Zero Quantum Gravity

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Abstract: Proposed here is a new approach to the known disparity between the 4d spacetime designs of quantum field theory (QFT) and general relativity (GR). The reason for calculus in physics, and how and why QFT developed as a flat 4d spacetime model, and why GR developed as a curved 4d spacetime model shall be outlined. The key difference between QFT and GR shall be confirmed as the notion of QFT relying on independent inertial frames of reference, and GR relying on inertial frames of reference dependent of each other. Following such a brief account of current attempts of uniting QFT and GR in their search for quantum gravity shall be outlined. In granting the disparity between QFT and GR and difficulty in proving quantum gravity a new approach forward is proposed that makes use of the QFT-GR disparity via a zero-dimensional number theory application to the known data of QFT and GR. By this zero-dimensional number theory, the QFT and GR data and associated disparity are confirmed, together with presenting a zero-dimensional quantum gravity paradigm termed as “zero quantum gravity” outlining QFT processes prescribing a proposed zero-point gravitational field effect.

Keywords: calculus; infinitesimal; quantum field theory; general relativity; quantum gravity; temporal mechanics; zero-dimension; information paradox

1. Introduction

Here shall be introduced the work of Temporal Mechanics[1][2] and associated zero-dimensional number theory in discussing the fundamental importance of calculus in physics and how such has led to not just the ΛCDM[3] model, yet how the dimensional number theory mismatch between quantum field theory[4] (QFT) and general relativity[5] (GR) has occurred, and beyond such how this mismatch can be made use of. The purpose of this historical and contemporary exploration is ***not*** to ask if physics is going about understanding reality the most fundamental and conclusive way, *yet to support how and why physics describes reality the way it does and then suggest a logical next step*.

Of course, this type of task is performed daily by schools, universities, learning institutions, and forums the world over in the form of question and answer on this very subject. For, when physics is taught, questions are being asked by students, answers are discussed, and new approaches debated, and the status quo usually maintained if not for a new step of theory that presents with new proof. Here this task will be presented in the following manner:

1. Introduction
2. State of the art
3. Dimensional Calculus
4. Flat and curved 4d spacetime
5. The zero-dimensional number theory
6. Zero quantum gravity (0QG)
7. Conclusion

The unique approach taken here is in taking a closer look at the upside of the mismatch between QFT (*flat* 4d spacetime) and GR (*curved* 4d spacetime) with a new bridging zero-dimensional number theory. Here, the upside of the mismatch between QFT and GR is proposed to be an entirely new theoretic zero-dimensional number theory script. To thoroughly present that case and how that can be tested for, an analysis of the actual difference between the dimensional number theory of EM as quantum field theory (QFT) and gravity as general relativity (GR) needs to be presented to ensure any professional readership is being acknowledged and addressed in this new proposal.

[1]The current work of 56 papers detailing a new mathematical approach to the dimensions of time and space as zero-dimensional logic, see https://www.xemdir.com/.

[2][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][48][49][50][51][52][53][54][55][56].

[3] The cold dark energy (Λ) and cold dark matter (CDM) cosmological model [57].

[4] A theoretical framework combining classical field theory, special relativity, and quantum mechanics [58][59].

[5] Einstein's theory of general relativity [60][61].

2. State of the art

The state of the art in physics circa 2023 circumscribes a dedication to dimensional number theory as a variety of methods of calculus and geometry presenting the case for two key physical theory pillars, namely QFT and GR. The dimensional number theories for QFT and GR do in fact not link, and so the quest is on to rectify that mismatch between such with a bridging dimensional/hyperdimensional number theory model. An example of this effort is evident with the Clay Mathematics Institute Millennium Prize Problems[6] and that number theory pursuit as described in papers 44 [44], 49 [49], and 55 [55] of Temporal Mechanics.

Calculus wizardry on its own though is not sufficient as a basis for a physics theory, as any dimensional number theory needs to be relevant to, to directly point to, known observable data. All the universities and research agencies and their associated data across the planet agree with the current number and associated physical theories describing that data, leading to the current QFT and GR models for EM and gravity respectively. Indeed, to present a new model based on a few bits of data is not what physics is looking for, and such is not the process here. Here in this paper, the widely published and accepted physics theories[7] of QFT and GR[8] are granted, while then proposing a way to make use of the flat and curved 4d spacetime mismatch between QFT and GR.

