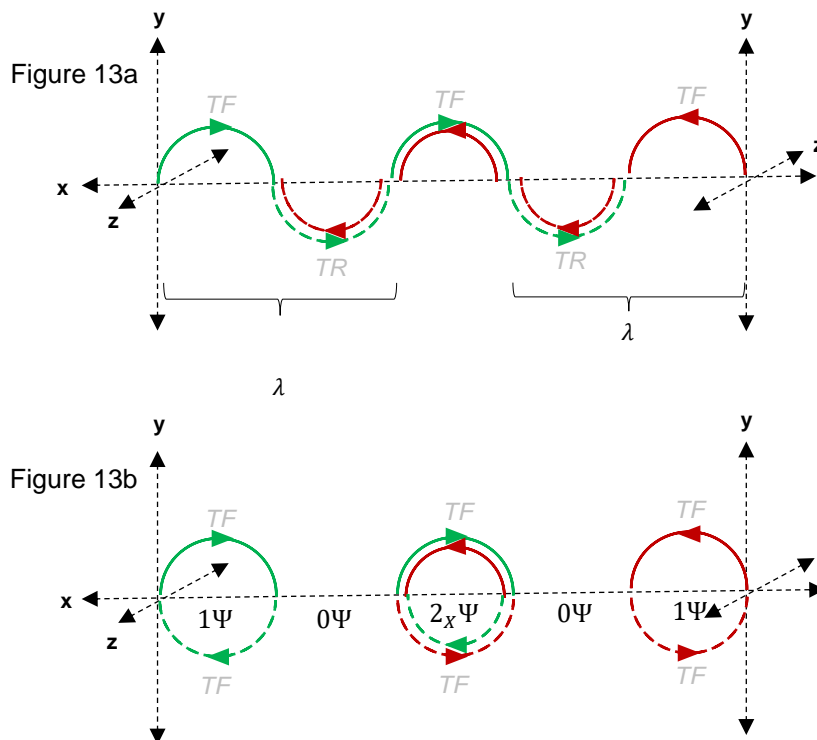

Figure 11a

Figure 11b
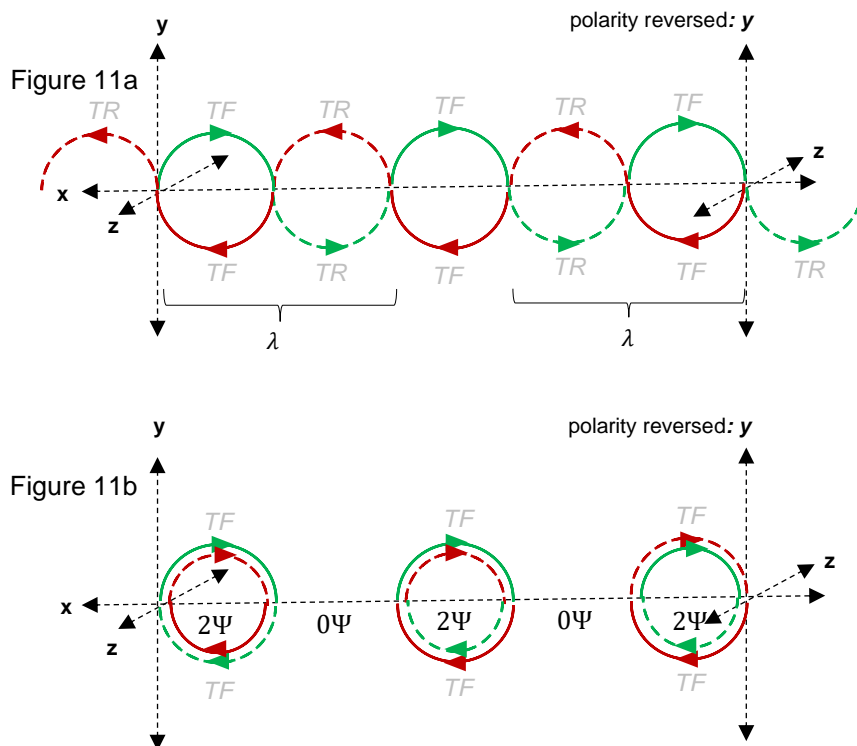
Figures 11a-11b: temporal "phase-3" as the green and red quasiparticles forming from their basic time-forward (TF) and time-reverse (TR) wave function (Ψ) components (11a) to their time-forward (TF) adjusted wave function (Ψ) components (11b).

And such would continue.

This is the proposed *particle-antiparticle pair production* process of paper 38 ([38]: p17-21, fig4-6).

Now consider (as an adaptation of figures 9-11) how these EM fields would face off *in phase*, here as phase-1 (once again, one temporal wave function step), figures 12a-12b:

Figure 12a

Figure 12b

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

Now consider phase-2 (as the second temporal wave function step) as figures 13a-13b:

Figure 13a

Figure 13b

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

Phase-3 (the third temporal wave function step) similar to figure 11b as 14a, and then considering the logical result as figure 14b:
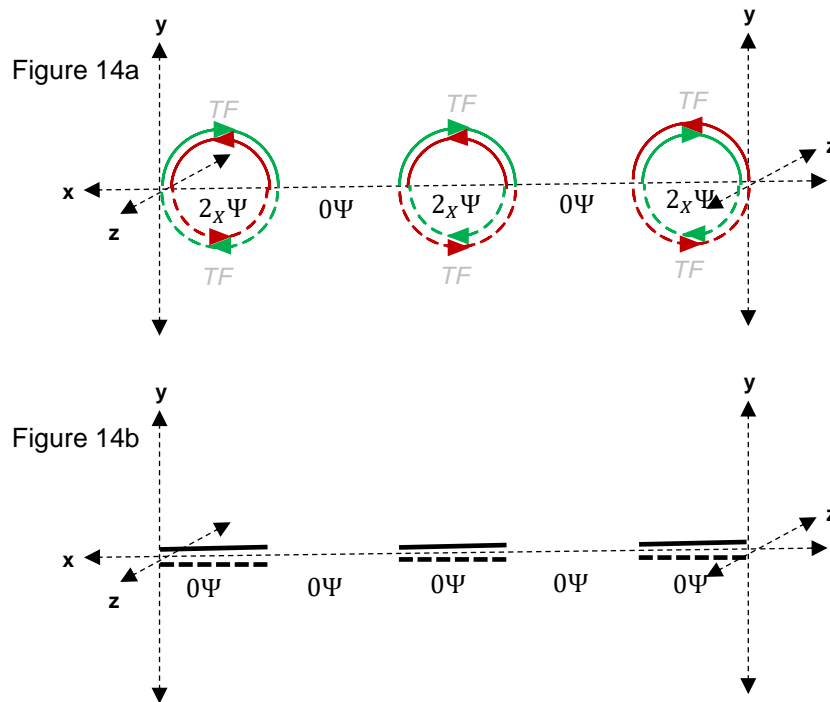
Figures 14a-14b: temporal "phase-3" as the green and red $2_X\Psi$ (TF) particles (14b) as a flatline EM_X^{DIR} particle-field (14b).

