The zero-dimensional mathematical theorem describing physical phenomena in resolving the Riemann hypothesis and Fermat’s last theorem

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Abstract: Presented here is how the physical theory approach can be demonstrated to be incomplete in explaining physical phenomena if indeed physical phenomena have key dimensional components that extend beyond the dimensional time-domain of time-now; although the past and the future cannot be proven to exist, for one has happened and the other has yet to happen, and reality is primarily defined physically in the time-domain of time-now as the action-principle realm, proposed here is that the idea of time-before and time-after should be if not are essential to a complete understanding of time. It follows therefore that to propose time to be linked with space as spacetime is to restrict one’s theoretic understanding of time and space to the datum reference of time-now and thence not acquire a full account of the theory of physical phenomena. This issue though is resolved by extending the dimension of time to time-before and time-after and labelling such with a zero-dimensional mathematical theorem, by which process that mathematical theorem can then explain the phenomena of time-now. Here, this mathematical theorem can be shown to resolve the quantum mechanical measurement problem, and general relativity’s dimensional mismatch with quantum mechanical flat spacetime, together with the Riemann hypothesis and Fermat’s (last) theorem.

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1. Introduction

What is reality? What is the idea of being conscious of reality? What is a question, and then how does a question seek an answer? What is consciousness, and what is consciousness aware of and why to be involved in a question-and-answer dialogue in explaining reality? What makes us doubt? What makes us certain?

It could be argued that what is real is certain, and what is not real is uncertain. Yet how is consciousness defined in the process of being used to determine what is real and what is not? Indeed, what is our ability to be aware of physical reality that makes us think such is real as compared to what is not?

For instance, there is no simple mental picture that can be used to describe the inner workings of the human body. More so is there no simple mental picture to describe the inner workings of the atom. Even more so there is no simple mental picture to describe the workings of the universe.

What is a mental picture though? Is it real or imaginary, and is it helpful to explain physical phenomena with imaginary processes such as the utility of our mind producing mental pictures?

These are fundamental questions reserved for philosophy it seems, yet should they be for philosophy alone?

Reality is commonly defined as the sum of all that is real or existent within a system, as opposed to that which is only imaginary.

The question posed here asks how we picture reality, how we accommodate for if not explain reality by mental pictures. Are for instance mental pictures a required abstraction of theoretic formulation to explain reality in the form of a book? Can reality be explained using pages of a book that on being read invoke mental images describing the workings of reality?

To arrive at anything close to a simple mental picture of any underlying physical phenomenal process even for the dimensions of time and space, one would need a basic holistic descriptor component. For the human body, that basic holistic descriptor component could most simply be described as the idea of consciousness; indeed, how can the human body be explained if not in the context of explaining how well it is functioning as a conscious entity?

Can the same be said for a universal physical reality though?

If it were possible such is the same and we exist within such, namely within a greater consciousness, must we then ultimately explain physical reality as an ultimate universal consciousness as the ideal basis for our theory formulations?

Given the unfathomability of a universal consciousness, could we then ask how the universe is organized as a mathematical perception-based framework compatible with our own perception? The next questions there are, “what is mathematical, mathematical being applied to what, to mass or the dimensions, both, and why, and how indeed in a perception-based framework and such being what exactly?”

In many respects, the universal language of today is no one specific cultural dialect, yet numbers and mathematics. Numbers and mathematics even in the highest echelons speak louder than
words; numbers are how we break up the hours, the days, the weeks, and the years, how we track our movement, and how we plan endeavours.

Indeed, thoughts struck on vocal cords are merely what speech is, an abstract thing given the differing words used to describe the same fundamental physical concepts of reality. Mathematics though can form any basis, yet its meaning as number relationships remains the same.

Here will be proposed a mathematical theorem to explain the dimensions of time and space. Yet the process of doing such will involve using both the real aspects of our perception ability for time and space, and the unreal aspect of our ability to perceive time and space. The real aspect will acknowledge our conscious ability in the datum reference of time-now, and the unreal aspect (or perhaps more correctly the imaginary aspect) will involve our conscious ability of time-before and time-after. Indeed, if a pure theory is technically an imaginary theory based on, encircling, what is in fact real, here that idea shall be exercised in the formulation of a theory of reality that can be described in words.

Specifically, here the case is presented that mathematics can be applied to the dimensions of time and space to describe physical phenomena in a mathematical perception-based framework manner from which words can then be used in various language formats to describe the same physical phenomenal effect, yet of course from a more fundamental dimensional account.

The proposal here is fivefold, namely:

(i) In the absence of interpreting messages from a universal consciousness as words, the description of reality most fundamentally can be presented as a mathematical theorem\(^2\) embracing our conscious ability of time and space, and thus a stream of events from time-before to time-after about the datum-reference of time-now.

(ii) This mathematical theorem would be based most fundamentally and primarily on a description of the dimensions of time and space, and not be based most fundamentally and primarily on the description of mass.

(iii) This mathematical theorem to be verified must derive the natural number system and associated prime numbers for it to be a complete number system from 0 to \(\infty\).

(iv) The numerical relationship of time and space is proposed to link as 1d, 2d, and 3d timespace which, in being confined by the number and equation restrictions it is proposed to be governed by, would derive timespace equations relating to what would be observed as physical phenomena\(^3\).

(v) This mathematical theorem in being applied to the dimensions of time and space is thence proposed to relate a physical theory\(^4\) to be evaluated with known data.

The resultant proposal here therefore is that the scripted physical theorem approach has failed to be fundamental enough with its axioms, especially the axiom of our ability to be conscious of time as

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\(^2\) See section 3.

\(^3\) If indeed this mathematical theorem is modelled on our perception ability of time and space and if indeed perception is related to physical phenomena.

\(^4\) See section 3.
a stream from \textit{time-before} to \textit{time-after} circumscribing the datum reference of \textit{time-now}. In this way one is including a key feature of our dimensional perception-ability syntax in the formulation of not a physical theory yet the basis for a theory of that which is both \textit{non-physical} (as the dimensions can only be in the time-domains of \textit{time-before} and \textit{time-after}) and \textit{physical} (physical phenomena in the \textit{time-now} datum-reference of time and space).

In adding more fine-tuning to this process, the following shall be proposed:

(vi) The primary \textit{mathematical theorem} basis is the \textit{zero-dimensional mathematics} for time and space.

(vii) Zero-dimensional time is not zero-dimensional space.

(viii) Time and space do not have the same mathematical value on their respective zero-dimensional level.

(ix) It is how zero-dimensional time relates with zero-dimensional space as different mathematical values that then creates 1d, 2d, and 3d \textit{timespace} and thence \(\mathcal{E}M\), mass, and gravity field phenomena.

The mathematical zero-dimensional objects of time and space are therefore proposed not to focus directly upon the \textit{time-now} real world objects alone, yet combine as a time-equation for space involving \textit{time-before}, \textit{time-now}, and \textit{time-after}, a time-equation that derives the conditions of \(e\) (Euler’s number) and \(\pi\), thence deriving real world physical phenomena in the time-domain of \textit{time-now}, primarily the fields of \(\mathcal{E}M\), mass, and gravity, which as a hypothesis form the primary zero-dimensional mathematical theorem. This overall mathematical theorem is \textit{then} matched and scaled with physical phenomena in presenting the case for being a \textit{physical theory by proxy}.

The zero-dimensional mathematical theorem proposal here therefore ultimately relies on physical phenomenal data, and thus the disciplines of classical mechanics, special and general relativity, quantum mechanics, and the standard model of particles. As becomes evident though in the process of comparing the mathematical theorem framework to the physical phenomenal data of physics, two measurement and scaling issues become apparent in the physical theory approach of physics owing to its dependence upon mass as the primary subject of measurement, namely:

(x) The \textit{measurement problem}: namely \textit{how or whether} a wave function collapse occurs.

(xi) The \textit{dimensional scaling problem}:

\footnote{A derived problem noted in how Einstein curved flat spacetime leading to the cosmological constant problem and thence the requirement for dark energy and dark matter; see section 4.}

encountered with general relativity in curving flat spacetime.

In short, here the zero-dimensional mathematical theorem still accepts the best data measuring tools can offer, yet describes the \textit{nature}, the \textit{why}, and the \textit{relationships} of that data while bearing in mind known issues with data measurement mechanisms for light, mass, and gravity. As shall be shown,
this mathematical theorem process is able to derive all the key field equations of force, mass, charge, and scale.