Specifically, here in this paper and its references to the work of Temporal Mechanics is an account of calculus as a descriptive application for physical phenomena, namely how calculus came to be, how it was applied to physical phenomena, and how it has grown as two particular dimensional number and thence physical theories into the infrastructures of QFT and GR. Essentially, this paper will look at the structuration of calculus found in QFT and GR and determine if any benefit can be granted from the known difference between flat and curved 4d spacetime.

The inspiration for this paper has come from a recent[9] inquiry into the nature of zero-dimensional time and zero-dimensional space, an almost seemingly counter-intuitive if not entirely abstract approach to studying physicality. This inquiry has been described in volumes 1-8 of Temporal Mechanics[10], consisting of 56 papers [1-56]. Unlike popular science fiction[11], the work of Temporal Mechanics is not about making time machines yet examining the deeper structure to the arrow of time itself without corrupting the known entropic direction of that arrow. There, the idea of examining how a number theory

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[6] *"To celebrate mathematics in the new millennium, the Clay Mathematics Institute of Cambridge, Massachusetts (CMI) established seven Prize Problems. The Prizes were conceived to record some of the most difficult problems with which mathematicians were grappling at the turn of the second millennium; to elevate in the consciousness of the general public the fact that in mathematics, the frontier is still open and abounds in important unsolved problems; to emphasize the importance of working towards a solution of the deepest, most difficult problems; and to recognize achievement in mathematics of historical magnitude"* [62].

[7] And associated proofs/data.

[8] Qualified by the widely practiced journal-submission approach [63].

[9] Circa 2017.

[10] The work of Temporal Mechanics is not involved in the construction of theoretical time machines yet examining the deeper structure to the arrow of time itself without corrupting the direction of that known arrow.

[11] The promoted idea of time travel, whether into the past or into the future [64].

can evolve from a certain approach to defining a point in space and moment in time is chartered. To achieve such, all that physics understands of dimensional and thence physical analysis must be first considered.

3. Dimensional Calculus

Describing physical phenomena falls to the idea of *how* to label physical phenomena, namely:

(i) what aspects of phenomena are being labelled?
(ii) with what precision?
(iii) to what extent, namely how broad and wide (zero to infinite scales)?

Accompanying such is realizing our own limitation of being conscious, namely:

(iv) our resolution of quantum (light) perception.
(v) our resolution of quantum perception primarily occupying the datum reference of time-now in a 3d reality of space.
(vi) such (v), in the context of a singular dimension (1d) of time's flow.
(vii) such (vi) in the context of what can be trusted to be physical laws as a consistent feature of physical reality and our consistent observation ability in it anywhere, anytime.

In many regards, we have agreed that our conscious experience of reality can be considered with two basic features, two dimensional paradigms, that of the dimension of time (1d, as a type of arrow), and that of the dimensions of space (3d, namely spatial volume), all of such though as reality in a datum-reference of time-now, one moment to the next in 3d space.

It would be natural for us to consider that time and space as dimensions are connected. Thus, as much as we perceive reality in a type of continuous fashion in the datum reference of time-now, we would consider that reality also operates as a type of 3d space and 1d time continuum as 4d spacetime. Such is what physics proposes as 4d spacetime as a grand platform we would exist with/within[12]. We then with such a basis ask how physical reality performs as 4d spacetime. In fact, we test the theories we have of 4d spacetime to see if they measure up with observable physical reality. Further to this, we assess how the description of 4d spacetime can represent the general platform for the description of all other phenomena. By such as all the data suggests, two versions of spacetime have become apparent, flat 4d spacetime for QFT and curved 4d spacetime for GR.

How did we get there though, how did we construct the description for 4d spacetime?

The process here is to appreciate how numbers and geometry relate with the idea of dimensionality, namely by recognizing:

[12] As a dimensional mathematic model and associated physical theory.

(viii) features of dimensionality, precisely their known parameters and limitations, specifically how points in space and moments in time are approached, such as the idea of:
   a. an infinitesimal datum reference for time-now,
   b. infinitesimal points in space in time-now's datum-reference.

(ix) how approaching the idea of time-now ***and*** a point in space requires a particular type of mathematical approach prescribed by infinitesimal calculus[13].

(x) thence how that calculus is constructed ***in adapting to***[14] the varying features of physical reality.

