

# Dimensional Mechanics of Time and Space

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**Abstract:** This paper presents the case for a mechanics between the paradigms of time and space and what those mechanics prescribe as general symmetries and asymmetries for physical reality, most notably the field forces of electromagnetism and gravity. This paper presents the key principle “that the basis of gravity-mass and electromagnetism is by understanding the dimensional relationship between time and space”. As this paper shall highlight in acknowledging the incompleteness theorem of Gödel, it is not mathematics that is the core issue, it is what mathematics is applied to, what concept, primarily time or space, that prescribes a successful outcome of theory. The lens of data analysis the new approach proposed for the mathematics of time and space offers highlights a key fundamental flaw in spacetime theory, largely unnoticed by the professional physics community, namely that in seeking the mass-spacetime link while trying to uphold all the features of SR, the overall context of uncertainty that exists between the dimensions of time and space is not being addressed. In other words, every calculation physics makes that is closer to resolving mass and spacetime (as gravity) will be inherently flawed if the nature of relationship between the dimensions of space and time is itself governed by a principle of uncertainty.

**Keywords:** mathematics; time; space; energy; spacetime; gravity; electromagnetism; Gödel; Galileo; Newton; Einstein; entropy; enthalpy; standard model; golden ratio; special relativity; general relativity; Einstein; quantum mechanics; quantum field theory; entropy; uncertainty principle; TOE; big bang; dark matter; dark energy; symmetry

## 1. Introduction

This paper takes the next step from paper 20 [20] in explaining the key dynamic between the paradigms of time and space, paper 20 [20] primarily presenting the underlying mathematical paradigm for time, and so here in this subsequent paper how that temporal paradigm manifests with space central to the known fundamental laws of physics regarding mass-gravity and electromagnetism. This paper presents the mechanics between the paradigms of time and space and what those mechanics prescribe as a general symmetry of laws, and asymmetries, for physical reality in the here and now. The feature of describing this mechanics of time and space is that it must underwrite all physical phenomena, and that to develop a theory of reality that does not make mention of such an underwriting can only become confused with the absence of the required proposed key principles to be outlined in this paper, namely:

- (A) The time-space uncertainty (TSU) principle: *the key to known issues with indeterminacy and uncertainty regarding the temporal and spatial location of elementary particles.*
- (B) Gravity as a primary feature of the mechanics between time and space: *the key to determining why gravity appears to be a separate concept to mass and what that inter-relationship between mass and gravity is.*
- (C) EM as a primary feature of the mechanics of time (and energy) in space: *the key to explaining the redshift effect and associated propagation of light through space, providing a new cosmological model.*

As paper 20 [20] linked together the ideas of time and energy carried through all its predecessor papers [1]-[19], reaching the mathematical principle of time, so shall this paper take that mathematical principle of time and energy and apply it to its associated mathematical principle of 3-dimensional space, such to determine the general laws of reality, here as gravity and electromagnetism in association with mass. This paper presents the key principle “that the basis of gravity and electromagnetism is from understanding the dimensional relationship between time and space”, the dimensional relationship of time and space as presented in papers 1-20 [1]-[20], yet here in this paper accounted for as specifically as words allow in direct comparison to the quest of Galileo in describing Gravity and henceforth to today’s physics.

To properly explain the mechanics of the relationship between time and space, time as defined in the previous paper [20] mathematically with space, the question must be asked, “why is such a definition required, is it important, is it relevant to physics, or is it just another attempt at explaining everything with a new set of words and ideas?”. To address this issue, first the spectrum of classical to modern physics will be examined from Galileo to today, citing Galileo, Newton, and Einstein, and then moving to Quantum Field Theory, and what the underlying theme of that quest of discovery has been central to, what key discovery has been sought (section 2). Here, a theme is established central to that

quest of physics, with a map clearly becoming evident of where and why things stand today in physics as they do, without any doubt, and what the next steps must and can only be. Following this a solution to that logistic map of physics is forwarded in the form of the new axiomatic definition for time (as presented in paper 20 [20]) and those resultant mechanics with space, solving the current problems of classical>quantum physics theory (section 3). As it shall be demonstrated, physics from classical times to today has missed a key principle regarding the definition of time and its interaction with space, preferring to use instead a too simplistic understanding of time and its relationship to space with the simple notion of 4-d spacetime, resulting in a litany of experimental failures between observation and calculation, all because the basic premise of a symmetrical uncertainty between time and space had not been considered as the basis for all physical mechanics between time and space. This paper is not in specific dispute of classical to modern physics yet presents that script (section 2) for the reader to decide what is the obvious path forward for physics and why.

A few themes nonetheless become apparent in this paper given how it is constructed, as per section 3 (the new physics) resolving section 2 (classical and quantum physics), namely the replacement of *spacetime* theory with a more useful if not logical definition for the platforms of time and space itself. As this paper shall highlight (in following on from paper 20 [20], as per also acknowledging the incompleteness theorem of Gödel), it is not mathematics that is the core issue, it is what mathematics is applied to, what concept, time or space, that presents the solution. Paper 20 [20] held the proposal that mathematics is ideally primarily applied to time as a codex, as by this mechanism of application the incompleteness theorem of Gödel is not contradicted as explained in paper 20 [20], while still allowing for a complete understanding of physical mechanics to be reached using mathematics, and here the mathematics of time. In other words, the proposal of this new physics (as based on a new foundational instrument of a new mathematics for time) does not change physical reality, does not change the physical data, does not even change the general equations and associated constant values, yet proposes a cleaner theoretical definition basis for time and space doing away with fictitious variables. None of what is “real”, all the “real” data, is changed, merely the starting point of theory is changed, namely a new starting point of mathematics for time. The feature that does become noticeable though through such a replacement is that all the issues with contemporary physics, all the anomalies, all the problems (such as dark matter, dark energy, the monopole problem, the flatness problem, the horizon problem, the Hubble constant problem, relativity theory experimental anomalies, and so on) are all resolved; *spacetime* physics, as shall be highlighted in comparison to this new lens of theory, is a process of wading through an uncertain and unnavigable theoretical terrain without end.

## 2. Classical to Quantum Physics

This section will be subdivided into three parts:

### 2.1 History of Classical to Quantum Physics.

- 2.2 Problems with Quantum Field Theory.
- 2.3 Summary of Classical to Quantum Physics.

It shall become apparent what the key theme of classical to quantum physics has been, namely the great mystery of gravity as the apparent disconnect between the force of gravity and mass itself, that the force of gravity operates according to a field separate to the mass of an object, in that objects of different masses all fall at the same rate, the same acceleration, in the same gravitational field, despite the differing masses of the objects. The question in physics through the centuries to today, as shall be highlighted, has been “why”? As it has become too often the case, not addressing this issue only has the discipline of physics itself appearing to micromanage itself as something it does not have a fundamental grip on, a fundamental understanding of, a fundamental acceptance of, a fundamental need to explain.

## 2.1 HISTORY OF CLASSICAL TO QUANTUM PHYSICS

The question here is, “*what is physics trying to primarily prove and why?*”. The best way to get an idea of that answer is to go back to the considered father of physics itself, Galilei Galileo, and what was the most interesting unsolved issue to him, and to this day. Such is the issue of **gravity** and its apparent disconnect from yet obvious relationship to the feature of **mass**.

### 2.1.1 GALILEI GALILEO <1564-1642>

Galileo is widely considered as the "father of observational astronomy", the "father of modern physics", the "father of the scientific method", and the "father of modern science". Such is of no surprise given Galileo first presented the idea of the *principle of relativity*, namely that the laws of physics should be the same in any system that is moving at a constant speed in a straight line, regardless of its particular speed or direction, a paradigm of physics thought to this day, leading to the conclusion that there is no absolute motion or absolute rest. This principle provided the basic platform for Newton's laws of motion, together with being key to Einstein's Special theory of relativity. Much of Galileo's work was in physical mechanics with pendulums and the observations of the celestial objects and their movement, landing him by his results in prison for going against the then model of the solar system, putting the sun as the centre of the universe as opposed to earth. Nonetheless, despite the antagonism against him by the establishment, his question regarding gravity and mass remained till Newton, namely how objects of different masses (and in his case the swinging of a pendulum) fall at the same rate, suggesting that there existed a fundamental disconnect between mass and gravity and that gravity was a type of universal field force affecting different masses equally. The question was, “*how so?*”.