The process of achieving such here is as follows:

1. Introduction
2. Methodology
3. Theorems and theories
4. Einstein’s physical theories
5. The zero-dimensional mathematical theorem approach
6. $EM$ (light), $EM^{DIR}$ (mass), and $EM^{2DIR}$ (gravity) field relationships
7. Natural mathematics: the mathematics of physical phenomena
8. Conclusion

Temporal Mechanics as the account of the mathematics of zero-dimensionality for time and space is a new proposed way of examining physical phenomena in using the mathematical object description of a time-equation. More fundamentally so, Temporal Mechanics uses the mathematical object description of zero-dimensionality for time and space, namely time as a moment and space as a point.

Here with the mathematics of zero-dimensionality and the associated derived time-equation, Temporal Mechanics presents the case of defining time as time-domains central to our perception ability of time and space. In other words, Temporal Mechanics presents the case of self-evident axioms for time and space, axioms that are self-evident to our perception ability of physical phenomena. The thinking here with Temporal Mechanics is that the right initial mathematical model should derive the known equations and values relevant to known phenomena, provided that the data exists to confirm or deny that new axiomatic base. By all of such, the general result here shall highlight that there is a natural mathematics to reality, reality proposed as 1d, 2d, and 3d timespace, which can then resolve both the Riemann Hypothesis and Fermat’s last theorem.

2. Methodology

Physics in its current form relies on analysing the physical properties of observable phenomena (mass, motion, and energy) as per the equations of force and momentum, and to relate such most fundamentally to a mathematical model of time and space, or more simply to create the mathematical object of momentum characterized with time and space to then build models of physical phenomena. Such is the physical theory\(^6\) approach.

This physical theory approach has worked well for millennia. Only recently in our history have cracks started to appear in this approach in it leading to:

\(^6\) See section 3.
(xii) The search for dark phenomena.

(xiii) The need to resolve the dimensional differences between the current theory for gravity (Einstein’s general relativity as curved spacetime) and the discipline of quantum mechanics (as flat spacetime), presented here as the dimensional scaling problem (xi).

(xiv) The quantum mechanical measurement problem reducing the specificity of identifying exact results for quantum mechanical data to then confirm the supporting physical theory (x).

In view of the key problems related to the physical theory approach and given the vast amount of data available for physical phenomena, a new approach has been proposed as the zero-dimensional mathematical theorem approach, here as the mathematics of zero-dimensional time and space, as Temporal Mechanics8 [1-47], primarily to tackle points (xii)-(xiv). By such literature, Temporal Mechanics has found between the disciplines of general relativity and quantum mechanics a dimensional (mass-space) scaling issue reflecting upon a chosen9 requirement for the dimensional scales.

In resolving this scaling issue, the purpose of this paper is to highlight the overall scheme of the mathematics of zero-dimensionality and how this mathematical theorem derives the two basic known field force concepts, namely EM and gravity.

Here, this paper shall describe:

(xv) How EM and gravity are related to the idea of time and space:
   a. without incurring the quantum mechanical measurement problem,
   b. and without incurring dimensional mismatch between curved and flat spacetime.

(xvi) Why reality as a physical (mass based) phenomenon is shaped the way it is by EM and gravity.

(xvii) On a fundamental level, how atoms are held together and why there is such a thing as inertial mass (resistance) as compared to gravitational mass (freefall).

As shall be highlighted, a key question being asked here with the physical theory approach and its use of the mathematical object momentum as its foundational mathematical object is how indeed mass attracts mass in a metric expansion of a space if mass is defined by Einstein as an extension of space10?

In resolving this question, proposed here is that:

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7 Dark matter and dark energy.

8[1][2][3][4][5][6][7][8][9][10][11][12][13][14][15][16][17][18][19][20][21][22][23][24][25][26][27][28][29][30][31][32][33][34][35][36][37][38][39][40][41][42][43][44][45][46][47].

9 What appears to be a pre-ordained general relativistic theory of cosmology in championing over the quantum mechanical measurement problem, to be described in section 4.

10 As proposed by Einstein, to be presented in section 4.
(xviii) There exists a necessary dimensional mathematical substructure to the idea of mass and momentum, especially to the idea of inertia, synthesized by the time-domains beyond the Lagrangian\textsuperscript{11} coordinate time-now time-domain, namely as per the proposed non-local time-domains of time-before and time-after.

(xix) The ideas of momentum and inertia require the mathematics of zero-dimensionality as this substructure to accurately describe themselves as processes of physical phenomena.

(xx) The zero-dimensional mathematical theorem approach can resolve the quantum mechanical measurement problem in not relying primarily on physical data as a model for the behaviour of \( EM \).

As such, here it shall be demonstrated that contemporary physics in primarily using the mathematical object of momentum (and thence inertia as an assumed physical quality of mass) as a basis for its physical theories of general relativity and quantum mechanics is missing a sizeable amount of theory together with incorrectly calculating the scales of time and space for astrophysical phenomena.

To highlight how much theory contemporary physics is missing and how incorrect the current cosmological scales for time and space are, it is necessary to simplify the description of what is being missed out on with an overview of the zero-dimensional mathematical theorem papers of Temporal Mechanics in comparison to the real axis of the problem in physics today, namely the physical theorem approach and the associated requirement for mass-momentum. As shall become evident in that description process, physical phenomena have a vast ecosystem of basic equations and constants all based on the one zero-dimensional mathematical theorem scheme where nothing should be assumed in being abstracted by words and associated thought experiments (despite the utility of doing so for experimental physics).

Proposed here therefore is the phenomenal reality of zero-dimensional space and time (space as a point and time as a moment) not as a spacetime singularity yet a zero-dimensional concept for space as a point and a zero-dimensional concept for time as a moment in time. Thence a mathematics is concorded to such, not as an abstraction, yet as a tool of choice to describe the reality of zero-dimensionality for time and space. The specificity there of such concordance is the value of 0 accorded to zero-dimensional space and the value of 1 accorded to zero-dimensional time. By such, Temporal Mechanics hypothesises the existence of a point in space and a moment in time and then applies a mathematics directly to such a proposal, not as an abstraction, yet a way to simply and clearly state that:

(xxi) The dimension of space is different to the dimension of time.

\textsuperscript{11} As described in paper 40, chapter 4, of Temporal Mechanics ([40]: p9-19).
The dimensions of space and time do not form a singularity in any point location or instance.

Time and space can though be associated as 1d, 2d, and 3d timespace.

It may be argued that a point in space and a moment in time cannot be proven, that such zero-dimensional objects are not real yet abstract. However, abstraction in mathematics is:

The process of extracting an underlying mathematical structure from a physical object.

Then generalizing that abstraction to apply elsewhere.

Yet with Temporal Mechanics, no mathematical object is being extracted from a physical reality to be applied elsewhere. With Temporal Mechanics the proposition is to consider thoughtfully the mathematics of a moment in time and a point in space. Thus, with Temporal Mechanics quite the reverse is happening to the process of mathematical abstraction, namely:

The application of the mathematical value of 0 for space and the mathematical value of 1 for time to a proposed dimensional time and space reality as a fundamental dimensional template structure.

To then evaluate that fundamental dimensional template structure with known data.

To thence uncover any scaling issues with physical theories that are not based on the zero-dimensional mathematical approach, specifically both curved spacetime theory (general relativity) and flat spacetime theory (quantum mechanics).

A key problem in physical theory is central to joining the dimensional scales of $EM$ with gravity. Such was the theme of the previous paper of Temporal Mechanics in discussing how Einstein in stretching-bending flat spacetime created a physical theory abstraction with the description of general relativity as a proposed basis for the phenomena of gravity ([47]: p7-11). Albert Einstein however considered that such was justified if his process of formulating curved spacetime could describe physical phenomena in a way that flat spacetime theories of gravity and light could not, in especially highlighting the measurement problem of quantum mechanics. And so, the abstract status of general relativity has been overlooked. In fact, Albert Einstein agreed with his abstract approach in comparison to quantum mechanics as per his comments in 1952 [48]:

**Generalized Theory of Gravitation**

The theory of the pure gravitational field on the basis of the general theory of relativity is therefore readily obtainable, because we may be confident that the "field-free" Minkowski space with its metric in conformity with (1) must satisfy the general laws of field. From this special case the law of gravitation follows by a generalisation which is practically free from arbitrariness.
The further development of the theory is not so unequivocally determined by the general principle of relativity; it has been attempted in various directions during the last few decades. It is common to all these attempts, to conceive physical reality as a field, and moreover, one which is a generalisation of the gravitational field, and in which the field law is a generalisation of the law for the pure gravitational field. After long probing I believe that I have now found the most natural form for this generalisation, but I have not yet been able to find out whether this generalised law can stand up against the facts of experience.