Here (14a-14b) is proposed to be a *flatline (EM$_X$) destructive interference resonance (DIR)* effect, here described as $2_X\Psi$ *(EM_X^{DIR})* wave functions (fields) as two quasiparticles of opposing spin cancelling each other out, a violation, and not a particle pair production scenario given particle pairs (particle and antiparticle) have <u>the same spin</u>, and thus same fundamental/basic temporal dynamic in space as each other (and thus spin).

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

To note is that the idea of a "reflection" in this resonance chamber scenario is not being considered, as the development of the temporal wave function according to these scales with each EM field source facing off with other cancelling one another out produces a new field effect, the EM_X^{DIR} field.

A complete theoretic description for this EM_X^{DIR} field is now warranted, namely it's phenomenal attributes with time and space needs to be presented. For instance, as presented, the EM^{DIR} field is considered as the process for gravity and the associated *particle pair production* effect [38], yet how

indeed does the EM^{DIR} field associate with the EM_X^{DIR} field, and therefore what exactly is the EM_X^{DIR} field as a phenomenal entity compared to the EM^{DIR} field effect as gravity? What "energy" attributes for instance does the EM_X^{DIR} have or require and where is it most naturally found as a phenomenon in time and space, in the universe?

9. The EM_X^{DIR} field as 0-gravity and 0-EM

To understand gravity in a most basic sense is to understand two basic attributes of the gravitational field effect, namely potential and kinetic gravitational energy.

According to the classical mechanics description, the gravitational potential of an object at a location is equal to the work (energy transferred) per unit mass that would be needed to move an object to that location from a fixed reference location. There, the reference location is defined where the potential is zero in being infinitely far away from any mass, resulting in a negative potential at any finite distance. Quite simply, if an object such as a ball is lifted above the ground it has gravitational potential energy. If the ball is then dropped from rest it will fall back to the ground whereby the gravitational potential energy is converted to kinetic energy; there with that example gravitational potential energy is at the top which then equates to the kinetic energy at the bottom, as according to the law of conservation of energy.

One of the key implications of the EM_X^{DIR} equations of $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$ and $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ (equations 19 and 20 respectively) is that here gravity represents the maximum "0" status, of _0 potential energy_, and thus by itself as a force represents a drive for 0 potential energy, as a t_A (_time-after_) event, and thus 0-gravity, as a "_0 potential energy_" effect given here t_A (the time-domain of _time-after_) is being defined as 0. The implication here, the paradox, is that this 0 potential value represents in theory a maximum kinetic energy facility, as infinite _kinetic_ energy. The question is, "_how_"?

The EM^{DIR} field (and not EM_X^{DIR} field) as a basic c-based wave-field (figures 1-2, B) effect was first proposed in paper 23 ([23]: p26-27). The problem there was the stage of development the theory was at, proposing the EM^{DIR} field to be at a $45°$ tilt between the *y-axis* and *x-axis*:

7.2 EM^DIR-TSW signature

*The EM^DIR (destructive interference resonance) wave is a little different to describe, for it would have its own unique wave-function **potential** separate to that of an EM field, still abiding nonetheless by the TSF and associated TSG process of time movement function. The only way to explain this is to propose most simply that it would exist at $45°$ **to the alignment of the "z" and "y" axis EM-TSW field, as per figure 14:**
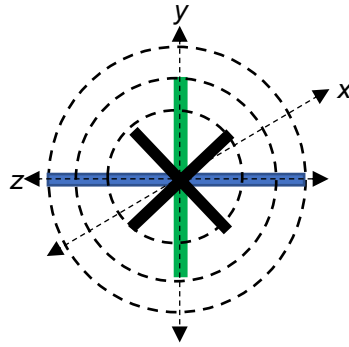
Paper 23, figure 14: Note here the installment diagrammatically of the proposed EM^DIR field axes, marked as a black-cross 45º to the "y" and "z" axes.

*As a field interaction this is slightly different, as the resonance here happens in a different manner, as per the following diagrams for the new time period along the x-axis of time x-5 to time x-8. Note that a **double** EM wave is used in each step for the destructive interference resonance EM^DIR step to be performed as per figure 15.*
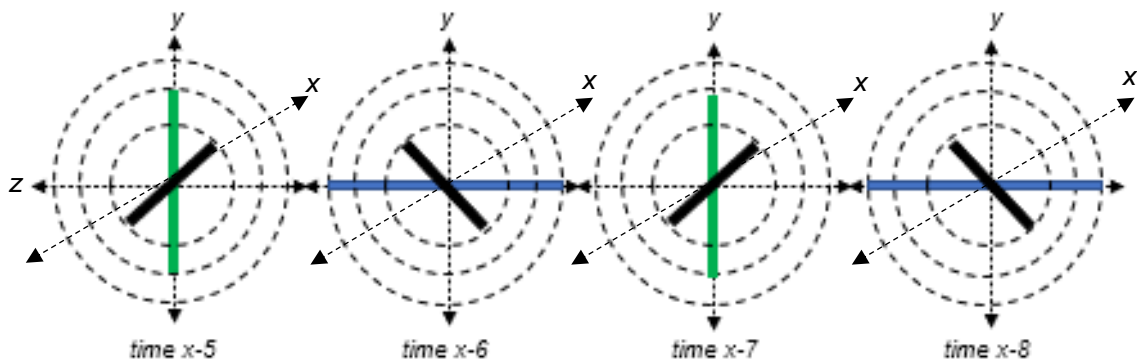
Paper 23, figure 15: symbolic representation of the wave-function temporal steps along the x-axis, the green symbolic of the electrical function, blue symbolic of the magnetic function, through the x-axis time-steps of x-5 to x-8, highlighting the new wave-function EM^DIR 45° in alignment to that of the electrical (green) and magnetic (blue) EM wave-function.