### 2.1.2 ISAAC NEWTON <1642-1726>

Newton is most widely known for his work into *Optics* (light) and mechanics-gravitation. With *Optics*, he considered that light travelled as a type of particle (his “corpuscular theory of light”) and had properties of color. With his *Mechanics*, an extension of his *Optics*, he considered that mass was made of *grosser/larger* corpuscles. It is important to note though that Newton considered there to be an “aether” that existed between these corpuscles of light and mass, a medium that transmitted forces between such corpuscles/particles. This was the platform for his theory of gravitation, namely that the force that existed between mass was “gravity”. Newton, in describing this idea, used the concept of “inertia” as the resistance of mass (to Galileo’s relativistic state of rest) as “inertial mass”, and successfully developed the mathematical laws of mass and gravity, that relationship, on such a basis. So, here was an explanation for both light and gravity upon the platform of aether, where the force between mass was carried by this aether, as gravity, yet this aether as highlighted by Galileo held that the aether itself as that force of gravity was “separate” to the corpuscles of light and mass. Therefore, missing from Newton’s work was this explanation of “aether”. The question was, “*is this aether real (and if so how does it work), and if not then what exists in replace of aether to explain gravity?*”.

### 2.1.3 ALBERT EINSTEIN <1879-1955>

When Albert Einstein presented his theories of Special and General relativity it was done so in the recent new discovery/context of aether being dismissed by the Michelson Morley experiment, as upon the work of James Maxwell and that associated theory of light as a wave travelling at the speed of light (and not, as Newton presented, a corpuscle). Einstein therefore chose to explain the previously considered aether realm (through which both light and gravity were considered to be conveyed) as “spacetime”. He delivered his preliminary paper on “Special Relativity” as a proposal in line with Galileo’s principle of relativity, while upholding the notion of Newton’s mathematical laws of gravity, yet set about re-explaining the process of the principle of relativity given the recent advancements of the theory of light and its associated constant speed, together with the Michelson Morley experiment invalidating the idea of aether. The task for Einstein was to explain what Newton considered as “aether” as the very fabric of time and space itself as “spacetime”, a realm which gravity would manifest and yet mass also interact with, as per his key paper of “General Relativity”

where he explained gravity as a “curvature” of spacetime, a 4-d manifold of 1-d time and 3-d space, using the same principles of inertial mass as Newton (using what Einstein called the “equivalence principle” equating relativistic mass with inertial mass). Much of Einstein’s successful results, like Newton’s, were based on astronomical observations of the celestial objects and predicting their behavior, and thus together with Einstein’s theory, as with Newton’s and Galileo’s, came a model of cosmology. Yet the problem Einstein faced was not that he explained gravity, in the absence of aether, as a curvature of spacetime, yet how mass itself was related to “spacetime”, and how gravity as a curvature of spacetime still remained separate to spacetime itself, as Galileo realized with bodies of different masses falling at the same rate in the same gravitational field.

Despite Einstein considering inertial mass accelerating under the influence of a gravitational field being equivalent to the gravitational field (for instance, that free-fall and inertial motion were physically equivalent), the question was how is mass related *directly* to spacetime. In fact, all the problems with SR and GR appear to be related with the equivalence principle and how mass would **not** be directly related with the curvature of spacetime, an issue many theoretical physicists still fail to properly understand. On top of this, the key issue theorists in relativity theory face is the idea of light in regard to spacetime theory, how gravity as a curvature of spacetime can bend light, suggesting that light is associated to mass, leading to the idea of light being an underlying mechanism of mass itself (which interestingly Newton proposed in his corpuscular theory), facing the **same** equivalence issues as mass. Although Einstein asserted that the acceleration imparted to a body by a gravitational field is independent of the nature (mass) of the body, the idea of mass and its relationship to spacetime was left to a new field to pursue inheriting the same problems SR conveyed to GR with its inertial-mass codex of mathematics, namely Quantum physics (where interestingly the idea of the corpuscle became the light particle “photon” model). Nonetheless, underlying all of such was the problem with Einstein’s cosmological model, leading to the “Cosmological Constant problem”, a problem central to the required amount of energy for his theory relating mass to spacetime to be upheld, ushering in a series of fixes such as dark matter and dark energy, fixes that have yet to be proven to this day. The focus thence was on the potential “light” (quantum) theory of mass, bearing in mind the inherent problems that must be faced in using the SR inertial codex of location transformations of light particles as waves.

#### 2.1.4 QUANTUM MECHANICS (QM)

Quantum mechanics came into the historical physics picture taking advantage of this problem of relativity theory in re-analyzing the nature between mass and spacetime as an issue between “light” (electromagnetism) and spacetime. The key

principle here that was promoted was the idea of the smallest fundamental length of light as energy known as the Planck length and associated equation ( $E = hf$ ) where the energy ( $E$ ) of a package of light is equal to the Planck constant ( $h$ ) multiplied by the frequency ( $f$ ) of that package of light, as the new way to interface mass with spacetime via quantum mechanics. This was the most obvious course, namely to find the smallest idea of light as a wavelength with energy that approaches the fundamental level itself of space and time, and **then** find the codex to gravity there, how gravity connects with such a quantum level and thence mass. This then led to “Quantum Field Theory” as the process of QM *replacing* the idea of spacetime (Einstein’s gravity) with a quantum description of energy on the Planck scale. This is quite a difficult process to present in a few simple sentences, so the following bullet points are used:

- Newton did not consider the *spatial field* aspect of gravity, using inertia instead as action at a distance through *aether*.
- Maxwell demonstrated that light was a wave and not particles.
- The Michelson Morley experiment falsified the idea of Newton’s aether.
- Einstein sought to explain gravity and mass, as Newton did, except with the greater suggestion of gravity being a part of a more fundamental field, a field entwined fundamentally to spacetime and not to mass itself, given the falsification of aether.
- Quantum mechanics in embracing the idea of light as a wave and particle sought to take the next step and explain how mass can be explained as EM, and then how EM relates with spacetime as per the Planck scale.
- Quantum Field Theory (QFT) as such has aimed to explain the link between mass and gravity in seeking to understand gravity from a quantum mechanical perspective, with the aim of utilising gravity in a quantum mechanical manner.
- One mathematical process of solving such is the employment of the 4-d mathematics of “spacetime”, 1-d time and 3-d space, commonly as a “quaternionic” function, the limitations of such mathematics being on two fronts, the first being the problems inherent to QFT and the uncertainty principle (discussed shortly), and the other being the incompleteness issue of mathematics (that mathematics as an axiom cannot be complete in describing an entire physical system) as expressed by Gödel’s incompleteness theorem.

It needs to be noted that the QM codex of description is the *SR inertial mathematical codex*, which is also used by GR as a vast number of straight SR constructs forming the general curve of spacetime as gravity, yet QM replaces this with the notion of the

Planck scale, still using the inertial SR mathematical codex nonetheless to explain the QM wave-function of light on the Planck scale ( $E = hf$ ) as an analogue of spacetime.

In short, the question of gravity and mass was apparent from the time of Galileo, and from such a time the question still remains unanswered, 500 years later; as only can be the case as the scientific method permits, throughout all this time the theories central to gravity and mass have become refined through experimental data and associated cosmological modelling and those observations. Indeed, Einstein knew that gravity was a field independent to mass, yet to find what that field was as a part of space and time and EM he constructed thought experiments regarding the relative speed of masses and deduced that the field of gravity between objects was interwoven between objects based on the nature itself of *spacetime* as a “curvature”, and that mass displaces *spacetime* as gravity; Einstein considered that gravity actually *moved* matter along the curving pathways embodied in spacetime as paths (grooves) imprinted by mass and energy themselves. QFT on the other hand, as an extension of relativity theory, considers mass as a vibration itself of energy, quanta, separate to spacetime, like a field. How that field interfaces with the tapestry of spacetime according to QFT requires even something more fundamental, namely a Planck length, a length where time and energy can be equated according to distance, thus proposing that link to quantum gravity, thus by-passing GR as a description for gravity yet using the quantum mechanical description. The problem though with QM and QFT is that it faces the same SR inertial mathematical codex issues as GR, simply because they each all rely on Einstein’s 4-d SR description of spacetime.