The question of the particular field law is secondary in the preceding general considerations. At the present time, the main question is whether a field theory of the kind here contemplated can lead to the goal at all. By this is meant a theory which describes exhaustively physical reality, including four-dimensional space, by a field. The present-day generation of physicists is inclined to answer this question in the negative. In conformity with the present form of the quantum theory, it believes that the state of a system cannot be specified directly, but only in an indirect way by a statement of the statistics of the results of measurement attainable on the system. The conviction prevails that the experimentally assured duality of nature (corpuscular and wave structure) can be realised only by such a weakening of the concept of reality. I think that such a far-reaching theoretical renunciation is not for the present justified by our actual knowledge, and that one should not desist from pursuing to the end the path of the relativistic field theory.

There, Einstein considered quantum mechanics as a more abstract process of physical theory construction, and so considered his general relativity work more viable than the difficulties then faced by quantum mechanics.

What Einstein did not consider though was the mathematical theorem approach underlying the idea of mass, as shall be presented in the following section.

Einstein spent much of his time trying to explain how mass can be considered as a fundamental dimensional entity of space and thence time, yet still failed to deliver a suitable description of quantum mechanics that could resolve the known measurement problem issues. There, although general relativity has described phenomena Newtonian gravity could not (perihelion of Mercury, black holes, light bending to mass, temporal distortions, the constancy of c), in achieving such his spacetime theory divorced itself from flat spacetime dimensional scales and that associated quantum mechanical description of light. How Einstein did this was described in paper 47 of Temporal Mechanics ([47]: p7-11).

The physical theory approach of quantum mechanics though has also made EM difficult to describe as a physical theory given how EM can only be measured according to that theory, namely its dependence on mass/momentum and that disparity with EM and the very measuring process in play (as per the measurement problem).

The measurement problem centrally accepts that the process of measuring light incurs a collapse of the EM wave function to a certain value, in which event the EM wave function prior its collapse can only be described as a probability wave function given its actual state would not be known.
In fact, the physical theory approach is hampered by the very nature of light itself, and Einstein made this noticeably clear to then propose an argument for the superiority of his general relativity describing key features of the phenomena of light and mass in a way quantum mechanics could not.

Temporal Mechanics as the zero-dimensional mathematical theorem resolves the measurement problem by first deriving the nature of the \( EM \) wave function and then asking, “does the zero-dimensional mathematical theorem that derives the nature of the \( EM \) wave function concord with known physical phenomenal traits of \( EM \) and associated metric values?” In then addressing and counter-arguing Einstein’s presumption of the superiority of general relativity, here in this paper Temporal Mechanics will achieve the following:

(xxiv) Describe the dimensional basis Einstein presented his theory of general relativity upon.

(xxv) Highlight the mathematical error made there as per his deliberate curving of flat spacetime to accommodate for gravitational free fall.

(xxvi) Present the case for zero-dimensional mathematics as a mathematical theorem that can overcome the quantum mechanical measurement problem.

(xxvii) Uphold a dimensional scale link between gravity and \( EM \) as that new mathematical theorem approach.

No matter how well general relativity can describe gravitational phenomena, the question here being asked is whether Einstein’s formulation process for general relativity bent the rules in failing to address a fundamental mathematics for time and space in accordance with our unwavering perception ability of the dimensions, especially so given his curving of flat spacetime left quantum mechanics out of his scope of expression.

Indeed, to explain gravity a certain way is to then lay claim to a pandora’s box of data related to physical phenomena. The problem with general relativity is that it doesn’t relate on the quantum level, simply because the flat spacetime quantum level was twisted to satisfy general relativity, overlooked by Einstein given the measurement problem; simply, quantum mechanics has the measurement problem, and general relativity relies on that measurement problem to be a more viable option.

General relativity nonetheless opened a pandora’s box of presumed proof by its proposal of curving flat spacetime. Such does not make general relativity as a physical theory correct though, yet a way of explaining physical phenomena more superior to other physical theories. The question this paper asks is, “how does Einstein’s general relativity stand-up to the proof of zero-dimensional mathematics as not just a description for gravity yet \( E_M \), each being verified with known data and associated physical phenomenal descriptors?” Beyond such, the process of description here fundamentally shall highlight that there exists a natural mathematics in reality, specifically as 1d, 2d, and 3d timespace, that can then resolve both the Riemann Hypothesis and Fermat’s Last Theorem.
3. Theorems and theories

In setting the context of this paper, key ideas need to be clarified:

(xxxiii) *Theoretical physics* is a branch of physics employing mathematical models and abstractions of physical objects and systems in the time-domain of *time-now* to reason, explain, and predict physical phenomena.

(xxiv) *Experimental physics* thence uses experimental tools to probe physical phenomena.

(xxxv) There is an aim for *theoretical physics* to comply with the data generated by *experimental physics*.

(xxxxvi) *Theoretical physics* in amalgamation with *experimental physics* can adopt two processes:

a. Physical theories with a greater dependence on experimental data, and thus becoming the primary focus of *theoretical physics*.

b. Mathematical theorems with greater dependence on the mathematical models, and thus becoming the secondary focus of *theoretical physics*.

(xxxvii) A physical theory is a model of physical events as judged by:

a. The extent to which its predictions agree with empirical observations.

b. Its ability to make new predictions which can be verified by new observations.

c. Being a successful relationship between various measurable quantities.

d. Its formulation of *scientific law*.

(xxxxxviii) A mathematical theorem is:

a. A statement of logic that has or can been proved as a logical argument using standard deduction procedures\(^\text{12}\):

i. The axioms are often yet not always (as with zero-dimensional mathematical) abstractions of properties of the physical world.

ii. Mathematical theorems as opposed to being a scripted scientific law are themselves **purely deductive**.

iii. Mathematical theorems are mostly conditional statements in that their proofs deduce conclusions from hypothetical conditions.

Here, if the proposed mathematical theorem of zero-dimensional time and space can be demonstrated to interface with physical phenomenal data through applying two key scales into play (namely key known scales for the dimensions of time and space), then the paralleling data of physical phenomena inputted into this mathematical theorem would logically translate into a scientific theory.

In short, here mathematics uses a hypothesized condition of time and space that creates a timespace mathematical network of equations that when scaled with known physical phenomenal

\(^{12}\) As a logical consequence of the axioms and previously proved theorems.
values enters the domain of being a scientific theory still based nonetheless on the primary mathematical algorithm and associated theorem.

In demonstration of such ("mathematical theorem"→"physical theory"), Temporal Mechanics employs the following processes:

(xxxx) Applying a zero-dimensional mathematical theorem to what exists beyond the datum reference of time-now and thus presumably beyond the local (the time-now time-domain) confines of physical reality.

(xl) As such, to create the hypothetical condition of zero-dimensionality of time and space:
   a. The value “1” as a moment in time for the time-domain of time-now (time-now=1),
   b. The value “0” as an infinitesimal point in space (for the time-domain of time-now) and thus space without any dimension, as a pure vacuum without dimensional scale.
   c. Thence creating the hypothetical condition of time-before and time-after from the relationship of zero-dimensional time (time-now=1) and zero-dimensional space (0),
   d. Thence deriving the physical fields of 1d, 2d, and 3d timespace for the time-domain of time-now, namely the component of time imparting zero-dimensional space with a 1d, 2d, and 3d scale.

Temporal Mechanics therefore upholds the idea of a field being a physical quantity represented by scalar, vector, or tensor values for each point in space and time.

With zero-dimensional space, the hypothesis is that 0 is the absence of something, and that is how space is defined, namely having the absence of dimension and therefore scale. Yet when 0 is given dimensional scale care of time, 1d, 2d, and 3d timespace fields are formed in the time-domain of time-now. There, zero-dimensional spatial references as points in space communicate with other zero-dimensional spatial references per the temporal wave function as the basic energy field component of zero-dimensional (point) communication.

Here therefore with the zero-dimensional mathematical theorem approach, a field:

(xli) Occupies space (in being built on a pure vacuum zero-dimensional basis),

(xlii) Contains energy (as the component of time’s flow through the time-now time-domain).

Here though with the zero-dimensional mathematical theorem proposal a field does not preclude a pure vacuum yet is based upon a pure vacuum because of the zero-dimensional basis of time and space proposed to be at play.

With the zero-dimensional mathematical theorem→theory approach, a physical quantity therefore is:

(xliii) A physical property of a material or system that is quantifiable by measurement:
a. Any measurable property.
b. A value describing the status of a physical system.
c. Observable.