.

*As a wave though this is not evident for EM^DIR and therefore for mass, as it is a destructive interference wave, and so there would exist an "incursion" along the x-axis **ALSO**, marking a 45º shift along the x-axis direction. One most basic example of this would be a particle spin along the x-axis 45º incursion (which shall be explained per the TSP description shortly). Another example of this field effect would be if two masses were to revolve around (relative to) each other then they could produce a wave as a timespace field distortion. Evidence for this effect exists in nature with what is considered to be binary neutron stars as they coalesce.*

The thinking there was that G in being based on an EM "destructive interference effect" was a feature requiring the condition of c while upholding a $45°$ tilt for the EM^{DIR} field between the *y-axis* and *x-axis* of the EM field. The subsequent modelling detailed here though (section 8) has shown a destructive interference resonance field can take two forms, namely EM^{DIR} and EM_X^{DIR}.

The implication of the EM^{DIR} gravitational field effect explained here (increasingly kinetic energy for masses in a G field effect) as the more fundamental EM_X^{DIR} field is that such (the EM_X^{DIR} field) would represent a mandate for the EM^{DIR} field having an "immediate" force component. Further to this, the EM_X^{DIR} equations of $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$ and $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ lend to the notion that this EM_X^{DIR} field is _non-inertial_. Such a feature is not the description of "anti-gravity" _per se_ yet "0-gravity", as the EM_X^{DIR} field itself as this feature is not opposing gravity yet represents the exhaustion (via entropy) of the gravitational field effect given t_A (_time-after_) as energy in these equations for EM_X^{DIR} (equations 19 and 20) is 0.

The next question is, "how does this feature as a phenomenal effect, namely 0-gravity, in nature"?

Although Temporal Mechanics associated the equation of G to c, as per equations 11 and 18 in this paper (namely $G = T_G \cdot e_c \cdot c$ and $G = \frac{33}{2} E_{MG} \cdot c$ respectively), the issue here is how the feature of the kinetic effect of gravity on mass by this EM_X^{DIR} field effect would play out.

The mathematics shows that owing to the EM_X^{DIR} field equations of $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$ and $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$ (equations 19 and 20 respectively) this would play out _instantaneously_ simple because at this level of time (t_A) for equations 19 and 20 _time=0_.

To note is that the Newtonian equation for gravity (which holds gravity as an immediate force field effect) was derived in paper 40 ([40]: p20-21, eq4-9) in the context of deriving the electric radius of the proton (r_{p_e}) and the maximum speed (cosmic ray phenomenon) of the proton (v_{pc}) ([40]: p21-23, eq9-13).

Temporal Mechanics would thus conclude that gravity has _two_ features, namely a feature at c as the basic EM^{DIR} effect prescribed by equations 11 and 18, and an immediate effect prescribed by its negative energy feature (kinetic) regarding mass as according to equations 19-20.

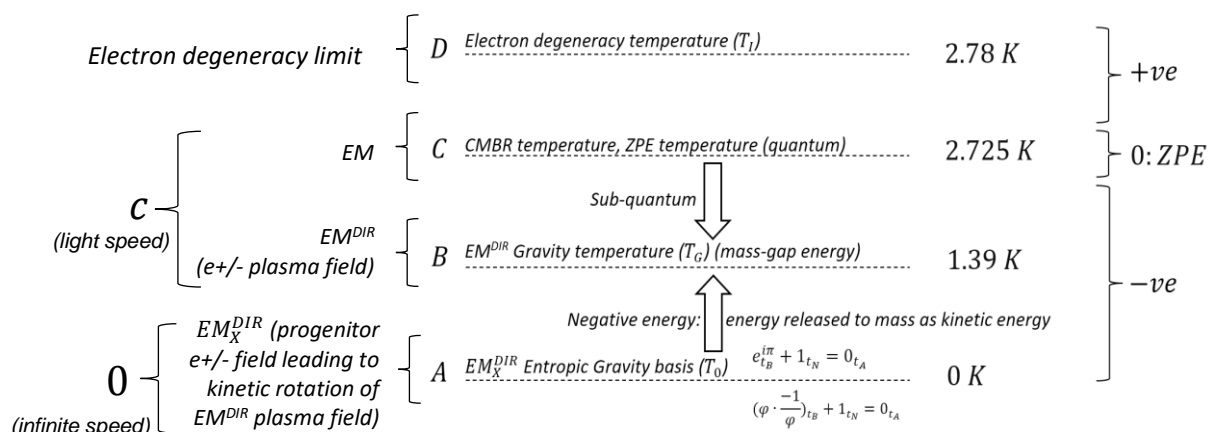Consider figure 15 to explain this further as an adaptation of figures 1-2:

Figure 15: an adaptation of figures 1-2, highlighting the baseline quantum entanglement and gravitational entanglement mandates of the EM_X^{DIR} field, and the c mandate for the EM and EM^{DIR} fields. Note "0" representing a "0" passage of time for (A), and thus infinite speed (entanglement).

The idea of the EM_X^{DIR} field would therefore represent a fundamental phenomenal feature, effecting the behaviour of particles and EM, as is found with black hole phenomena, and associated galactic shapes. Ultimately, the EM_X^{DIR} field would present the case for a basic shaping of reality, establishing an overall *form* for mass as central to this underlying EM_X^{DIR} field.

Two key questions to ask therefore are:

- "How does the idea of *distance* come in to play here between the kinetic EM_X^{DIR} field and the gravitational potential EM^{DIR} field"?
- "How indeed would the EM^{DIR} field relate with the EM_X^{DIR} field in regard to the *shape* of time and space, of *timespace*, and thence reality?"

According to the derivations of Temporal Mechanics, the EM^{DIR} field as a maximum potential energy was considered at the realm of $E = f$, namely the maximum proposed distance of a mass/particle from the sun ([13]: p11, eq6-8) and thus here a maximum proposed EM^{DIR} kinetic field facility-effect, beyond which, namely beyond this outer limit, would presumably be an infinite *potential* kinetic energy effect, proposed here to be a mechanism that underwrites the idea of "infinite speed", namely *quantum entanglement* and *gravitational entanglement* (the proposed kinetic energy effect for mass objects in a gravitational field).