To this day, QFT considers that to explain mass *and thence its association to gravity* is through using QM, and thus requiring the Planck scale, and thus technically replacing the idea of GR (and all its utility in cosmology) with a QM description of spacetime at the Planck length scale. The problem here though is that according to the cosmological model that holds this scale (and associated inertial-mass-energy transformations of quantum vibrations) an energy level  $10^{122}$  above what is observed is required *in* what is considered as spacetime, bearing in mind that “spacetime” as a concept is still being used as a mathematical codex for QM and QFT, just not the description of gravity (GR). The other problem that exists for all such modelling is the nature of what is being sought, namely the smallest unit of space and time **as one** according to energy and thence mass, leading to the quest for a “singularity”, and how such a concept can be modelled and studied itself. Indeed, it is the search for a “singularity” (and its associated mathematical definition) that would most logically hold the answer to the relationship between mass and spacetime via such a route of theory. Yet, is such a route possible?

## 2.2 PROBLEMS WITH QUANTUM FIELD THEORY

There are three broad fields of problems in contemporary physics with its thrust of research into QFT, as “small scale problems” (2.2.1), “large scale problems” (2.2.2), and “general problems” (2.2.3).

### 2.2.1 SMALL SCALE PROBLEMS

The small-scale problems in QFT are central to two key issues, namely the “uncertainty principle” and “faster than light” travel. The uncertainty principle prescribes the inherent problem of defining the exact location of a particle, elementary, being measured using quantum mechanics (QM), requiring the use of mathematical probability-scales to approximate results. The second issue central to QFT is the idea of “faster than light” travel, a concept associated to “quantum entanglement” where the case exists for two particles to have connecting properties (quantum states) through a distance without the requirement of a passage of quantum information between those quantum states of those particles, seeming to defy any field in between them. The issue here that has largely gone unnoticed is the idea that the states in between particles may be of a purely dimensional nature and not field force itself, or rather, the field forces themselves could not be as elementary as previously thought, that there could exist a substructure to space and time, or that there could even exist “greater definition” to space and time, beckoning theories along such a course of pursuit, namely the pursuit and testing of the “extra dimensions” hypothesis using complex quaternionic mathematical modelling that still betrays Gödel’s theorem and the many physical-based and energy-dependent issues of probability and indeterminacy.

### 2.2.2 LARGE SCALE PROBLEMS

The large-scale problems in QFT are dependent upon the actual evolution itself of QFT and the associated cosmological models of the predecessor theories to QFT. In short, with each step of understanding regarding the nature of physical mechanics, of mass and its association to gravity, came a new cosmological model, from Galileo’s heliocentric system to Newton’s Principia model, to Einstein’s GR cosmological model to, today’s Big Bang (BB) theory model, a model (BB) that prescribes when space and time began to accommodate for the redshift effect (presumably what is best explained by the “metric expansion of space” requiring a BB event) and nature of energy in time. Today, in the context of QFT there are 5 keys issues associated to the BB model

central to known data (flatness problem, monopole problem, horizon problem, cosmological constant problem, Hubble constant problem), as also outlined in paper 20 [20], issues pertaining to the relative density of the universe, the measured energy, and so on, issues suggesting something very broad-spectrum if not general needs addressing. Yet the quest for QFT in replacing GR is to somehow explain the nature of the light from the stars based upon the previous GR model, essentially replacing GR with QFT. In fact, modern cosmology is central to QFT explaining away GR, trying to find evidence for a QFT “singularity” in the stars that can explain the nature of gravity, and as such the obvious place for cosmologists and quantum field theorists to search for that data in reality is in what are to be considered as black holes, massive super-dense structures (as they are proposed to be) and to determine how such black holes could perhaps be central to each star system as a form of gravity-influence on the stars themselves, keeping the stars in place, of course using QFT, and thus replacing GR. Can such an approach work though, or is the basis of such a quest entirely flawed?

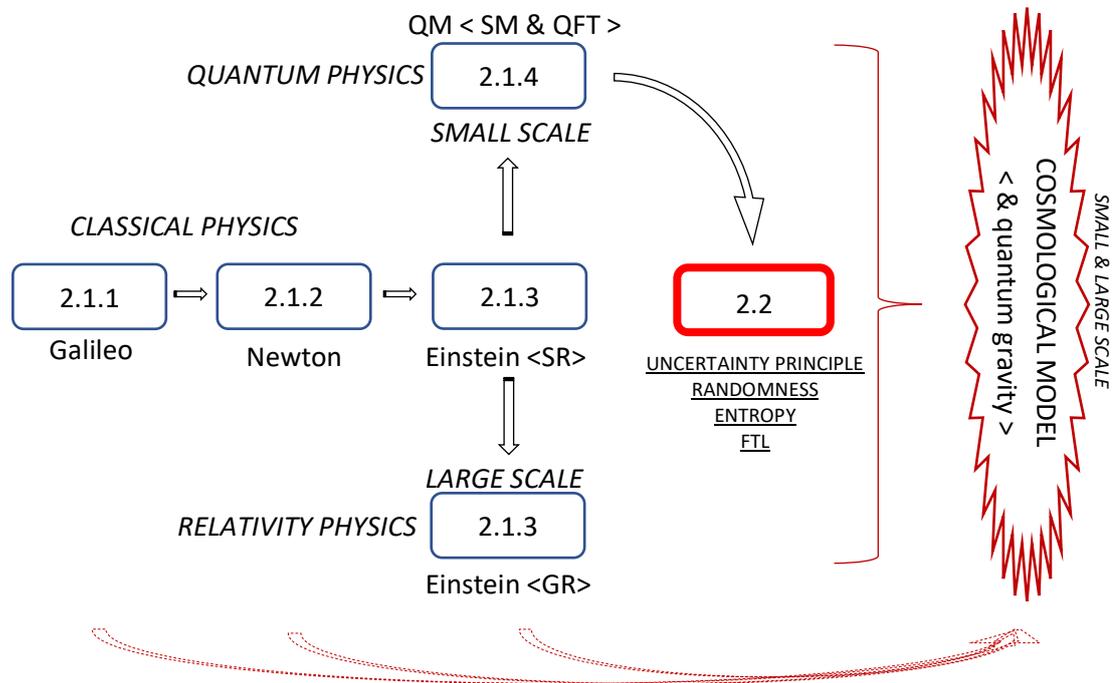
#### 2.2.4 GENERAL PROBLEMS

The first key general problem in physics theory is central to the nature of the mathematics being employed to solve the nature of reality, as presented by Gödel, namely that mathematics as an axiom cannot be complete in describing an entire physical system. There is also the key problem of requiring a model that explains the tendency of the energy of observed systems to undergo a state of increasing entropy, of increasing randomness, and how indeed mathematics can accommodate for that. Associated to this is the general issue of determinacy, namely how can a system with symmetries, with physical laws, exist hand in hand with a system that also appears to be undergoing a type of increasing-randomness and thus increasing state of uncertainty? And so finally, there is the issue of whether the quest of “quantum gravity” is in fact valid with all general issues considered, whether such is the right path, or another more fundamental “dimensional” path is in order.

### 2.3 SUMMARY OF CLASSICAL TO QUANTUM PHYSICS

To get a clearer picture of the current process and associated disciplines of physics, the following flow chart (figure 1) highlights what has been presented in section 2.1, here as a type of mass-gravity development chart (blue), with its associated problems (red) (2.2).