(xliv) Able to be expressed as:
a. A value as an algebraic product of a numerical value and a unit.
b. A quantifiable physical property used to describe changes between one time-now time-domain to another time-now time-domain state.

Although what Temporal Mechanics proposes here requires an axiom basis that extends beyond the confines of a physical property, quantity, and associated field description, the laws of physical fields and their properties/quantities are kept in check for the time-domain of time-now. Yet the principle of the mathematical theorem at play requires an over-arching perception-based inclusion of the time-domains of time-before and time-after. The reason for this is to assist in points (i)-(xi), considered to be a more accurate and complete approach to theorizing and describing physical phenomena in the constraint of our temporal and spatial perception abilities.

By all of such, when 0 and 1 as mathematical objects are applied to the dimensions of space and time respectively, as a hypothesis, the golden ratio values \(\frac{1}{\varphi}, \varphi\), \(\pi, e\) (Euler’s number), and the prime numbers become apparent as the key numerical components for 1d, 2d, and 3d timespace as demonstrated in paper 44 of Temporal Mechanics, “A mathematical analysis of zero-dimensionality in deriving the natural numbers, offering a solution to Goldbach’s conjecture and the Riemann hypothesis” [44]. From there three basic field effects become apparent, namely \(E M\), mass (\(E M^D IR\)), and gravity (\(E M^G IR\)), thence the strong and weak field forces, as demonstrated throughout papers 42-47 of Temporal Mechanics [42-47].

All such forms the basis of proof for the zero-dimensional mathematical theorem thence detailing a scientific theory. Yet is such proof required if indeed there is nothing wrong with the “physical theories” of Einstein, namely his special and general relativity theories? Are there problems with these theories and what are these problems, and how does the zero-dimensional mathematical theorem resolve these problems together with detailing what Einstein’s physical theories cannot account for?

4. Einstein’s physical theories

It must be noted that Einstein considered his theories of relativity (special and general) to belong to a class of "principle-theories" employing an analytic method, namely that the elements of his theories are not based on hypothesis or any strict mathematical theorem yet on empirical discovery, or rather, data that is already observed and known.

For instance, at the time Einstein conceived his theories of relativity, the Equivalence Principle and the Principle of Relativity were already known circa early 1600’s [49], the redshift of light was already known circa 1848 [50], the constancy of the speed of light was already proposed circa 1860’s
[51], the Perihelion of Mercury was already known circa 1859 [52], light deflection around a massive object was already known circa 1801 [53], and time-dilation was already predicted via Maxwell’s equations circa 1897 [54]. It was then Einstein’s task to explain such phenomena in the one physical theory regarding the massless photon, and he did so the way he did [55]. Yet the problem remains regarding the completeness of Einstein’s theories of relativity, specifically whether general relativity is complete in not forming a mathematical link with quantum mechanics.

To examine what the problem could be, no matter how strong his work is with describing physical phenomena, the question to be asked is if Einstein bent any physical phenomenal rules with his formulation of general relativity, and if so, what rules did he bend?

To answer this question, it is first necessary to consider what Einstein thought of space, time, and more importantly mass. Consider the following excerpts from the titled “Space-time” of the 1926 13th edition of Encyclopaedia Britannica, as presented by Albert Einstein [56]:

**Space-time**

All our thoughts and concepts are called up by sense-experiences and have a meaning only in reference to these sense-experiences. On the other hand, however, they are products of the spontaneous activity of our minds; they are thus in no wise logical consequences of the contents of these sense-experiences. If, therefore, we wish to grasp the essence of a complex of abstract notions we must for the one part investigate the mutual relationships between the concepts and the assertions made about them; for the other, we must investigate how they are related to the experiences.

So far as the way is concerned in which concepts are connected with one another and with the experiences there is no difference of principle between the concept-systems of science and those of daily life. The concept-systems of science have grown out of those of daily life and have been modified and completed according to the objects and purposes of the science in question.

The more universal a concept is the more frequently it enters into our thinking; and the more indirect its relation to sense-experience, the more difficult it is for us to comprehend its meaning; this is particularly the case with pre-scientific concepts that we have been accustomed to use since childhood. Consider the concepts referred to in the words “where,” “when,” “why,” “being,” to the elucidation of which innumerable volumes of philosophy have been devoted. We fare no better in our speculations than a fish which should strive to become clear as to what is water.

**Space**

In the present article we are concerned with the meaning of “where,” that is, of space. It appears that there is no quality contained in our individual primitive sense-experiences that may be designated as spatial. Rather, what is spatial appears to be a sort of order of the material
objects of experience. The concept “material object” must therefore be available if concepts concerning space are to be possible…….

Reference to the Earth

If we start from the view that all spatial concepts are related to contact-experiences of solid bodies, it is easy to understand how the concept “space” originated, namely, how a thing independent of bodies and yet embodying their position-possibilities (Lagerungsmöglichkeiten) was posited. If we have a system of bodies in contact and at rest relatively to one another, some can be replaced by others. This property of allowing substitution is interpreted as “available space.” Space denotes the property in virtue of which rigid bodies can occupy different positions. The view that space is something with a unity of its own is perhaps due to the circumstance that in pre-scientific thought all positions of bodies were referred to one body (reference body), namely the earth. In scientific thought the earth is represented by the co-ordinate system. The assertion that it would be possible to place an unlimited number of bodies next to one another denotes that space is infinite. In pre-scientific thought the concepts “space” and “time” and “body of reference” are scarcely differentiated at all. A place or point in space is always taken to mean a material point on a body of reference…….

Euclidean Geometry

If we consider Euclidean geometry, we clearly discern that it refers to the laws regulating the positions of rigid bodies. It turns to account the ingenious thought of tracing back all relations concerning bodies and their relative positions to the very simple concept “distance” (Strecke). Distance denotes a rigid body on which two material points (marks) have been specified. The concept of the equality of distances (and angles) refers to experiments involving coincidences; the same remarks apply to the theorems on congruence. Now, Euclidean geometry, in the form in which it has been handed down to us from Euclid, uses the fundamental concepts “straight line” and “plane” which do not appear to correspond, or at any rate, not so directly, with experiences concerning the position of rigid bodies. On this it must be remarked that the concept of the straight line may be reduced to that of the distance.1 Moreover, geometers were less concerned with bringing out the relation of their fundamental concepts to experience than with deducing logically the geometrical propositions from a few axioms enunciated at the outset…….

Einstein has clearly set a primacy for mass over light, in fact over the idea of space itself, as a primacy of mass over space-time. Further highlighting this definition of space regarding the primacy of mass was with a final amendment that he made to his Theory of Relativity as per the following from his 15th edition to his Special and General theory [57]:

1
Note to the fifteenth edition

In this edition I have added, as a fifth appendix, a presentation of my views on the problem of space in general and on the gradual modifications of our ideas on space resulting from the influence of the relativistic viewpoint. I wished to show that space-time is not necessarily something to which one can ascribe a separate existence, independently of the actual objects of physical reality. Physical objects are not in space, but these objects are spatially extended. In this way the concept “empty space” loses its meaning. June 9th, 1952. A. EINSTEIN

The question of course is “what is the difference between stretched/expanding space\textsuperscript{13} and extended space?”

Indeed, Einstein does not confuse stretching with extending, for this amendment is merely Einstein highlighting an annexing of space as mass, mass being intricately associated to space as a localised extension of space (and not stretching).

Einstein though set the foundation to have one need to explain how to physically and practically measure space and time, and thus define them in physical terms. Yet his theory still failed to explain why mass attracts mass in the context of his required metric expansion of space ([47]: p7-11).

In short, Einstein argued that physical beings must describe things physically. This though has led to several key problems regarding the dimensions of spacetime, namely the mismatch between flat spacetime (special relativity) and curved spacetime (general relativity) ([47]: p7-11).

It is interesting to note though that the physical expansion of space is now known mathematically as a metric expansion of space, suggesting mathematics can be a part of a physical process (space being connected to mass in mass being an extension of space). The implication of this is that if mathematics is therefore allowed to be a physical process, then considering a primary metric feature of space should require the mathematics of zero-dimensionality, of at least a point in space and moment in time. Indeed though, how can one measure physically zero-dimensional space and zero-dimensional time? How does one measure a point in space and a moment in time if not primarily as a mathematical theorem hypothesizing such to be so? Such is the task of the proposed zero-dimensional mathematical theorem, namely, to derive the consistency and thoroughness of this proposed mathematical theorem, together with confirming such with the substantiating data of physical phenomena.