Consider figure 16 highlighting these basic proposals for kinetic and potential gravitational energy for the EM and EM^{DIR} fields:
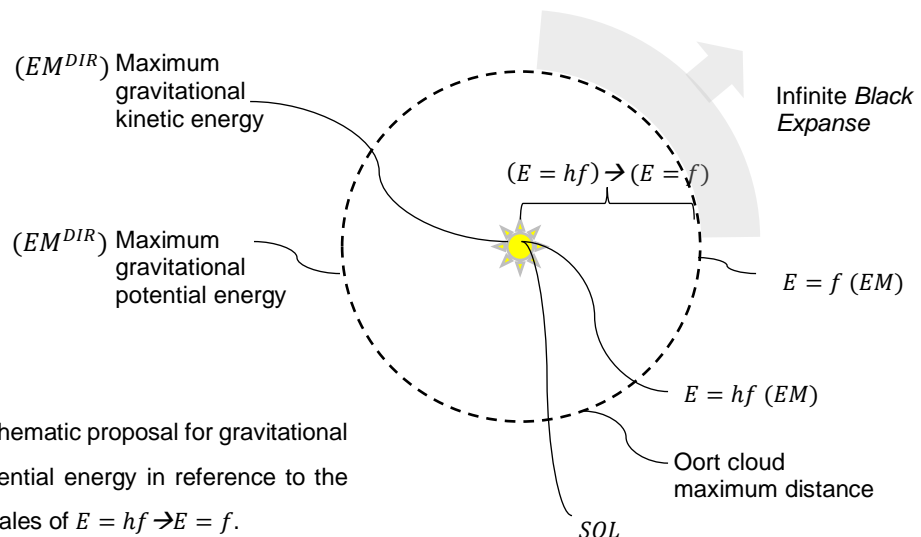

Figure 16: the basic schematic proposal for gravitational EM^{DIR} kinetic and potential energy in reference to the proposed *timespace* scales of $E = hf \rightarrow E = f$.

Beyond the $E = f$ realm, Temporal Mechanics derives such to be the potential infinite *Black Expanse* ([33]: p5-18), a cosmological void, which maintains the solar system *within it*. This was presented through papers 32-34 [32-34]. Although papers 32-34 gave a basic proposal for such a scheme, here

further refinement is offered to the ideas proposed in those papers regarding the greater structure of reality.

As figure 16 highlights, the $EM\text{-}EM^{DIR}\text{-}EM_X^{DIR}$ relationship is proposed to exist throughout reality depending on the nature of their field effects and associated dynamics. To note is that the $E = hf \rightarrow E = f$ phenomenon is an EM phenomena, yet there is proposed to be a gravitational boundary (EM^{DIR}) to such regarding maximum gravitational kinetic energy ($E = hf$) and maximum gravitational potential energy ($E = f$), as highlighted in figure 16. Thus, the issue is how EM and the gravitational EM^{DIR} relate to the 0-gravitational EM_X^{DIR} phenomena.

As figures 1-2 highlight, the EM_X^{DIR} field is proposed to underwrite the EM^{DIR} field. What of the energy requirements to manifest a EM_X^{DIR} field?

Consider an adaptation of figure 15 here, here as figure 17:
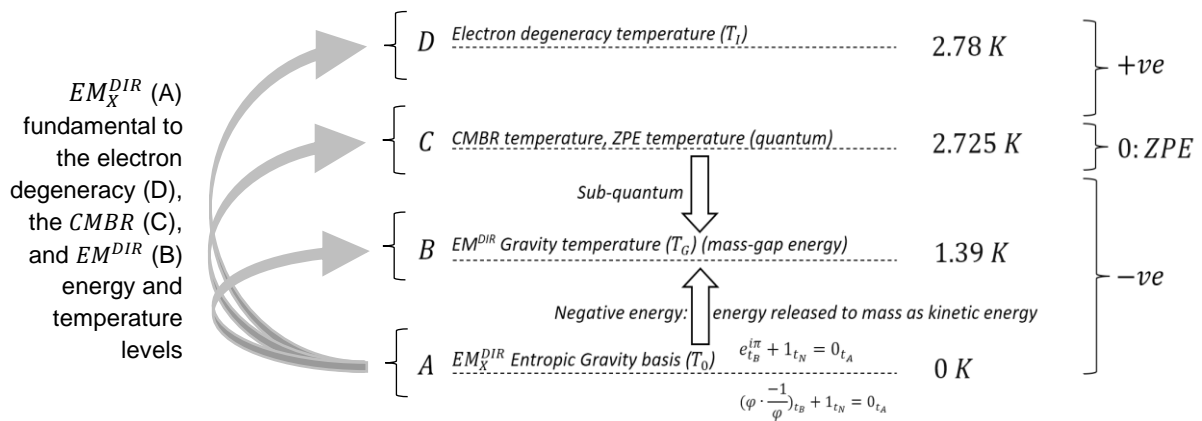
Figure 17: note here how EM_X^{DIR} level A is fundamental to the electron degeneracy level D, the $CMBR$ level C, and EM^{DIR} level B, and thus would in theory have certain energy requirements for its manifestation to instruct the behaviour of levels B→D

To note is that according to equations 19 and 20, the EM_X^{DIR} field is *not* an energy field yet a *timespace condition*, as with the time-equation. This *timespace* condition for the EM_X^{DIR} field effect is derived to have the following effects:

- o having the EM^{DIR} gravitational potential and kinetic energy fields approach 0,
- o and thus keeping both fields from approaching infinity,
- o thus creating a definable limit for reality (figure 10),
- o while thus balancing these gravitational kinetic and potential energy fields,
- o thus creating a steady-state definable reality.