## GRAVITY-MASS development chart



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

Such a process requires a vast amount of accountability and fact-checking, a large amount of equations (many inertial transformations, many probability scales, many rounding-off factors, and so on and so forth), all to explain a *simple almost singular context of elementary particles at play*. Such is the process that has evolved, existed, and still exists. What therefore is **still** required is how to explain atomic and elementary particle behaviour, the behaviour of light extra-atomically, and the nature of the observed reality, all in the context of an understanding and associated definition of space and time to resolve the simple problem of mass, gravity, and of course EM, together with the associated background features of randomness, uncertainty, FTL, and of course entropy. The problem that becomes obvious on such a quest is the attempt by physics theorists to base any theory on that which can't be explained or proven to exist (such as requiring dark matter and dark energy), to make the problems “fit” with such fixes, while only relying on bits of data and not **ALL** the data. Indeed, although data from each of the cosmological models through time has been based on astronomical observations, that data nonetheless has been open to a variety of theories, as is obvious, to solve the known problems as presented in 2.2, theories that nonetheless propose the stars themselves to be “different things” according to those “different theories”. Therefore, if the search for a solution to the connection between mass and gravity must be as real as the

reality being explained, then the scientific method employed by physics needs to be “kept real” on this quest. This was explained in paper 18 [18], namely the need not to unrealistically manipulate the data, and to remain true to data in the *here and now*, to the human perception ability of the *here and now*, and to put fantasy models of cosmology and associated fantasy cosmology fixes aside. Thus ultimately, the solution to the theoretical link between mass and gravity requires that the theory:

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

Such is what section 3 of this paper shall now address, namely points (i)–(iii), thus making the broad suggestion that the entire quest of physics theory in regard to mass and gravity from Galileo to today can be solved, addressing all the key issues of 2.2 without creating non-existent data and associated non-existent phenomena, while upholding **ALL** known data and equations describing that data to associated observed phenomena, as it only can.

### 3. Time-Space Dimensional Mechanics

This section will be structured in 5 parts:

- 3.1 Introducing a new approach.
- 3.2 Time-space theory review.
- 3.3 Time-space context (TSC).
- 3.4 Time-space groove (TSG).
- 3.5 Resolving spacetime theory.

The key feature to present here is a solution to the issues raised in section 2, namely a new approach to the axiomatic definitions for time and space that is able to accommodate for all the key general issues that have been faced by classical, relativity, and quantum physics.

#### 3.1 INTRODUCING A NEW APPROACH

The key issue that any mathematical modelling attempt for space and time is “accommodating” for **ALL** the physical data, and for physics such involves accommodating for the idea of “uncertainty”, “determinacy”, “randomness”, and so on, primarily with a “mathematics” that accommodates for **ALL** of such. Yet one needs to step back and ask, “who

is the one making the physical observation?" The simple answer is, "it is human consciousness".

As it seems, human consciousness generally perceives reality in a 3-d spatial format while finding it natural to consider the passage of time from *time-before* to *time-after* via *time-now*, *time-now* where we all appear to exist in, *in a 3-d space reality*. Such is how paper 1 [1] began, namely acknowledging the human perception ability regarding time and space perception, and then developing an algorithm, a mathematical algorithm, for time based on what appeared to be the human ability of temporal awareness and associated formulation of reason-logic to explain space. The idea of 3-d space was then applied to this algorithm for time. Subsequently, the "golden ratio" algorithm for time was formulated for space, and as such a well-known algorithm was considered an interesting discovery, interesting enough to then ask the question, "*what would happen if this golden ratio algorithm for "time", as what appeared to be "time's-flow", was applied to "space" as a "new" mathematical approach to mathematical spatial geometry?*". Such is what paper 1 [1] represented, namely the mechanics of the time-algorithm for space, resulting in what appeared to be the basis for an atomic construct (*associated basic equations for gravity ([1]: p8) and electromagnetism ([1]: p10), together with formulation of Rydberg constant ([1]: p12-15) based on this time-algorithm*).

Paper 2 [2] then set about developing that time-algorithm with space as a new mathematics, resulting in what appeared to be a wave-function central to an atom, deriving the fine-structure constant ([2]: p12, eq9). Although that seemed a fundamental discovery at the time of the paper, it was not enough to base a theory on only a few pieces of data, as a theory of time and space regarding mass and gravity had to ultimately be explained, and therefore **ALL** the equations relevant to **ALL** physical data in physics considered to be "real" had to be derived. Nonetheless, with the confidence in the results of the first two papers [1][2] the quest was on to derive all the key equations and associated constants for energy, mass, EM, and gravity, using this new algorithm for time when associated to space. The thinking was that only a few papers should be required to capture all the relevant equations, yet as this algorithm demonstrated there are many features to physics theory that are perhaps not entirely evident to physics theorists just yet, and so new descriptions of known phenomena had to be employed to convey those new principles and ways of explaining the same equations, the same phenomena, the same data, from this new mathematical approach for time.

It is important therefore to consider the general flow of the papers ([1]-[20]), how the confidence was gained and why, and why it seemed nonetheless an ultimate principle had to be reached regarding the relationship between mass and gravity and that association with electromagnetism (as the mechanics of time and space), as a solution to contemporary physics, to the nature of mass and gravity, as a solution that needed to be as simple as it would be practical, as logical as it would need to be self-evident, "as" the relationship between time and space, as that specific dynamic and associated metric. That solution became apparent as the need to understand that what represents the **widespread** phenomena in time and space, such as the uncertainty principle, entropy, and increasing randomness, must represent fundamental

issues, as fundamental as a dimension, as fundamental an issue as time and space. The question was, “*how?*”.

### 3.2 TIME-SPACE THEORY REVIEW

The answer to this question was presented simply in the previous paper, “The Mathematical Principles of Time and Energy” [20] in the following sections:

Paper 20: 4.1	The Time Axes	([20]: p11-13)
Paper 20: 4.2	The Time-Equation	([20]: p14-15)
Paper 20: 4.3	The Time-Space Uncertainty (TSU) Principle	([20]: p15-19)
Paper 20: 4.4	The Flow of Time	([20]: p19-20)

Such has been the theme through the 20 papers [1]-[20], namely that in using an algorithm for time suited to our perception ability and therefore one that is **logically** constructed to serve a purpose as an awareness of time itself in regard to space, then the “general” issues of time and space theory as spacetime theory should become self-evident, and here the general issue that became evident was the time-space uncertainty principle (TSU) ([20]: p 15-19). Together with this principle was the idea of the passage of time from time-before>time-after in a manner of the TSU, as in a manner of increasing uncertainty, of increasing randomness ([20]: p19-20). These are properties of time and space, and therefore the entire issue of the uncertainty principle and the general flow of time and associated behaviour of energy becomes addressed. It therefore seemed that what remained to be addressed was the description of mass and gravity, and of EM, in regard to mass and hence gravity, and how all of such manifests as a mechanical dynamic in nature according to mass being separate to gravity yet effected **by** gravity, as all evidence in reality demands to be so, as presented in section 2 (in this paper).

In addressing such, the manifestation of mass had been explained in paper 4 ([4]: p4-11) along the lines of QM, there though as the time-equation analogue of quantum mechanics (QM) as the “phi-quantum wave-function” (PQWF) description, leading to the time-equation analogue of the standard model (SM) of particles ([4]: p11-15). In that same paper the “3” properties of mass associated to time and thence space in the manner of gravity from the PQWF (*atomic* EM field, say EM-A) were explained, as follows:

Paper 4: 2.3 (p7-8)	Mass-based Gravity (EG1)
Paper 4: 2.4 (p8-9)	Magnetic Particle Spin (EG2)
Paper 4: 2.5 (p10-11)	Electron Crystal Shield (EG3)

Such were presented as the three properties of gravity “A” (say, G-A), namely the quantum description of how mass relates with mass on the quantum (PQWF, EM-A) level. In terms of contemporary physics, such could be considered as the “inertial mass” of a construct, its localised mass.