To note are the following contemporary notions of zero-dimensional space:

(xlv) Zero-dimensional space is considered as zero-dimensional topological space having dimension zero with respect to other non-zero dimensions of topological space, simply put graphically as a point.

\textsuperscript{13} As per the metric expansion of space.
There, the “metric” of zero-dimensionality is given as zero in comparison to what is not zero, namely in being associated to accompanying non-zero-dimensional spatial topologies; there, are the various mathematical descriptions for how to define such zero-dimensional spaces (as points) with other associated non-zero topologies.

The closest idea mathematics provides for a stand-alone zero-dimensional space is the idea of a zero-dimensional ball as a point.

Mathematics also provides zero-dimensional space with the idea of the set of rational numbers as the idea of “subspace” topology. Yet such is zero-dimensional subspace, not zero-dimensional space.

As an extension of such (xlvi)-(xlvi), the literature of Temporal Mechanics has revealed the key problem with the assumption of a point, namely ([43]: p1-5):

What presumably existed before the big bang according to the ΛCDM model (based on Einstein’s general relativity), zero-dimensionality on an infinitesimal scale one could only consider.

Thence what would still exist ahead of the big bang shock front, also a point yet on an infinite scale.

There, the problem is the scale, and Temporal Mechanics has identified this as the infinitesimal-infinite paradox (0-∞ paradox) of zero-dimensional space ([43]: p1-5) in view of the ΛCDM model.

Paper 43 ([43]: p6-8) of Temporal Mechanics, as with paper 44 ([44]: p8-13) thence delivered a mathematical description for zero-dimensional space, one that allowed a point as a 0-reference to be labelled for any reference in 3d space, provided that the infinitesimal-infinite paradox could be resolved. How such was achieved required defining zero-dimensional space with a new mathematics, specifically with new mathematical tags to accommodate for the ideas of 0 and ∞, namely the infinitesimal scale (0) and the infinite scale (∞), which then proposed a new cosmological model in highlighting the flaw in the current ΛCDM cosmological model. Simply, by using the mathematics of zero-dimensionality the ΛCDM was demonstrated to be flawed.

By such, Temporal Mechanics asks why physicality must be described physically to support a theory? Indeed, physical measurement can verify a physical theory, yet does a theory if not theorem depend on physical measurement alone given the idea of a theory itself is an intangible if not non-physical thing? The proposal here is how the intangibility of theory can make sense to our ability of conscious reason as a description of physical reality, namely by the zero-dimensional mathematical theorem approach.

5. The zero-dimensional mathematical theorem approach
The initial proposal in paper 1 ([1]: p1-5) of Temporal Mechanics was to examine how one is naturally conscious of time and space on a most fundamental level as a basis for counting objects in time and space. This led to the derivation of the time-equation. Such then through a series of papers [2-47]14 led to the fundamental mathematics of zero-dimensionality15, specifically papers 43-47 [43-47].

To be noted here is that Temporal Mechanics is a proposed new stream of physics16, and thus much of the work of Temporal Mechanics requires referencing the work of Temporal Mechanics as compared to known data references, one paper to the next. Given the large amount of data available to physics theory, Temporal Mechanics in its adaptation process to that data has itself become a just as large body of work, as follows:

(i) Volume 1 (papers 1-7):
   a. **Hypothesis**: the time-equation proposal and associated process of equation-data matching:
      i. [1-7].

(ii) Volume 2 (papers 8-14):
   a. **Adaptation**: following the revised mathematical time-equation formulation of paper 8, the required process was of equation and data matching with physical phenomena:
      i. [8-14].

(iii) Volume 3 (papers 15-21):
   a. **Development**: the development of a dual time approach for \( EM \) and \( G \) as the Hybrid time-theory by deriving time to have different subsidiary equations for \( EM \) and \( G \):
      i. [15-21].

(iv) Volume 4 (papers 22-28):
   a. **Derivation**: the interlinking mathematics of the hybrid time theory with microscopic and macroscopic data and equations:
      i. [22-28].

(iv) Volume 5 (papers 29-35):
   a. **Range**: determining what the microscopic and macroscopic limits are and why for the time-equation theory, presenting a basic scheme for time-equation cosmology.
      i. [29-35]

(i) Volume 6 (papers 29-35):
   a. **Refinement**: a process of deriving the known and more refined subatomic and elementary particle values and associated field force equations and data, together with the known macroscopic values:

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14 The primary compass of theoretic design being the time equation and its associated derived golden ratio (Fibonacci) feature.


16 See section 6.
i. [36-42].

(lvii) Volume 7 (papers 43-48):
   a. **Zero-dimensionality**: establishing the common underlying mathematics of physical phenomena and associated field force effects, particularly the basis for inertia and gravitational freefall:
      i. [43-47].
      ii. This paper being paper 48.

To then efficiently acquaint oneself with Temporal Mechanics, volume 7 has been designed with the benefit of hindsight of volumes 1-6, particularly paper 42 of volume 6 where the gravitational analogue $EM_{DIR}^5$ field was derived ([42]: p29-56), which then inspired volume 7 as a new overall approach to revising Temporal Mechanics with the idea of zero-point energy and thus presumably the mathematics of zero-dimensionality. The key issue found with paper 42 though was the need to thence derive the **timespace zero-dimensional timespace grid**, hence papers 43-47 [43-47]:

(lviii) Paper 43 [43]:
   a. Describing zero-dimensional space and a moment of time:
      i. ([43]: p1-5).
   b. Thence deriving 1d, 2d, and 3d timespace:
      i. ([43]: p6-8).

(lix) Paper 44 [44]:
   a. Using zero-dimensional mathematics to derive the natural number system from $0 \to \alpha$ via deriving the prime numbers:
      i. ([44]: p5-12).
   b. Resolving Goldbach’s conjecture:
      i. ([44]: p12-13).
   c. Resolving the Riemann hypothesis in mapping the primes using Euler’s equations for the zero-dimensional derived number values of $0 \to \alpha$:
      i. ([44]: p14-19).

(lx) Paper 45 [45]:
   a. Using zero-dimensional mathematics to:
      i. Derive the 5 processes of time for physical phenomena ([45]: p12, (xv-xix)).
      ii. Derive the constancy of the speed of light in a vacuum for all frames of reference ([45]: p15-16).
      iii. Derive Einstein’s cosmological constant error in Einstein’s failing to accommodate for zero-dimensional mathematics ([45]: p27-31).

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17 Solving the Riemann hypothesis is considered as a key mathematical achievement according to the Clay Mathematics Institute [58].
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(lxi) Paper 46 [46]:

a. A criticism of the current manner of employment of mathematics by physics of space as a mass field and time as relative motion of masses, as such assumes:
   i. The dimensions automatically confer mathematically to physical objects.
   ii. The idea of not only the mathematics of a point in space, yet also a moment in time, leading to dimensional scaling anomalies (stretching and bending).

(lxii) Paper 47 [47]:

a. Highlighting the flaw in Einstein’s theory of general relativity in:
   i. stretching/bending flat spacetime using straight-line segments and thence:
      1. Failing to derive Fermat’s principle.
      2. Failing to derive the stationary-action principle
      3. Failing to derive the principle of inertia.

Preceding and yet also underwriting such, the process of paper 42 [42] was to:

(lxiii) Account for $E_M$ as the analogue of the temporal wave function.

(lxiv) Thence describe the $E_M$ model as a process of destructive interference resonance ($DIR$) in two ways:

a. A partial destructive interference resonance ($EM^{DIR}$) resulting in particle pair production as a mass-field effect:
   i. ([42]: p36-37).

b. An absolute destructive interference resonance ($EM^{XDIR}$) resulting in a baseline zero-point field as the gravitational freefall field effect:
   ii. ([42]: p38-41).

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 attempts to achieve through mathematical infinitesimal functions. Here, Temporal Mechanics exercises itself via a more precise zero-dimensional mathematical process not incurring the scaling problems of general relativity.

By the described mathematics of zero-dimensional time and space, the following were derived:

(lxiv) The arrow of time (time-before to time-after via time-now) as a golden ratio time-equation:
   i. ([44]: p8-12).

(lxv) 1d, 2d, and 3d timespace:
   i. ([44]: p12-19).