Therefore, although the EM_X^{DIR} field represents no energy per se, it would _require_ a baseline amount of energy to be a phenomenon (for the energy to be transferred into the known facilities of the EM_X^{DIR} field, namely B→D), to have it represent what it does, namely to be a part of the stages of D→B, namely an ultimate electron degeneracy event (D) and a $CMBR/EM/ZPE$ (C) event, and thence an EM^{DIR} event (B). Thus, once the EM_X^{DIR} field generation process gets to that energy threshold requirement, the effect should be striking with how it opposes a magnetic field, noting that this EM_X^{DIR} would resist being formed in resisting EM. Where that energy comes from must abide by the following protocols:

- o condition/level B (figures 1,2,15,17),
- o condition/level C (figures 1,2,15,17),
- o condition/level D (figures 1,2,15,17),
- o thence condition/level A being a _flatline_ destructive interference resonance of an EM field, hence displacing the energy of the EM_X^{DIR} field to the requirements of B, C, and D (figures 1,2,15,17).

Thus, the EM_X^{DIR} field although having no energy-temperature is nonetheless a mathematical process for _timespace_ conducting the behaviour of energy with the time-equation; energy thus needs to be put into a system in a _flatline_ "destructive interference resonance" (EM_X^{DIR}) manner to have the energy of that system not be destroyed yet displaced to other processes (B, C, D), still satisfying the law of conservation of energy, in fact, _mandating_ the conservation of energy law.

Thus in _creating_ a EM_X^{DIR} field (artificial EM_X^{DIR} field) it can be proposed that all the energy requirements for B-C-D (figures 1-2) must be accommodated for in manifesting the EM_X^{DIR} field.

The question is, "what is that baseline energy value requirement?"

The _natural_ enthalpic requirement would find its source as based on the premise of an overall thermodynamic steady state system of time and space, if indeed Temporal Mechanics has found no fundamental evidence for a big bang event and associated metric expansion of space.

Essentially, $\varphi \cdot \frac{-1}{\varphi}$ would be the enthalpic component of this process, namely the basis for _quantum entanglement_ and _gravitational-entanglement_, a process where energy needs to be put in to make such phenomena (_quantum entanglement_ and _gravitational-entanglement_) work. This energy therefore would be available and exist everywhere care of conditions B-C-D, as a thermodynamic steady state system exercising a mandate for both the conservation of energy and conservation of momentum principles, and thus conservation of mass, a steady state principle of mass the maximum of which was derived in paper 36 as the proposed mass of the solar system ([36]: p22-26), fundamentally though related to the energy of quanta undergoing _destructive interference resonance_ (DIR).

10.   The EM_X^{DIR} field as anti-gravity and anti-EM

There is nonetheless one baseline key feature to this EM_X^{DIR} field effect regarding EM and gravity (EM^{DIR}), namely that the EM_X^{DIR} field effect represents a baseline mandate, a *flatline* of the *timespace* field which thence is proposed to *exclude/repel* the <u>*quasiparticle* signature of EM</u> and the <u>*particle* signature of EM^{DIR}</u>.

Consider figure 18 highlighting the baseline nature of the EM_X^{DIR} field excluding the signature features of EM (electromagnetic) and EM^{DIR} (gravity) fields:
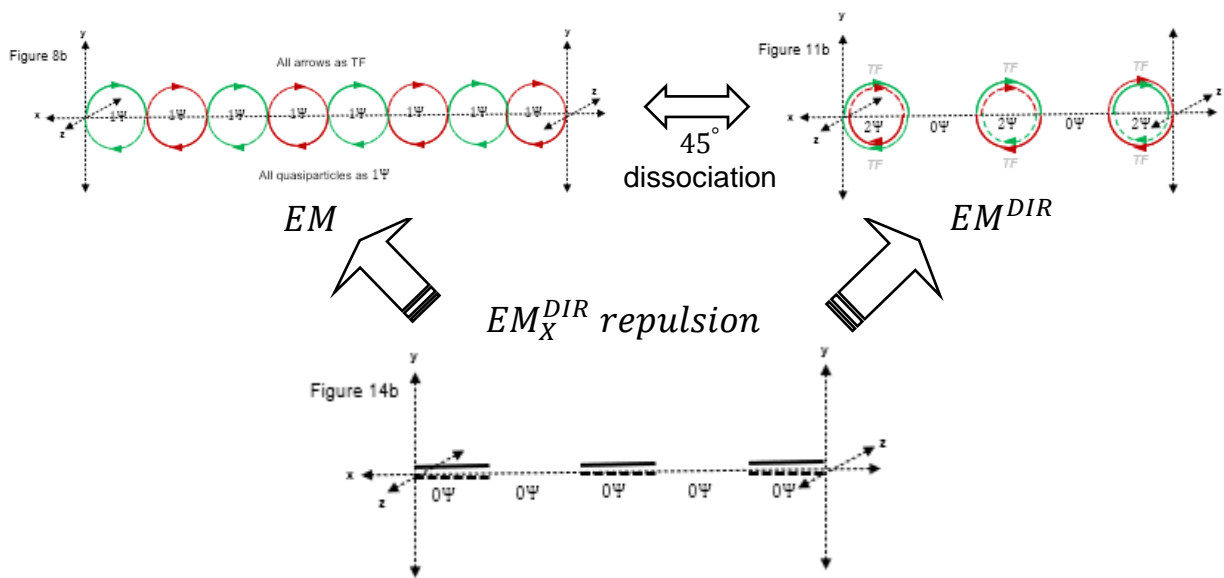
Figure 18: note here how EM_X^{DIR} level A is proposed to repel levels B (EM^{DIR}) and C (EM), noting also the natural $45°$ dissociation between levels B (EM^{DIR}) and C (EM).

The blocking if not repulsion nature of the EM_X^{DIR} field needs further thought in regard to the use of figure 8b in figure 18. Consider figure 19 as an adaptation of figure 14b:
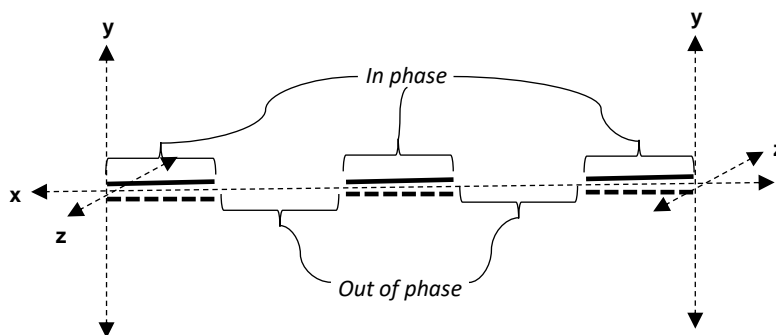
Figure 19: a basic description of the *flatline EM_X^{DIR}* particle-field.