In paper 4 ([4]: p6-7), the general field equation **constants** for gravity and EM were presented in the new context of the mathematical codex for time, as according to using **spatial** **“dimensions”** as mathematical descriptors in relation to the mathematical codex for time, as the time-algorithm could only allow. Therefore, in implementing these constants into the equations of G and EM as presented in paper 1 ([1]: p8-10) and from paper 7 ([7]: p19, table 1), the following becomes evident:

From paper 1 for EM ([1]: p10)

$$Q_{AB<NEWTONS>} = \frac{Q_C c^2 Q_A Q_B}{d_{AB} d_{BA}} (C^3 t^{-2}) \quad (1)$$

Whereby:

$$Q_C c^2 = k_e \quad (2)$$

Yet, as per paper 7 ([7]: p7, eq2):

$$Q_C = \frac{3 \cdot 2 e_c}{4 \lambda} \quad (3)$$

Thence:

$$k_e = \frac{3 \cdot 2 e_c}{4 \lambda} \cdot c^2 = \frac{6 \cdot 1.6 \cdot 10^{-19} \cdot (3 \cdot 10^8)^2}{4 \cdot 2.426 \cdot 10^{-12}} = 8.9 \cdot 10^9 \text{ Cms}^{-2} \quad (4)$$

Similarly, as from paper 1 ([1]: p8), for G:

$$G_{AB<NEWTONS>} = \frac{M_C M_A M_B}{t_{AB} t_{BA}} (kg^3 t^{-2}) \quad (5)$$

$$G_{AB<NEWTONS>} = \frac{M_C c^2 M_A M_B}{d^2} (kg^3 t^{-2}) \quad (6)$$

Yet, as per paper 7 ([7]: p10, eq1):

$$M_C = \left(\frac{2}{3}\right)^2 \cdot M_p \quad (7)$$

Thence:

$$M_C = 3.33 \cdot 10^{-27} \cdot \frac{2}{3^2} \cong 7.4 \cdot 10^{-28} \text{ (kg)} \quad (8)$$

$$M_C c^2 = 7.4 \cdot 10^{-28} \cdot (2.99 \cdot 10^8)^2 \cong 6.67 \cdot 10^{-11} = G \text{ (kgd}^2 \text{t}^{-2}) \quad (9)$$

Essentially, EM and G are linked via the same time and space dimensional definition via this method of generating equations from the perspective of “time” and that associated mathematical algorithm (golden ratio) in being applied to space. Therefore, let this type of dimensional description of gravity (G) according to the time-algorithm be considered as G-B (eq.6), and similarly let this type of dimensional description of electromagnetism (EM) according to the time-algorithm be considered as EM-B (eq.1). G-B is pure and simply the “dimensional” (time and space) description of gravity, as with EM-B being the “dimensional” description of EM, purely dimensional descriptions regarding time and space.

What began therefore from paper 1 [1] as the time-algorithm central to the human perception temporal measurement-ability in space ([1]: p3-5) grew through the papers to develop a time-equation quantum model (PQWF) of mass and associated projection of mass-field interaction assuming three forms of gravity on the atomic scale (EG1, EG2, EG3: ([4]: p7-11)) emergent from EM-A described simply here as “Gravity-A” (G-A). Yet upon G-A is the emergent feature of G-B, as that equation (eq.6) aligned to the dimensional property of space itself in regard to time. What now needs to be explained is how those mathematical descriptors for G-B and EM-B relate back to the fundamental relationship between time and space as field forces, namely how the concept of mass (G-A) (*as derived from the PQWF (EM-A), EM-A being the time-equation analogue of QM, and G-A the SM analogue of particles*) can relate with the concept of space and time itself, how it can solve 2.2 (section 2.2), the puzzle that contemporary physics faces regarding the relationship between mass and gravity, and of course the role EM (and thus in spacetime theory QM and QFT) plays with this.

### 3.3 TIME-SPACE CONTEXT (TSC)

This section shall address the need to define a *time-space context* (TSC) to better examine not just the nature of interaction between G-A and G-B yet also the interaction between EM-A and EM-B in a similar fashion, how the dimensional mechanics between time and space in defining a TSC can describe the atomic (EM-A, G-A) and extra-atomic (EM-B, G-B) features of EM and G respectively. Simply, the TSC is a name for a reference in the time-space paradigm as initially based on paper 1’s ([1]: p2-4) definition of time and space.

#### 3.2.2: G-A & G-B

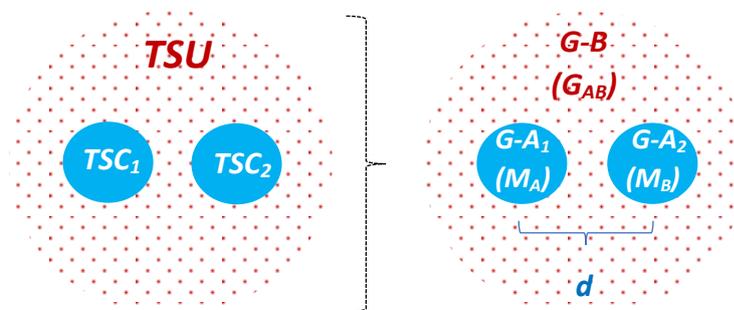
Granted G-A as gravity (as described on the atomic level) is being considered as equivalent to inertial mass, and gravity as a field is described as G-B according to eq.6, as defined by the spatial dimensions in regard to time, the question then is “*what is the nature of interaction between G-A and G-B?*”, if indeed that is the right question to ask. Perhaps more fundamentally, the question “*what is “prescribed” for G-A and for G-B?*” is the better stance to take as a question, and that the TSC here would be the focus of interaction between G-A and G-B to answer such a question.

According to paper 4 ([4]: p4-15) G-A is an emergent feature in the atom of EA-A, that mass as G-A is derived from the specific atomic PQWF (EM-A) resonance, namely a DIR resonance of an EM-A (PQWF) field, say an EM-A<sup>DIR</sup> field, and therefore G-A essentially being an EM-A<sup>DIR</sup> field. It also needs to be noted as according to paper 20 ([20]: p19-20), as per also paper 1 ([1]: p4-6), time (as  $t_B$ ) seeks space (as  $t_A$ ). Therefore, it would be logical to suggest that time as the wave-function (as the PQWF), as EM-A, and therefore as G-A (as the PQWF analogue of the standard model of particles, of SM) **seeks** space, and thus would manifest as the feature of G-B, namely G-B being the tendency of G-A to seek space. Such is how mass as G-A would “cleave” to “space” as G-B, and therefore connection between G-A and G-B.

The question though is, “how does G-A<sub>1</sub> (one mass) relate with G-A<sub>2</sub> (another mass) via G-B?”. The answer is in the nature of the underlying property itself of G-A, namely EM-A. Although G-A seeks to cleave to G-B, G-B holds that G-A<sub>1</sub> (one mass) is attractive to G-A<sub>2</sub> (another mass) according to the rules of G-B. G-A though as prescribed in paper 4 [4] is self-attractive, as the nature of the underlying EM-A field being a self-attractive property (DIR) to effect G-A in the first place (as EM-A<sup>DIR</sup>). Essentially, the codex of G-A is built upon EM-A<sup>DIR</sup>, and that codex, that interaction of EM-A on the elementary particle level (G-A) prescribing mass as G-A to have three key properties, the dominant one being self-associative ([4]: p7-8).

As an example, take two contexts TSC<sub>1</sub> and TSC<sub>2</sub>, each context representing a different G-A reference of G-A<sub>1</sub> and G-A<sub>2</sub> respectively. The general context of the TSC<sub>1</sub> and TSC<sub>2</sub> would be in the overall time-space uncertainty platform of definition, the overall TSU. Coupled with this would be the general time-space dynamic of G-A as G-B, as per the equation  $G_{AB} = \frac{M_C c^2 M_A M_B}{d^2}$ , where M<sub>A</sub> would represent G-A<sub>1</sub>, M<sub>B</sub> represent G-A<sub>2</sub>, and G-B represent G<sub>AB</sub>. Here, G-A<sub>1</sub> (M<sub>A</sub>) and G-A<sub>2</sub> (M<sub>B</sub>) cleave to the property of space G-B (G<sub>AB</sub>) according to the uniform field principle of G-B in a G-A<sub>1</sub>↔G-A<sub>2</sub> attractive manner, as per figure 2.

$$G_{AB} = \frac{M_C c^2 M_A M_B}{d^2} (kg^3 t^{-2})$$



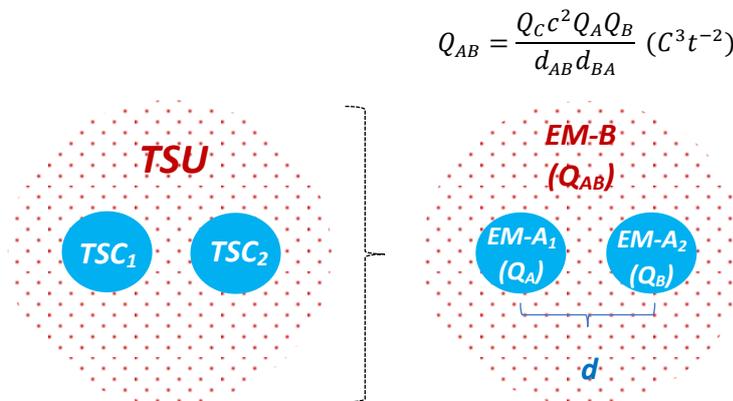
**Figure 2:** symbolic representation between G-A and G-B using two references of G-A (G-A<sub>1</sub> and G-A<sub>2</sub>), as M<sub>A</sub> and M<sub>B</sub>, that exist in step with the TSU principle.