(lxvi) The derivation of the prime numbers from $0 \to \infty$ as the interlinking numerical entities of 1d, 2d, and 3d timespace:
   i. ([44]: p12-19).
The 5 processes of time for physical phenomena ([45]: p12, (xv-xix)):

a. Time as a $t_N1$ time-point as a momentary time-point for zero-dimensional space.

b. The general direction of time as the time-equation $t_B + t_N1 = t_A$, namely a forward direction of time utilizing the datum-reference of $t_N1$.

c. Time as $t_N1 - t_N1 = 0$ time-points as time at the speed of transmission between $t_N1$ time-points.

d. The resultant temporal relativity and associated temporal doppler effects ([30]: p11-15) of objects in 3d timespace in the context of $c$ where at $c$ time=$0$ (lxvii-c) (namely a 0 passage of time).

e. The standard observed passage of time being due to (lxvii-b), namely the incremental cycles of the temporal wave function as timespace ([2]: p3-10):
   i. Specifically, as the on-off feature of the temporal wave function as the increment between a $t_N1$ time-point moment/loop and the absolute absence of a $t_N1$ time-point moment/loop.
   ii. Such, owing to the need to disallow time→time− given (lxvii-b) is a time−forward equation by its design ([43]: p2-8).

A timespace temporal wave function as an $EM$ analogue:
   i. ([2]: p2-15).

The partial $EM$ destructive interference resonance (DIR) phenomenal derivative $EM^{DIR}$ field as the basic destructive interference resonance (DIR) of an $EM$ field as mass formation:
   i. [38].
   ii. ([42]: p7-21).

The absolute $EM$ destructive interference resonance (DIR) phenomenal derivative $EM_{3DIR}$ field as the flatline destructive interference resonance (DIR) of an $EM$ field, as gravity:
   i. ([42]: p21-55).
   ii. ([47]: p15-18).

As per (lxx), Temporal Mechanics defines and derives gravity to be a general result of all the features of physical phenomena, principally according to the following key equations:

$e^{i\pi} + 1 = 0$ (gravitational free fall and mass-mass attractivity):
   i. ([15]: p11, eq6).
   ii. ([40]: p16, eq3).

$G_{AB<NEWTONS>} = \frac{M_AM_B}{r_{AB}^2} $ $(kg^3t^{-2})$, $G_{AB<NEWTONS>} = \frac{M_CM_B}{d^2} $ $(kg^3t^{-2})$:
   i. ([1]: p10, eq10-12).

$F_m_1m_2 = \frac{m_1m_2v^2c^2}{d^2}$:
As the equations highlight, gravity is revealed to be a pan-phenomenon as a derivative of the destructive interference resonance (DIR) of the temporal wave function, namely as a specific DIR of the temporal wave function and the associated incursion event for electron mass [39].

A list of the references for the temporal nature of the gravitational field force can be tracked as a zero-dimensional mathematical epistemology as follows:

- **EM** and \(G\) temporal analogue equations of force:
- Provisional gravity constant \(G\) for the gravitational force equation:
  - ((4): p5, eq1).
- Negative energy proposal for gravity:
  - ((7): p2-3).
- Linking EM with \(G\):
- Gravity as entropy:
- Proton/neutron mass from electron charge:
EM$^{DIR}$ field compared to $EM$:
   i. ([23]: p23-28).

$G$ constant from neutrino mass:
   i. ([35]: p28-29, eq3).

Entropy and enthalpy as features of time’s arrow:
   i. ([37]: p14-18).

Particle pair production:
   i. ([38], p17-22).

The derivation of $G$:
   i. ([39]: p43).

The features of gravity central to energy and momentum:
   i. ([40]: p20-21, eq4-10).

The features of gravity as a zero-point energy basis:
   i. ([42]: 16-60).

6. $EM$ (light), $EM^{DIR}$ (mass), and $EM^{XDIR}$ (gravity) field relationships

Although physics seeks to find the link between $EM$ and gravity as per quantum gravity, as a melding of general relativity and quantum mechanics, Temporal Mechanics has found that such is too strong a proposal in given the dimensional disparity between general relativity and quantum mechanics.

To make the description simple yet hierarchical and thence more accountable:

Temporal Mechanics defines $EM$ from the basis of the time-equation as the temporal wave function.

Temporal Mechanics then highlights how from that temporal wave function under the condition of $\pi$ is organized an atomic locale that prescribes the idea of mass, as particles of the atomic locale, which are formed by a “destructive interference resonance” process of $EM$ as the $EM^{DIR}$ field.

Temporal Mechanics though investigated the $DIR$ (destructive interference resonance) process further in paper 42, in describing two types of $DIR$, namely the partial $DIR$ that results in mass ([42]: p36-37) as the $EM^{DIR}$ field, and the absolute $DIR$ responsible for the effect of gravity ([42]: p38-41) as the $EM^{XDIR}$ field.

The question therefore is, “what determines how both $EM^{DIR}$ and $EM^{XDIR}$ remain patent for destructive interference resonance process of $EM$?” Fundamentally there are two conditions at play:

The $EM$ field and associated golden ration equation of $t_B + 1 = t_A$ ($t_B$ as time-before where $t_B^2 = t_A$):
i. ([1]: p1-5).
ii. ([8]: p2-5).
iii. ([43]: p1-8).
iv. ([44]: p1-12).

(c) The $EM^{DIR}$ field and associated $e^{it_B} + 1_{t_N} = 0_{t_A}$ equation:
   i. ([15]: p8-10).
   ii. ([40]: p16, eq2-3).
   iii. ([44]: p10-12).

In between these two fields is the idea of mass ($EM^{DIR}$) which expresses itself as an interplay of the temporal wave function ($EM$) and the fundamental $e^{it_B} + 1_{t_N} = 0_{t_A}$ ($EM^{DIR}_X$) field condition.

The organization of mass ($EM^{DIR}$), mass as a light-making ($EM$) factory and how mass gravitates ($EM^{DIR}_X$) include the following derivations:

(ci) Deriving the atomic locale and associated particle phenomena:
   a. The subatomic particle level:
      i. [2][3][4].
      ii. ([23]: p12-31).
   b. Proton/neutron mass:
      i. ([23]: p22).
   c. Electron mass:
      i. ([36]: p14-18).
   d. The elementary particle level:
      i. ([25]: p38-53).
   e. Neutrino mass:
      i. ([25]: p51, eq10).
      ii. ([35]: p28, eq2).
      iii. ([39]: p41-46, eq9-21).
   f. electron radius:
      i. ([38]: p31-35).
   g. Proton radius:
      i. ([38]: p35-43).
      ii. ([40]: p19-25).
   h. Particle pair production
      i. ([38]: p17-21).
   i. Symmetry breaking, and Baryon asymmetry
      i. ([42]: p51-56).

(cii) Deriving Fermat’s principle, the stationary-action principle, and the principle of inertia:
   i. ([47]: p15-18).
Mathematically, the process that has mass \((EM^{DIR})\) manifest and hold and shape itself together is according to the two fundamental principles of \(EM\) and \(EM_X^{DIR}\) as the interplay of:

(ciii) The golden ratio equation:
   i. (xcix).

(civ) The \(\pi\) condition for the golden ratio equation, and thus the \(e^{i\pi}\) condition as the gravity equation:
   i. (c).

(cv) The set of prime numbers derived from \(t_B + 1 = t_A\) and \(e^{i\pi} + 1 = 0\) as fundamentally associated to the derivation of elementary particle mass:
   i. ([35]: pp27-28).
   ii. ([44]: p12-19).

By such, there exists a balance between \(EM\) and \(EM_X^{DIR}\) to keep physical reality \((EM^{DIR})\) together:

(cvii) The basic solar phenomenal values:
   i. ([36]: p22-26).
   ii. ([39]: p59-67).

(cviii) The solar system manifolds and scales:
   a. Oort cloud distance from sun:
      i. ([13]: p9-11, eq1-8).
      ii. ([36]: p26-29).
   b. Heliopause distance from sun:
      i. ([32]: p15, eq1-5).
   c. Bow shock:
      i. ([32]: p16-17, eq6-9).
   d. Black hole phenomena:
      i. ([42]: p40-50).
   e. Astrophysical phenomena and scales:
      i. [32][33][34].
      ii. ([39]: p30-67).
      iii. ([42]: p24-29).
   f. Isotropic CMBR:
      i. ([14]: p23-25, eq13).
      ii. ([37]: p29-31).
In short, Temporal Mechanics has found that gravity \((EM_{\text{DIR}})\) is the overall general context \textit{determining} and \textit{setting} \(EM\) “destructive interference resonances” for mass \((EM_{\text{DIR}})\) anchored predominantly by calculating a “maximum mass” event and what those scales would be for a maximum mass event and why, as limited by a \textit{space-time} principle ([36]: p14-29). To also note is that here a dimensional mismatch with quantum mechanical scales is not being incurred, simply because here with Temporal Mechanics flat 3d space in association with time (described here as 3d timespace) is not being corrupted.