The issue here is how the EM_X^{DIR} field commands a zone of influence in having already taken an underlying EM field (partial *quasiparticle*, standard EM field) into effect, namely how the EM_X^{DIR} temporal wave function develops as a progression in time and how that relates to an external EM field which would either express itself in phase or out of phase with the EM_X^{DIR} field:

- In the case of the EM (or EM^{DIR}) field being in phase with the EM_X^{DIR} field, then the proposal is there would be a blocking and thus a reflection of the EM field, and in the case of being out of phase the EM (or EM^{DIR}) field effect would appear to pass through.
- Despite the precision required for an out of phase condition to exist, an EM (or EM^{DIR}) field would be reflected from (repelled) or on average be contoured around a EM_X^{DIR} field in an out of phase condition.

Simply, this EM_X^{DIR} field would repel both the mass-field effect of gravity (EM^{DIR}) and thus demonstrate an anti-gravity phenomenon <a hovering effect by the EM_X^{DIR} source field>, and the EM field effect of light and thus demonstrate an anti-EM phenomenon <a cloaking/reflective effect by the EM_X^{DIR} source field>.

Also of note is the EM_X^{DIR} field is proposed to represent the $0\,K$ level, and thus have a basic superconductor effect, namely 0 electrical resistance yet being, as the theory suggests here, entirely non-particle, non-antiparticle, non-quantum, and thus *non-inertial*.

As data shows regarding superconductivity, an electric current through a superconducting substance or field can persist indefinitely with no power source. As such, the EM_X^{DIR} field is proposed to be analogous to the Meissner effect [44], namely the complete ejection of magnetic field lines from the interior of the superconductor (EM_X^{DIR}) field as per figure 20:

Figure 20: the Meissner effect, namely magnetic field lines (B), represented as arrows, are excluded from a superconductor when its temperature (T) is below its critical temperature (T$_C$), image from Wikipedia [47]
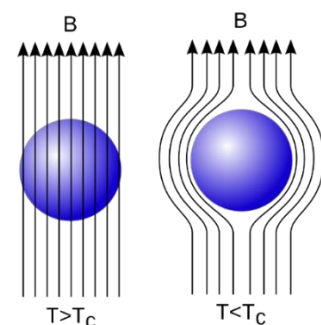
The full description of the EM_X^{DIR} field though in ejecting the magnetic field lines is more accurately given in the description of figure 18.

Thus, the proposal here is that a EM_X^{DIR} field is repulsive to a magnetic field (as being a process of ZPE), the importance of which being that the generation of an EM_X^{DIR} field is a process of "destructive interference resonance" of an EM field, and so when a magnetic field is proposed to be repelled from this

field effect, there is overall thrust in the direction of the ejected magnetic field *if indeed* the EM_X^{DIR} has *no inertial properties*, which by design/definition it does not in being a *flatline quasiparticle* field effect. To also note is that this proposed repulsive effect was derived in paper 23 ([23]: p23-31).

In understanding such, Temporal Mechanics proposes that the EM_X^{DIR} field is in fact responsible for the black hole phenomena, in being a baseline field effect seeming to operate with the following conditions and phenomena:

- Being the centre of surrounding EM such as electron degeneracy and thus proposed here as stellar-phenomena activity (as a black hole is).
- Appearing dark while also seeming to contour light and gravity around it (noting the known "soft hairs" idea of black hole radiation [48].
- Ejecting/repelling EM/gravity fields as noted with quasars [49].

In short, the classic example of a EM_X^{DIR} field is the black hole phenomena, namely being in the centre of point sources of EM (as per the proposed electron degeneracy phenomena) which thence at its central sphere of influence would create a destructive interference resonance effect, destructively interfering in a certain way, which as a behaviour also appears to eject material (as per quasars), noting the reference to paper 40 ([40]: p31-33) in section 7 of this paper, together with the cosmological principles (CP1-CP7).

Further to this:

- In the EM_X^{DIR} field being more fundamental to the electron degeneracy phenomena (B, figures 1-2), then here the EM_X^{DIR} field would be *central* to this electron degeneracy phenomena.

- Two EM_X^{DIR} fields revolving around each other would enact an anti-EM and anti-gravitational field *wave* effect, effect the EM and EM_X^{DIR} fields as both EM and gravitational *waves* [50].

- The EM_X^{DIR} field influences both ZPE (EM) and negative energy/gravity (EM^{DIR}), giving galaxies their characteristic rotational and associated shaped features as per CP7 (section 7).

Here therefore Temporal Mechanics more precisely predicts and accounts for black hole phenomena than what General Relativity has achieved. Indeed, General Relativity understands the black hole phenomena *mathematically* according to its proposed equations for mass and gravity and thence associated geodesic lines to arrive at the known data for black holes. Temporal Mechanics though describes this phenomena with more pan-data accuracy and pan-theoretic utility. Consider such a proposal for black hole phenomena as an 9th cosmological principle (CP9) as follows:

<center>*CP9: the EM_X^{DIR} field underlines the phenomena of black holes.*</center>

Primarily to note is that this EM_X^{DIR} field would uphold two fundamental principles for energy (EM) and mass (EM^{DIR}) for the entire proposed *timespace* system, particularly so given its quantum-entanglement and gravitational-entanglement mandates, namely:

- o Conservation of energy
- o Conservation of momentum

As such, the concept of the "black hole information paradox" is resolved, as here a more pan-data compliant account for the black hole phenomena is detailed.

An important issue therefore is, "how much baseline energy is required as an input to bring a EM_X^{DIR} field to life?".

The answer to this is elementary in that the energy required for a EM_X^{DIR} field is essentially the energy _nullified_, namely the energy involved in the DIR (*destructive interference resonance*) process, transferred thence (as that nullified energy) into the idea of the EM_X^{DIR} field resisting the EM and EM^{DIR} fields by this DIR process. The effect of this is that there is no minimum amount of energy required to generate a EM_X^{DIR} field other than the minimum amount of energy required for two quanta to destructively interfere (*flatline*) with each other, of course noting that the EM_X^{DIR} field is repulsive to EM, namely repulsive to the field trying to generate it through a flatline (X) destructive interference resonance (DIR) effect.