Such is how to explain the relationship between mass (G-A), inertial mass, in an inertial reference (TSC), in the context of a spatial gravity field (G-B), bearing in mind the relationship between time and space as presented generally throughout paper 20 [20], and that natural curvature of the time-front in space, and thus the more G-A, the more EM-A, and thus the greater the concentration of curvature of the time-front in space (as presented in paper 20 [20]).

### 3.2.2: EM-A & EM-B

EM-A is perhaps the most basic fundamental principle to consider, yet the best place to describe it (with all that has been presented in this literary format) is here at this junction of presentation. In view of the papers [1]-[20] (the reference material for this presented theory on the association of the dimensions of time and space), EM-A is the fundamental wave-function of the atom, the PQWF. Yet the predecessor of the PQWF, of EM-A, is the idea of how that PQWF made itself known as the PQWF. It did so as the process of taking the mathematics of the algorithm for time and applying it to space. Such was the process explained in papers 1 [1] and [2]. Yet, in focussing those papers through the filter of paper 20 [20], “Mathematical Principles of Time and Energy”, there exists the need to address the fundamental concept itself of the TSU regarding “now” events (say,  $t_N1$ ) in space, that there exists a central  $t_N1$  event surrounded by a spherical uncertain  $t_N1$  cloud of events, as presented in figure 7, paper 20 ([7]: p13, fig7). **How** this translates to space as a wavefunction is what paper 2 [2] represented, namely the two possible orientations in an overall spherical manifold of space, as the EM wave-function, termed the PQWF, here as the EM-A, the atomic EM construct. **Yet** what needs particular attention is the “relative motion” between the cloud of  $t_N1-t_N1$  events, and between the cloud  $t_N1-t_N1$  events with the central  $t_N1$  (dual) event, which is proposed to translate as the relationship between a central positive  $t_N1$  charge region (as a dual central mass; proton-neutron) with a surrounding negative  $t_N1$  cloud event (electron cloud) as presented in paper 2 ([2]: p15), as developed upon with equation 1 for charge as  $Q_{AB} = \frac{Q_C c^2 Q_A Q_B}{d_{AB} d_{BA}}$ .

As an example, once again take two contexts TSC<sub>1</sub> and TSC<sub>2</sub>, each context representing a different EM-A reference of EM-A<sub>1</sub> and EM-A<sub>2</sub> respectively. The general context of the TSC<sub>1</sub> and TSC<sub>2</sub> would be in the overall time-space uncertainty platform of definition, the overall TSU. Coupled with this would be the general time-space dynamic of EM-A as EM-B, as per the equation  $Q_{AB} = \frac{Q_C c^2 Q_A Q_B}{d_{AB} d_{BA}}$ , where Q<sub>A</sub> would represent EM-A<sub>1</sub>, Q<sub>B</sub> represent EM-A<sub>2</sub>, and EM-B represent Q<sub>AB</sub>. Here, EM-A<sub>1</sub> (Q<sub>A</sub>) and EM-A<sub>2</sub> (Q<sub>B</sub>) would cleave to the property of space EM-B (Q<sub>AB</sub>) according to the uniform field principle of EM-B in an EM-A<sub>1</sub>↔EM-A<sub>2</sub> attractive manner (as prescribed for this process in paper 4 different to that of gravity ([4]: p4-7), as per figure 3.

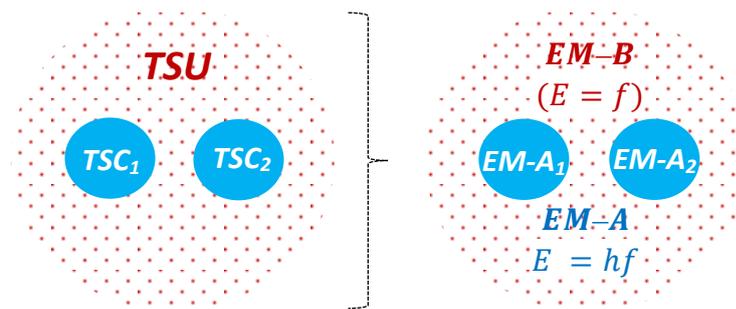


**Figure 3:** symbolic representation between EM-A and EM-B using two references of EM-A (EM-A<sub>1</sub> and EM-A<sub>2</sub>), as Q<sub>A</sub> and Q<sub>B</sub>, that exist in step with the TSU principle.

Although thence the description of EM would appear to be straightforward as such an atomic-based process, yet here lies the greatest controversy regarding the nature of EM-B, namely **extra-atomic EM**. As specified, EM-A as the atomic nature of EM was presented in paper 2 ([2]: p3-17) and paper 4 ([4]:p4-7) as the phi-quantum wave-function (PQWF) for the atom, deriving the fine structure constant ([2]: p12, eq9) and setting in place the general dimension of the atomic scaled spatial template for the elementary particles (G-A) to manifest upon ([2]: p14-18). The fundamental relationship between EM-A and energy was established on this atomic level by the equation  $E = hf$  ([3]: p3, eq1) derived using the time-equation set in place from paper 1 [1], yet EM-B as the developing theory could only abide by is a completely different process, presenting challenges based on how light is released from the atomic reference as per the general interaction of an atomic reference with space and those energy interactions as per paper 14 [14]. Ultimately the extra-atomic proposal for EM was that EM-B sought to satisfy the equation of  $E = f$ , thus creating a type of red shifting of light through space from the atomic level of  $E = hf$  to  $E = f$ . This led to a proposed basis of measuring and calculating the size of the known universe, giving a description of a scale in the vicinity of the Oort cloud ([13]: p11-12) with associated required re-sizing of light-sources.

To explain this more delicately, EM-B represents, like G-B, a basic principle of the interaction between time and space. EM-A is primarily a PQWF, a wave-function, that represents time as energy. On the EM-A level, this is characterised by a certain scale of relationship between wavelength and energy as per the equation  $E = hf$ . Yet beyond the confines of that scale, beyond the confines of that atomic reference, the wave-function as time itself has no scale for it to be measured with, and therefore EM-A “seeks” as EM-B “no scale” of spatial measurement, only to approach its ultimate definition in space as  $E = f$ . As vastly different as this appears to be compared to contemporary physics, the idea of the redshift effect is nonetheless accounted for (and

thus the requirement for a metric expansion of space and those added unverifiable features of dark energy (DE) and dark matter (DM) dismissed). The idea of light as a particle as EM-B is though not without merit (as light seeking space) as per the equation presented in paper 13 ([13]: p11, eq5), as  $E = h_x f$  where  $h_x = 1$  carries with it the feature of needing to also abide by G-B and thus abide-by any curvature of space accorded by G-B, noting the scale that exists between  $E = hf$  and  $E = f$  as the redshift effect of light toward a calculated redshift factor of “12” as derived in paper 13 ([13]: p9, eq1). Such though does not mean that light has mass or light is a particle, yet that there is a far more fundamental process regarding the dimensions of time and space at play, as presented in paper 20 [20]. Thus, as mass (G-A) is an EM-A (as  $EM-A^{DIR}$ , as per paper 4 ([4]: p7-11)) process seeking space (as G-B), light as EM-B must abide by G-B also, and thus light must *appear* to have mass, while of course not having mass, and not being a particle, yet primarily a wave-function. Figure 4 presents the feature of the relationship between EM-A and EM-B regarding  $E = h_x f$  where  $h_x = 1$  for EM-B and  $E = hf$  for EM-A.