Conversely, to curve flat spacetime as the creation of a new paradigm or realm to make gravitational freefall work is essentially deliberate by design and interferes with the known phenomenal flat spacetime constraints. In effect, Einstein twisted flat spacetime to create a new realm for gravitational freefall without properly considering the measured effect that would have on the phenomena related to flat spacetime (quantum mechanics).

Ideally, gravitational freefall should be explained in leaving flat spacetime alone while also considering a force that resists mass to create the effect of both inertial mass and gravitational freefall. Such a process though requires \textit{not} making mass (inertial or gravitational) the \textit{a priori} of mathematics \textit{yet another concept free from mass that is responsible for the effect of gravity}. That thing and that process is described in paper 47 of Temporal Mechanics in deriving the 3-principles essential to mass, inertia, momentum, and gravitational freefall, namely Fermat’s principle, the stationary-action principle, and the principle of inertia, such in most importantly not twisting flat spacetime ([47]: p11-18). There, the structural tension of mass by this \(EM-EM_{\text{DIR}}\) process of relationship, the force that binds all mass, resulting in the concepts of momentum and inertia, is proposed to be based on the fundamental interplay between the \(EM\), \(EM_{\text{DIR}}\), and \(EM_{\text{X}}\) fields, \textit{specifically} as based on a condition of numbers with the dimensions of space and time upon a zero-dimensional basis of regard.

To therefore explain the behaviour of mass \((EM_{\text{DIR}})\) in a gravity field \((EM_{\text{X}})\) also requires a description of how \(EM\) works with both mass \((EM_{\text{DIR}})\) and a gravitational field \((EM_{\text{X}})\), or rather how they work with each other. By all of such, the proposal here is that the entire scheme of \textit{timespace} organizes itself, arranges itself, according to these key \(EM\), \(EM_{\text{DIR}}\), and \(EM_{\text{X}}\) field constraints. In short, physical phenomena is proposed to have a vast ecosystem of basic equations and constants all based on the one zero-dimensional mathematical \textit{theorem}→\textit{theory} scheme.

7. Natural mathematics: the mathematics of physical phenomena

Given the pan-phenomena scope of the zero-dimensional mathematical theorem therefore, one of the questions that Temporal Mechanics asked of its results was regarding its mapping of the primes and thence all positive integers, thence offering a solution to the Riemann Hypothesis [44][58]. There in paper 44 [44], it was realized that to properly demonstrate the solution to the Riemann Hypothesis using the \textit{timespace} mapping process it would be necessary to interface the derived equations of \textit{timespace} to experimental data and to thus use the enormous reservoir of experiment data to demonstrate the
efficacy of the solution. The implication with this solution is that number theory is an embedded feature of reality, of timespace.

In much the same way a solution to the Riemann Hypothesis was approached using timespace, a solution to Fermat’s Theorem (Last) [59] can be approached, namely that:

\[ a^n + b^n = c^n \]  

(1.)

where \( a, b, \) and \( c \) are positive integers only applies for positive integers of \( n < 3 \), simply given that in the proof for the Riemann Hypothesis the Pythagorean theorem of:

\[ a^2 + b^2 = c^2 \]  

(2.)

was demonstrated to be the core and albeit limiting ingredient of 1d, 2d, and 3d timespace ([44]: p8-10, eq1-10), and thus reality, thence deriving the primes and natural numbers, and thus a real positive integer mathematics ([44]: p8-23, eq1-23).

Here therefore proof for Fermat’s theorem is intrinsic to the proposed proof for the Riemann hypothesis, as presented in paper 44 [44]. A fuller proof shall be offered in a subsequent paper highlighting the zero-dimensional mathematical theorem to represent the basis for number theory.

The only other question to be asked therefore is, “how much data of reality represents proof if reality is a generally consistent thing in our lifetime and the underlying consistencies of reality can be successfully derived with a mathematical theorem approach?”

One of the key features of the zero-dimensional mathematical theorem is its derivation of a time-equation that prescribes an endless algorithm for the interoperation of spatial points via time, only limited by the constraints of how the three derived fields (\( EM, EM_{DIR}, EM^2_{DIR} \)) are maximally able to relate with each other. In that entire system are still though fundamental rational and irrational number constraints at play, as described (xcix)-(c).

How does any of all of such arrive from a basis of one being conscious of time and space though? For instance, if there is a mathematics embedded in physical phenomena, does physical phenomena perform \( t_B + 1 = t_A \) or is it our conscious notion of being aware of time and space, as proposed, that reckons \( t_B + 1 = t_A \)? How is physical phenomenal information both processed and described, therefore? We might employ \( t_B + 1 = t_A \) to explain a small piece of reality, yet is reality doing the same piecemeal thing on any and every level of regard, however big or small? In short, does reality exist in any way that can be otherwise explained or only this way?

The zero-dimensional mathematical theorem explains physical phenomena in the most fundamental zero-dimensional way consciously possible (for the dimensions of time and space), namely using a basic zero-dimensional mathematics, as presented in paper 43 ([43]: p1-11), in then deriving \( t_B + 1 = t_A \). Should though we be concerned about anything beyond that process? Indeed, \( t_B + 1 = t_A \) does, as it seems, involve a whole host of number types, including mapping the primes as demonstrated in paper 44 [44], yet is such a concern in trying to explain reality? In saying these numbers, all of them as we attempt to count them mathematically with equations, do not exist as a
process of reality being reality, then *what* exactly is the mechanism of reality as an epistemology? Does mathematics make us ignorant to the true nature of reality?

Here reality is proposed to be a continual sequence of events as we perceive those events, forever changing as we perceive them, some parts more than others, yet nonetheless with underlying constraints at play. Thus, the proposal is that *how* we can count these changes can be akin to the changes we perceive being as what reality *is*. Such an argument formed the basis of the zero-dimensional mathematical theorem for time and space, initially as an account of how we are most basically conscious of time and space as dimensions ([1]: p1-11) and then reaching that counting process to the dimensions of time and space to arrive at fundamental dimensional number theory principles for the dimensions.

In many ways, if reality has an underlying mathematical disturbance in the manner of a constant calculation process, it is more likely than not the mathematical disturbance (here proposed as the golden ratio equation for time) that is *the* underlying *dimensional disturbance* of time with space, time disturbing space as this time-equation, than anything else acting as the disturbance.

Here, with the golden ratio equation for time as the mathematical disturbance is generated Mandelbrot (Fibonacci) domain references for every point in 1d, 2d and 3d *timespace*, deriving the primes from $0 \rightarrow \infty$. Essentially, by this zero-dimensional mathematical theorem process, every zero-dimensional point reference is derived to be bound infinitely to zero-dimensionality while still associating with other zero-dimensional point references *infinitely per* a time equation prescribing the golden ratio Fibonacci sequence.

The obvious question there is, "*why not interface this mathematical theorem with the physical data of reality?*" Such has been the whole point of Temporal Mechanics, to do that very thing. Subsequently, the zero-dimensional mathematical theorem is not an extension of spacetime or anything similar such as Hilbert space theory. Alternatively, the zero-dimensional mathematical theorem takes a step back and asks how all of physics theory has been designed in the first place while then proposing an innovative approach in harnessing today's new data availability.

The problem some may find with the zero-dimensional mathematical theorem is the idea of *zero-dimensional time as compared to zero-dimensional space*. The hypothesis here is that zero-dimensional space is given the mathematical number value “0”, and that zero-dimensional time is given the mathematical number value of “1”. “1” for zero-dimensional time may appear to be counter-intuitive to the idea of zero-dimensionality, yet it was found necessary given space was already being tagged with the mathematical value of “0” The value of time-now=1 ($t_N1$) as a zero-dimensional reference for time is not to say such is a unit of time, yet that such is a mathematical value of time distinct from the mathematical value for space as the representation of what exists between the non-local time-domains of time-before and time-after. By this process the following are derived:

(cix) Time as a $t_N1$ time-point as a momentary time-point for zero-dimensional space.

(cx) The general direction of time as the time-equation $t_B + t_N1 = t_A$, namely a forward direction of time utilizing the datum-reference of $t_N1$. 
(cxi) Time as $t_N^1 - t_N^1 = 0$ time-points as time at the speed of transmission between $t_N^1$ time-points.