11. The EM_X^{DIR} field mandating symmetry breaking and Baryon asymmetry

The following references for the phenomenon of symmetry breaking in Temporal Mechanics are worthy of consideration: ([1]: p4, eq3), ([25]: p47-49), ([27]: p3-6), ([29]: p19-21), and ([35]: p10-13), of particular note paper 25:

3.5.2.4 Symmetry-breaking:

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

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

$$t_A = t_B^2$$

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

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

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

Paper 25, figure 15: the underlying vacuum and its relationship with the theoretical realm of anti-particles by virtue of the mathematics defining the vacuum with the time-algorithm.
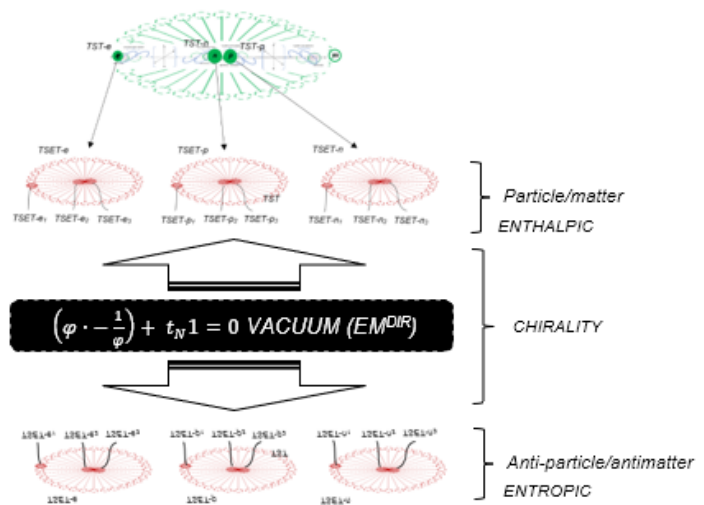
The proposal here is that the EM_X^{DIR} field (given its anti-EM and anti-gravity qualities) is the baseline effect for symmetry breaking, namely that the particle-antiparticle pair production (particle pair

production) process has particles and antiparticles separate at their genesis, as described in figure 15, paper 25, simply because $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$ is the EM_X^{DIR} equation and that this underlying field is not only repulsive to both mass-gravity (particles) and EM (charge), yet that the two particles produced (say electron e^- and positron e^+) represent different aspects of the EM_X^{DIR} equation, the EM_X^{DIR} field that would act as a natural catalyst for the symmetry breaking process in the particle-antiparticle pair production process, a fundamental force of activity.

Note in paper 37 the idea of _positron formation being entropic_ and _electron formation being enthalpic_, pages 17-18 ([37]: p17-18, fig2):

> 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:

Paper 37, 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.
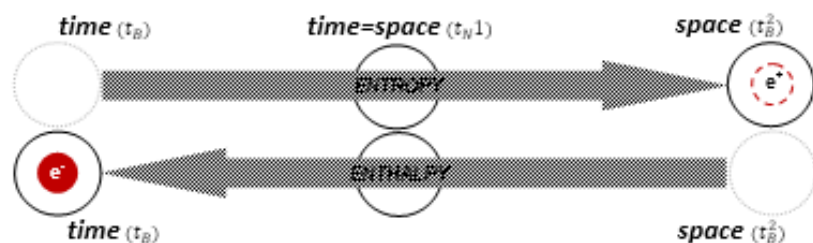
> Here, the description is central to entropy being a process of antimatter (e^+) formation, and enthalpy being a process of matter (e^-) formation. Note that electron formation (e^-) is the fundamental basis for a t_B result ([23]: p13-14).
>
> The key implication here with this proposal is that matter (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).

Note that the above figure ([37]: p18, fig2) is not necessarily a description of time or anti-time per se, as anti-time is considered by Temporal Mechanics to be forbidden (resolved by the logistics of the temporal wave function). The above figure is representative of the two types of energy _transference_, namely entropy and enthalpy, regarding positron and electron genesis respectively. Regarding such, the nature of the EM_X^{DIR} field with symmetry breaking although fundamental can therefore be further qualified

with the condition of CP violation in understanding how the basic condition of the EM_X^{DIR} field as $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$ would prefer a "particle" outcome over an antiparticle outcome, given $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$ is an entropic equation and thus take the effect of positron formation in a "0" eventual outcome, thus resolve the issue of *Baryon asymmetry*, namely why particles are favoured over antiparticles.

It would be plausible to go further here with this idea of Baryon asymmetry in regard to both the EM_X^{DIR} equation $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$ and figure 2 from paper 37 ([37]: p17-18, fig2), and bare reference here to figure 11b of this paper regarding particle-antiparticle pair production. There, in figures 11a-11b, the possibility exists that the primary yet "amended" time-reverse (TR) portion (dotted curves) of the temporal wave function form a time-circle as a particle (say, electron e^-) while the primary time-forward (TF) unbroken line forms the antiparticle (say, positron e^+). In this condition, figure 2 of paper 37 is further substantiated with the electron being a part of a time-reverse (TR) process and the positron being a part of the time-forward (TF) process. Consider figure 21:
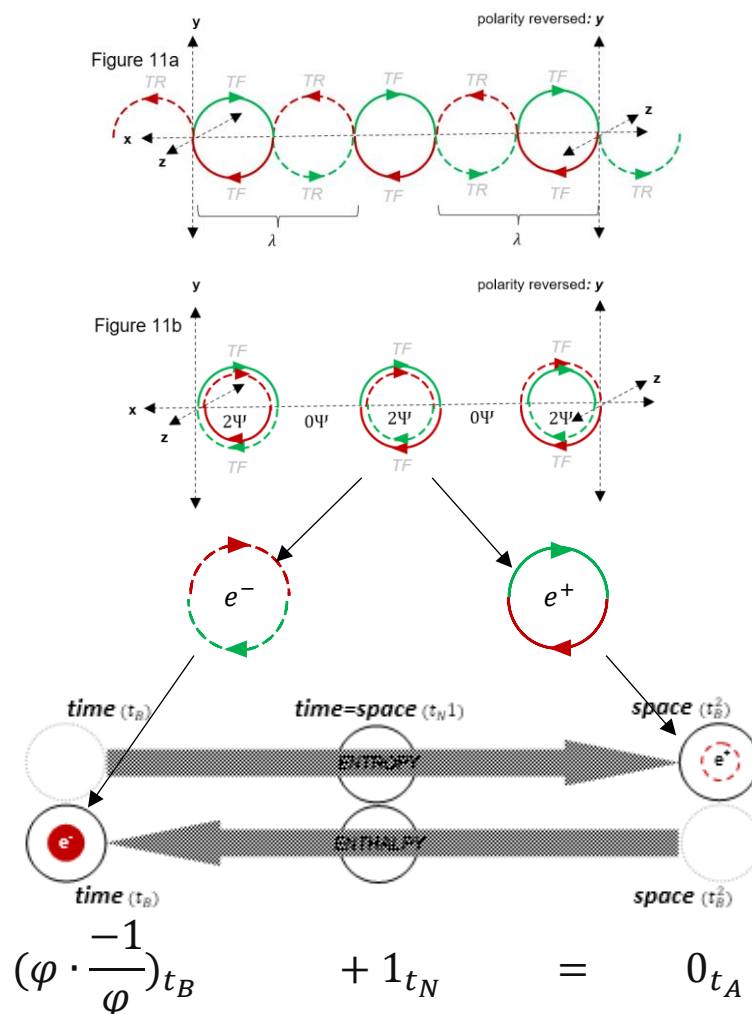