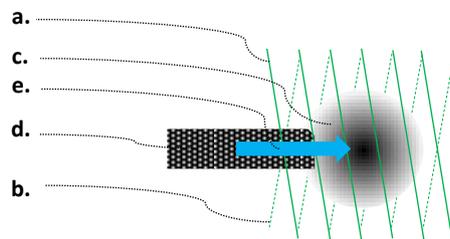


**Figure 4:** symbolic representation between EM-A and EM-B regarding  $E = hf$  (EM-A) and  $E = f$  (EM-B) that exist in step with the TSU principle, noting the scale in between  $E = hf$  and  $E = f$  as the redshift effect of light.

An extra feature of EM-B though is that EM as energy (and thus in being related to “time”) has an inherent uncertainty associated to its location in space (TSU), and therefore carries with it the ability of potentially being “anywhere” in the TSU spatial matrix. Contemporary physics understands this as FTL (*faster than light* travel), quantum-tunnelling, and other descriptions. The simple premise here though is that although there exists for EM-B a constant overall value regarding the property of the wave-function of time as light in space as “c”, as derived in paper 2 ([2]: p13, eq10), this property is still nonetheless held in the overall context of the TSU. The interesting feature to note with EM-B though is that when  $E$  approaches “ $f$ ” as  $E = f$ , as the redshift effect of light in space, the idea of a “singularity” is approached, and thus such an idea needs to be understood regarding G-B, namely the relationship between EM-B with G-B.

### 3.4 TIME-SPACE GROOVE: EM-B and G-B

The case of mass (G-A, and thus EM-A and thence EM-B) interacting with gravity (G-B) now needs addressing. In the physical research undertaken in the course of the papers, most specifically papers 7 [7] (EX-1, EX-2), 12 [12] (EX-3), 17 [17] (EX-4), and 19 [19] (EX-5), the idea has been to create a G-B field through what has been called a DIR (destructive interference resonance) of a standard EM field, and in the case here being extra-atomic, the proposal being G-B representing an EM-B field undergoing destructive interference, and thus an  $EM-B^{DIR}$  field. The logic is that a mass as G-A presented to a G-B field would fall into the greater concentration of that G-B field compared to other local gravity effects, would cleave to it, and therefore represent a process of thrust compared to the backdrop of local gravitational fields. Specifically, the idea has been presented that a G-B field can be created by nullifying the effect of a standard EM-B field through destructive interference resonance (DIR) in generating an  $EM-B^{DIR}$  field. Consider figure 5.

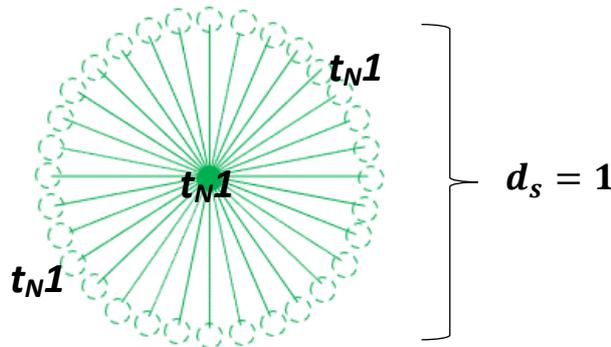


**Figure 5:** one direction of solenoid wind and associated RF current forward (a.), reverse direction of solenoid wind and associated RF current backward (b.), proposed generated EM-B field (c.), mass-core introduced into EM-B field (d.), proposed direction of thrust of mass-core (e.)

What has been proposed is that mass (d.) falls into (e.) the generated G-B field (c.) owing to the solenoids creating the  $EM-B^{DIR}$  field (a.)(b.). The real question is how time as a PQWF (EM-B) can be equated to space as a G-B effect. This has been explained as the equation of  $t_A$  as space being as 0, and if time as a “1” construct (for  $t_N1$ ) is collapsed as a wavefunction in regard to EM-B to 0, that wavefunction can only create an EM-B spatial effect. There is another way of explaining this, namely as a time-space groove (TSG).

One key issue that needs to be addressed regarding the interaction between mass (G-A, and thus EM-A and thence EM-B) and the gravity field (G-B) is what the nature of that relationship is mathematically, if not spatially and temporally. As proposed, G-A is based upon EM-A, as the PQWF analogue of QM and the SM as  $EM-A^{DIR}$ . Yet what is also being proposed is that an  $EM-B^{DIR}$  can create a G-B effect, as though collapsing an EM-B field can create a spatial G-B effect. The best way to explain this is by considering how time and space can become as one (not though as contemporary 4-d spacetime), namely as when time as “1” can relate to space as “1”, and therefore by default how time as “0” can relate to space as “0”. Simply, if there “is” an equality between time (as “1”) and space (as “1”) then there must be an equality of time as “0” and space as “0” concordantly. The question therefore is, “what is the equality of time as 1 with space as 1?”. The answer **requires** a description of the “time” dimension that is considered to be related to a “spatial” dimension, the question being “*how is time as a dimension related to the “spatial” dimension, space as a “1” dimension?*”. The answer

is found in relying on the knowledge that a spatial dimension of the value of ‘1’ **is** 1 dimension of space, and that a spatial dimension of the value of ‘2’ **is** 2 dimensions of space, and so on and so forth. Therefore, in taking the sphere of  $t_N1$  points as proposed in paper 20 ([20]: p13, fig7), and considering this as a spatial sphere value ‘0’ of temporal points, where do the spatial dimensions come into play? Consider figure 6.



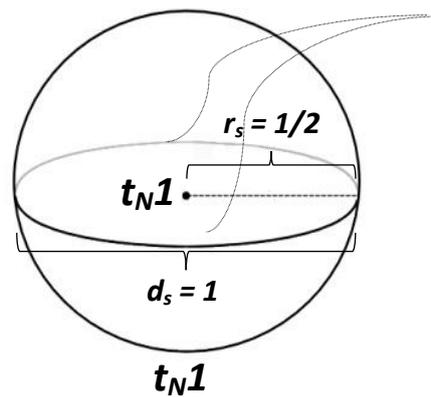
**Figure 6:** a proposed sphere of  $t_N1$  time-points, undetermined according to the TSU principle, yet forming on a sphere nonetheless, equating with space to a spatial diameter length of  $d_s = 1$ .

The proposal with figure 6 is that this temporal sphere equates spatially as a diameter to a value of  $d_s = 1$ , namely a basic temporal dimensional construct existing with its mathematical equal opponent of  $d_s = 1$  as  $t_N = 1$  ( $t_N1$ ). To note is that the temporal distance between the  $t_N1$  points is ‘ $t_N1$ ’, given the location of a  $t_N1$  point is always uncertain and can only be measured ‘as’  $t_N1$ . With this suggestion, the surface area of that sphere as a spatial-temporal dimensional construct would be  $4\pi(\frac{d_s}{2})^2 = \pi$  (given  $d_s = 1$ ). In other words, the surface area of that sphere, the location of the sphere in space as a temporal construct, also would exist as a ‘perimeter’ of that sphere as a circle as  $\pi d_s$ , a concept itself which can only represent the idea of something other than time and space as separate entities, and thus the proposal being as time-space **groove** (TSG), a natural result of the mechanics between time and space and associated TSU. Such would be a time and space singularity, how time and space would ‘connect’ as ‘1’, as a singularity.

Subsequently with three  $t_N1$ 's as per paper 20 figure 6 ([20]:p13, fig6) there would be three dimensions for space, yet each dimension for space here is proposed to be a time-space **groove**. The important thing to note is the precedence of time in this relationship, as presented throughout paper 20 [20], namely the ‘flow of time’ in regard to space, how time seeks space, and here as the case would suggest, like a temporal ring (groove) seeking to entwine itself with a spatial sphere, as per figure 7, as a time-space groove (TSG).

**$t_N1$**

TIME-SPACE  
GROOVE  
(TSG)



**Figure 7:** The TSG depicted here as the time-circumference “groove” with the  $t_N1$  existing anywhere on the spatial time-front sphere surface area where the time-space “groove” traces.