(cxii) The resultant temporal relativity and associated temporal doppler effects ([30]: p11-15) of objects in 3d timespace in the context of $c$ where at $c$ time=0 (cxi) (namely a 0 passage of time).

(cxiii) The standard observed passage of time being due to (cx), namely the incremental cycles of the temporal wave function as timespace ([2]: p3-10):

- Specifically, as the on-off feature of the temporal wave function as the increment between a $t_N^1$ time-point moment/loop and the absolute absence of a $t_N^1$ time-point moment/loop.
- Such, owing to the need to disallow time-after $\rightarrow$ time-before given (cx) is a time-forward equation by its design ([43]: p2-8).

Although time can be observed to contract and lengthen owing to the relative motion of bodies (cxii), $c$ is always a constant where at $c$ time=0 as a passage of time (cxi), and yet the idea of a moment of time is still a valid concept as $t_N^1$ (cix).

What is relevant for the ordinary understanding of time though, namely its passage, has been described as the temporal component of the temporal wave function as presented in paper 2 ([2]: p3-10) of Temporal Mechanics.

Thus, although Einstein was correct in considering $c$ as a constant where at $c$ time approaches the value of 0 (namely time not passing at $c$), together with attempting to uphold the principle of relativity, Einstein’s spacetime (where time contributes to the curvature of space as gravity) is a fundamentally flawed proposal in failing to define the fundamental basis of time itself. By that failure, it was shown and predicted that there would eventuate with general relativity massive calculation incursions that warrant the invention/amendments of dark energy and dark matter, as per papers 45 ([45]: p27-30) and 47 ([47]: p7-11) of Temporal Mechanics.

In short, Temporal Mechanics finds that the idea of a spacetime singularity is an error, as mathematically time and space are not the same unless the mathematics there has become blurred in forgetting exactly the fundamental difference between the idea of time and the idea of space.

The zero-dimensional mathematical theorem therefore cannot be directly applied to the current physical theories18 that are based on mass, namely those theories that depend on mass-momentum as a primary dimensional basis. The proposal here is for the zero-dimensional mathematical theorem to stand alone and then confirm its results with the mathematical results of physical theories.

Here, the zero-dimensional mathematical theorem can only be applied to physical phenomena by scaling its equations for time and space to 2 known basic values, namely one scale for time and the other for space; the proposal has been to use the charge of the electron (as charge for time) and the speed of light (as distance for space), as was adopted from paper 2 of Temporal Mechanics ([2]: p15-18), and then further clarified in paper 39 [39].

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18 Classical mechanics, special and general relativity, quantum mechanics, and the standard model of particles.
Conversely, in criticism of the current manner of employment of mathematics by physics, to demonstrate space as mass and time as motion of mass is presuming the dimensions automatically confer mathematically to physical objects, such in bypassing the idea of not only the mathematics of a point in space, yet also a moment in time.

Alternatively, Temporal Mechanics proposes and demonstrates that mathematics as a number theory is given completeness, can check itself, by deriving and mapping the primes (\((44): p12-19\)) via defining 0, 1, and \(\omega\) with the objects of space and time. Moreover, it is shown there (\((45): p30-31, (clxv)-(clxviii)\)) and here in this paper that mathematics alone as a pure number system with associated axioms and algorithms would not achieve such, namely not be able to check itself as a number theory alone, without the complementing absoluteness of the dimensions of time and space as the instruments of the mathematical theorem. In short, by the adaptation of the zero-dimensionality to time and space using the basic number value of 0 for space and 1 for time, mathematical completeness is equated and realized (\((45): p22-27, (ciii)-(cxliv)\)).

Thus, can an incomplete mathematical theorem explain reality as a physics theory? The proposal here is that:

(cxiv) Mathematics can explain physical reality as a mathematical theorem only by annexing the number system from a zero-dimensionnal application to time and space.

(cxv) The completing piece of mathematics is the annexed number theory itself of zero-dimensionnal mathematics, which then as a platform can be applied to physical phenomena as:

a. a set of number associations as equations (\((45) p20-22, (xc)-(cii))\),

b. thus, a process of confirmation with known physical data.

(cxvi) The incompleteness of number theory is owing to number theory not being entire of itself in the absence of the dimensions of time and space.

In addressing how a mathematical theorem that is proposed to be complete can measure itself, to check itself, in being complete, and by what application of mathematics can it do such in avoiding the incompleteness condition\(^{19}\), the process of Temporal Mechanics as a mathematical theorem checking itself is achieved in:

(cxvii) Deriving the basic time-equation and associated features:

i. (\([1]: p1-5, eq1-6)\).

ii. (\([8]: p1-5)\).

iii. (\([43]: p6-7, eq1-7)\).

iv. (\((45): p22-27, (ciii)-(cxliv)\))

(cxviii) Thereby deriving the overall cosmological model matching known astrophysical data as a macroscopic scale check:

\(^{19}\) As per Godel’s incompleteness theorem [60].
i. ([45]: p31, (clxxiv)-(clxxxii)).

In executing this process, as specified, only two standard metrics were required, primarily the value for $c$ as distance (as an analogue for space) and the charge of the electron $e_c$ (as an analogue for time), to then populate the remainder of the Temporal Mechanics derived equations proposed for physical phenomena, subsequently matching known physical phenomenal equations together with their associated constants. Such is precisely what a self-checking mathematical theorem based on a zero-dimensional mathematics should achieve.

In presenting such therefore, zero-dimensional mathematics (Temporal Mechanics) is not intended to replace physics. Instead, it does what it is designed to do, namely form a more fundamental link between the field forces via a new dimensional analysis of space and time, and thus being a more fundamental mathematical object description than the idea of mass alone. The great utility of this process is that it opens new doorways to physics research that can be confirmed as much as what it confirms already with experimental physics. For instance, Temporal Mechanics has predicted and calculated the mass of the X17 particle$^{20}$ and there also how electrons can be better utilized in electron shell circuits ([30]: p19-24).

The utility of the various physics theories is undeniable in gathering data the only way that is possible. For instance, the standard model is the result of "calculating" mathematically the residue energies of particle collisions that are sub-quantum as $eV$ (electron volt) values. Simply, the standard model is based on the mathematics of particle collision experiments which thence relies on mass-momentum and the baseline quantum values. All of such is still a process of experiment and mathematics, mathematics as the derivation of these particles compared to quantum values.

Indeed therefore, to discount the standard model is to be negligent of understanding the point of mathematics in mass-based (collision) experimental physics; the resource of data that forms the basis of the standard model is an experimental fact. The question posed here though is how to interpret that data properly. Here, the proposal is for the zero-dimensional mathematical theorem to be the baseline theory for that task given it has successfully predicted the existence of elementary particles and derived precisely the mass of the lightest neutrino$^{21}$.

8. Conclusion

There are found to be four key descriptions Albert Einstein's work for special and general relativity lacks:

$^{20}$ [61][62][63].

$^{21}$ ([35]: p27, eq1), ([35]: p28), ([42]: p13, eq12-13), ([42]: p20).
The why of time or space (only presenting a theory to explain how his proposal for space and time can work to explain certain features of light and gravity without nonetheless being able to link the two field forces).

The drive for the arrow of time.

The pinpoint idea of 0d space (a point in space) in the context of time’s arrow.

Why mass attracts mass, especially in the context of its required metric expansion of space; oddly, "dark matter" has been proposed to account for the shape of galaxies maintaining their shape in the context of a metric expansion of space, as even then mass has still not been described sufficiently to say why mass attracts mass.

The common feature to the field effects of $EM$ and gravity would logically be the dimensions of time and space. There, zero-dimensional mathematics demonstrates a driving mathematical equation for time and space that is forever incomplete, as what the golden ratio (Fibonacci) equation prescribes, echoing its vast utility in being applied to experimental data and future research.

Although Temporal Mechanics is very much a work in progress, its current results [1-47] show how much more versatile the mathematical theorem approach is in being applied to the dimensions of time and space in hypothesizing their zero-dimensional mathematical numerical values, as opposed to the basic physical theory approach regarding mass and associated basic kinematics, all of which can be nonetheless derived by the zero-dimensional mathematical theorem approach.

Further work with Temporal Mechanics is proposed to focus on the key issues contemporary physics finds as relevant and essential systems of proof for technological advancement. The current PDF of collated papers, “Temporal Mechanics: the mathematics of zero-dimensionality” [64][65], serves as a useful cross-referencing resource for those wishing to further explore this zero-dimensional mathematical theorem approach to describing physical reality.

Conflicts of Interest

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

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