Figure 21: a portrayal of Baryon asymmetry regarding the fate of the electron (e^-) and positron (e^+) in regard to the EM_X^{DIR} equation $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$.

Note here is the idea of e^- being associated to $(\varphi \cdot \frac{-1}{\varphi})$ as t_B described as the idea of *entanglement*. Here also is how the electron e^-, as featured in figure 2 from paper 37, represents an initial consideration of time-reverse (TR). However, given such was a violation for time (namely time-reverse), an amendment as time-forward (TF) in the opposite direction was required as initially explained and modelled in paper 2 ([2]: p9, fig8a-8b). Yet here, according to the EM_X^{DIR} equation $(\varphi \cdot \frac{-1}{\varphi})_{t_B} + 1_{t_N} = 0_{t_A}$, the e^- particle is preserved and e^+ antiparticle expended ($t_A = 0$), thus resolving Baryon asymmetry.

In short, the EM_X^{DIR} field is a result of how $time = space$, how the time equation works with space, and thence how all of what was derived in papers 1-41 [1-41] comes together. Such, namely the EM_X^{DIR} field, is proposed to represent the basis, the glue, for the entire system of *timespace*, yet noting that this glue creates the need for everything to be in a state of motion, of flux, given the fundamental glue as the EM_X^{DIR} field is repulsive to EM and G, thus creating such a precedent for movement by this repulsive effect, motion which comes into effect as the primary time-equation for points in space, and thus the end validating the primary means.

In applying the cosmological principles derived here (CP1-CP9), the known issue of the "Axis of Evil" [51] is resolved, namely large features of the microwave sky at distances of over 13 billion light years ([34]: p23-32) appear to be aligned with both the motion and orientation of the solar system, putting the solar system apparently at the centre of the universe, as is derived to be here. Quoting Lawrence Krauus [52]:

> *But when you look at CMB map, you also see that the structure that is observed, is in fact, in a weird way, correlated with the plane of the earth around the sun. Is this Copernicus coming back to haunt us? That's crazy. We're looking out at the whole universe. There's no way there should be a correlation of structure with our motion of the earth around the sun — the plane of the earth around the sun — the ecliptic. That would say we are truly the center of the universe.*
>
> *Lawrence Krauss – Physicist/Cosmologist, Ambrose Swasey Professor of Physics, Chairman of the Physics Department of Case Western Reserve University*

The specificity presented here though circumscribes all the fundamental aspects of astrophysical phenomena, and how that specificity works is covered here as cosmological principles 1-9 (CP1-CP9) together with the derived manifolds of the solar system [32-34], and of course the derived values of the sun [36].

12. Conclusion.

The issue with contemporary physics is how it regards the energy of space. Much of this has to do with both the design of Special and General Relativity (SR/GR), Quantum Mechanics (QM) and the Standard Model of particles (SM). More specifically, Temporal Mechanics finds that the core issue of physics is in regard to its description of the fundamental idea of "time".

All of these issues have led first to the cosmological constant problem, namely the energy required according to $E = hf$ for the quantum perturbations for space, thence leading to the current cosmological model and associated requirement of dark energy and dark matter (to explain the phenomena of galaxies).

As Temporal Mechanics has demonstrated with its pan-phenomena utility and pan-data matching, together with having no need for dark energy and dark matter, physics currently lacks a full theoretical model for understanding zero-point energy (ZPE) owing to an improper appreciation of the dimension of time.

Temporal Mechanics has resolved this issue in deriving the EM_X^{DIR} field and associated energy processes from a purely fundamental temporal basis [1-41], changing the outlook of cosmology theory entire in proposing a new *electron degeneracy* scale (a_e^0) for astrophysical phenomena.

In all, Temporal Mechanics proposes that the current temporal understanding and associated basis of energy for SR/GR/QM/SM is flawed, and that the theoretic error there is making mass-inertia-momentum a priority, and not time as a more fundamental descriptor with space and thence the energy of space in regard to particles and field forces. To demonstrate such, the innovative theoretic step here is deriving astrophysical physical data central to this solar system (scales and metrics of the sun, Heliopause, Bow shock, and Oort cloud) together with deriving the astrophysical phenomena of stars, galaxies, and black holes *without* the need for the unverifiable constructs of dark energy and dark matter. Upon all of such Temporal Mechanics resolves the "Axis of Evil" problem, while deriving and upholding an isotropic $CMBR$ together with the associated background X-ray field phenomena.

Here thus is a new proposed model for cosmology and associated description of galactic redshift and associated stellar spiral-motion behaviour [32-41] supported by the proposal and associated pan-phenomena and pan-data utility of the EM_X^{DIR} field.

Conflicts of Interest

References

For ease of search functionality, the complete PDF of Temporal Mechanics containing all its current papers is available from the following link (Non Open Access):
https://transactions.sendowl.com/products/78257031/AE5EA60A/view

The complete current transcript of individual papers can be found from the following links:
https://vixra.org/author/stephen_h_jarvis, https://www.researchgate.net/profile/Stephen-Jarvis-5/publications,
ORCiD: http://orcid.org/0000-0003-3869-7694

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