Once again, the mathematics for time as presented here is different to the commonly known mathematics for space, yet there is an interface as per the TSG which then opens the door to the associated geometries of the time-algorithm as per paper 2 ([2]: p3-20), and thence the equations for gravity (G-B) and EM (EM-B). The temporal nature of a spatial reference nonetheless obviously leads one to consider how this would manifest on an elementary particle level, and as presented in paper 4 ([4]: p8-9) this would manifest in the form of particle **spin**, as a G-A feature. The proposal is that taking an EM-A field and collapsing it to “0” effects the process of this TSU, simply because in collapsing EM-B to naught takes it to a spatial definition of construction, and thence effects a G-B effect. Note here also that G-A is essentially an EM-A<sup>DIR</sup> field, as explained in paper 4 [4]. In other words, the generation of a G-B field from G-A is due to the idea of G-A primarily representing a DIR field anyway, as an EM-A<sup>DIR</sup> field.

In mentioning this relationship between EM-B and G-B, one key feature that needs explaining is the relationship between G-B and “energy”, as though EM-B is related to G-B through the TSG, then of course energy from EM-B ( $E = f$ ) must also be related to G-B. This is where the idea of “entropic-gravity” comes into play, and the meaning of the first research paper, paper 7 [7], “Golden Ratio Entropic Gravity: Gravitational Singularity Field Testing”. An enthalpic system is one that increases in its energy. Mass is considered to be enthalpic regarding gravity in that when two bodies are under the influence of gravity and are attracted to each other via their mass they increase their energy through a kinetic energy effect, namely increasing their speed as they attract one another via gravity. Where does this energy come from? In simple terms, this increase in energy comes from the effect of time as entropy in regard to space imparting its energy to mass via the TSG; gravity here as this time-space groove, this TSG, is “entropic”, and imparts this energy to the relationship of mass **VIA** the fundamental relationship of time and space. Historical theory has proposed this gravitational energy as “negative” energy, like saying, “*where did that energy regarding gravity come from, how did the mass become kinetic, gravity must represent “negative energy” somehow?*”, somewhat of a thorn for physics theory and theorists alike. To note though that this is “not” the same process as EM, as EM-A↔EM-B, yet an EM-B↔G-B relationship. The EM-A↔EM-B relationship is an EM-B field effect that is directly associated to the relative motion of the underlying EM-A temporal PQWF effect.

### 3.5 RESOLVING SPACETIME THEORY

The following therefore become easier to understand in the general TSU context regarding G-B and EM-B and the proposed mechanics between the dimensions of time and space:

- Brownian motion [4][20]
- FTL, Quantum tunnelling, etc [4][20]
- Heisenberg's uncertainty principle [20]

More fundamentally though, on the grand scale of spacetime theory, as per figure 1, physics has sought the link between mass and gravity, how bodies of different masses fall at the same rate in a uniform gravitational field. That quest of physics has taken physics to the extreme measure of QFT to the Planck length, developing mathematical modelling and algorithms to calculate into existence the idea of space with time, as spacetime, as a platform that can interface with the idea of a quantum of energy related to mass, to thence deduce how gravity as a curvature of spacetime can link with a mass-related quantum, and thence develop a quantum-gravity theory, a TOE (theory of everything), that links the force of gravity with EM, while juggling uncertainty and indeterminism. This paper presents the case that such can be achieved yet only through a more deliberate discussion on the nature of time itself in regard to space, time and space as distinctly separate dimensions yet inter-related, as presented in paper 20 [20] and here in this paper. In doing such, the problems physics faces are reduced considerably, namely:

- **The Horizon Problem:**
  - Photons have been theorised to have the same uniform temperature, regardless of distance, roughly 2.725 degrees Kelvin:
    - Solving the “Cosmological Constant problem” [14]
- **The Flatness Problem:**
  - The Universal model proposed here is flat, as though spacetime shows almost no curvature whatsoever, or rather, there exists a uniform gravity density (uniform G-B, as it only can):
    - Solving the “Cosmological Constant problem” [14]
- **The Monopole Problem:**
  - A magnetic particle as a monopole, not a dipole, a unique entity, is discounted:
    - Golden ratio Axioms of Time and Space [2]
- **The Hubble Constant Problem:**
  - The difference in  $H_0$  determinations in surpassing 5 sigma have been explained with the  $E = hf$  (EM-A) >  $E = f$  (EM-B) process:

- Space, and the redshift Effect [13]
- The **Cosmological Constant Problem**:
  - The requirement of DE and DM is no longer in play 10<sup>122</sup>:
    - Solving the “Cosmological Constant problem” [14]

As proposed in the opening of this section, the key feature to be presented was a solution to the issues raised in section 2, here as a new approach to the axiomatic definitions for time and space, a new approach that is able to accommodate for all the key general issues that have been faced by classical and quantum physics, primarily the link between gravity and mass, together with the link between electromagnetism and mass, and the behavior of light in empty space. And such is the **new** key issue, namely how light behaves in empty space, from the atomic reference and beyond, as a process of  $E = hf$  to  $E = f$ , as the best way to explain the relationship between mass (EM-A<sup>DIR</sup>) and gravity (G-B), an explanation which understandably carries with it an associated explanation for the redshift effect and subsequent cosmological model, as presented in paper 13 [13], a new model for cosmology that is worth paying particular attention to, given the vast amount of time and resources spent on the examination of the stars in search for the answer of resolving mass and gravity that has largely dominated professional and popular physics discourse.

#### 4. Conclusion

The key issue in contemporary physics is that of the relationship between mass and gravity with the need to properly account for the uncertainty principle, FTL, randomness, and entropy, without proposing cosmological models that cannot be proven and lead to the requirement of unprovable entities (dark matter and dark energy) together with not resolving the “5” key issues of cosmology (flatness, horizon, monopole, cosmological constant, and Hubble constant problems). The proposal is that physics needs to stand back and re-analyse the idea of “spacetime”. Indeed, to go in search of a singularity itself while defining space and time as a 4-d “spacetime” unity is counter-intuitive, as one cannot search for a singularity when already using a type of unity of space and time in one’s approach to time and space theory **as** “*spacetime*” theory. If a theory such as relativity theory is flawed, as based on its foundations therefore, in search for the singularity, then it is not possible to argue against that theory using its foundation principles in order to put together a better theory, and in the case here the foundation principles of time and space employed by relativity theory simply cannot be used to manufacture a better theory. To improve upon a flawed theory, one must employ the use of new first principles, and the case proposed here is a new principle of time. In short, arguing against relativity theory by not improving on the fundamental mathematical definitions of time and space is not going to work, any time.

The solution presented here in these papers [1]-[20] is that on one front the issues of contemporary physics can be resolved with this proposed filter of time-space dimensional mechanics, and on another front that in resolving these issues the pan-scape of cosmology theory is drastically

changed. Indeed, what has been quite a feature of spacetime theory has been its need to propose a model of cosmology, almost as naturally as Galileo in his work of mechanics brought upon the new heliocentric universal model. Given the contemporary popular fanaticism in cosmology theory being the gateway to a new frontier of human exploration and discovery, the results presented here perhaps may be outweighed by the consistently romanticized idea of travelling to the stars and that associated physics theory pan-scape that is required to make that possible. Yet physics certainly has its paradoxes, and the cosmological model of this proposed theory is one of universal proportions. Nonetheless, the lens of data analysis that this new approach for the mathematics of time and space offers highlights a key fundamental flaw in spacetime theory, largely unnoticed by the physics community, namely that in seeking the mass-spacetime link while trying to uphold all the features of SR is a search for the impossible, as the closer a scientific theory as spacetime gets to the idea of a “scientific truth” the more that “scientific truth” betrays the faulty design itself of a scientific-theory such as spacetime in not realising the overall context of uncertainty that exists between the dimensions of time and space. In other words, every calculation physics makes that it considers is closer to resolving mass and spacetime will be inherently flawed if the nature of the relationship between the dimensions of time and space is indeed governed itself by a principle of uncertainty and therefore overlooked by those attempts. Or, quite simply, no matter what is said about anything in reality regarding the nature of the elementary particles, especially the nature of light from the stars, there will always be something that is able to demonstrate something wrong with that approach *within* the general context of uncertainty that as this theory shows exists between the dimensions of time and space. Such is not to say that any discussion of QFT, SR/GR and associated cosmology, is futile, as such can itself be a demonstration on how that uncertainty between the dimensions of time and space shares itself with those who aim to grasp it as the one *spacetime*, as a process of continual argument between physicists without resolution.

### Conflicts of Interest

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

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