(xi) how that calculus acknowledges the idea of a type of symmetry of laws for each infinitesimal point in space and infinitesimal moment in time[15].

In all, the clear idea here is assuming the ideas of:

(xii) a datum reference of time needing to approach an infinitesimal moment of time-now.

(xiii) 3d space needing to approach infinitesimal points as chosen datum references for describing physical processes.

Yet ***why*** must a mathematics be used to "approach" the idea of a moment in time and point in space? Why not just present a mathematical theory describing zero-dimensional time and zero-dimensional space, as what Temporal Mechanics is proposed to have done?

Physics is central to *dimensionality*, namely what is *measurable*, and so *dimensional lengths* of space and time *are essential*. Even if infinitesimally small *points* in space and *moments* in time are required for those actual measurements to take place, *dimensionality is required*. Technically, nothing can be measured using a zero-point for time and space as an axiom. A number theory at best can be the only result from a zero-dimensional appraisal of time and space, a number theory which thence must derive dimensionality and thence apply itself to known scales for time and space to then be relevant to physical phenomena and known associated equation descriptors. To achieve that description, a spatiotemporal geometric and thence dimensional number theory is required, namely one proposing to describe the dimensions of space and time, as a 3d space and 1d time mathematical model, ideally as a unified 4d spacetime using infinitesimal calculus, such as what QFT and GR have achieved.

The initial question for infinitesimal calculus in starting with the dimensions of time and space is how indeed space is related to time, namely how does space demonstrate the feature of time if not for using a concept associated to space and time such as mass, mass as an extension of space, mass as motion in time and how mass moves in regard to space, and thence mass as a basic core descriptor of

[13] Gottfried Wilhelm Leibniz and Sir Isaac Newton are both given credit for independently inventing and developing calculus, Newton being regarded as the first to apply calculus to physics [65].

[14] Not to be forgotten.

[15] See points (xxiv)-(xxvi) ahead.

4d spacetime? This is no coincidence, as mass yet more pertinently *momentum*[16] is used as the focus of how physical process change location in space:

(xiv) how mass changes location in space,

(xv) how light as a wave/particle changes location in space:

a. as a non-mass wave/particle with momentum,

b. has a fixed speed of travel in space,

c. and why indeed the speed of light is fixed at *c* for any inertial frame of reference[17].

In short, *momentum* is used to highlight the idea of motion and thus time regarding space, and therefore ultimately how mass and light moves in space using 4d spacetime. 4d spacetime has become therefore the basic emphasis description for not just how light travels in space and thus a description of EM, yet also the movement of mass in space and thus a description for gravity. The issue there though are the two types of 4d spacetime, namely flat and curved for QFT and GR respectively.

5. Flat and curved 4d spacetime

The word *calculus* comes from Latin meaning "small stone", an apt name given calculus is the art of looking at very small things on a broad scale whereby:

(xvi) *Differential Calculus* is the mathematical art of cutting something into small pieces to find how that something being cut changes in that cutting process, being useful for:

a. instantaneous rates of change.

b. slopes of curves.

(xvii) *Integral Calculus* joins (integrates) the small pieces together to find how much there is by that integration process, being useful for:

a. accumulation of quantities.

b. areas between or under curves.

(xviii) *Differential Calculus* and *Integral Calculus* are therefore inverse processes[18].

In short, modern calculus is purpose built for describing infinitesimals as a mathematical grid employed to describe physical phenomena mathematically, namely in being as precise (infinitesimal) as possible, creating nonetheless what are termed *infinitesimal estimates*.

[16] See point (xxiii) ahead.

[17] See points (xxvii)-(xxviii) ahead.

[18] Considered as the *fundamental theorem of calculus*, describing the proposed convergence of infinite sequences and series to defined limits.

Having developed a set of tools for describing infinitesimal calculus, integral and differential calculus of course needs to be ***applied to*** the conditions specific to physical reality, to the dimensions of space and time, and thus must abide by what is physically observed as conditions of nature[19]. Yet as presented in points (xiv)-(xv), the key basis used by physics to describe the dimensions of space and time is *momentum*.

To make calculus sensible to the dimensions, five basic ideas are used:

(xix) distance as length of 1 dimensional space.

(xx) time as duration of 1 dimensional time.

(xxi) mass:

a. considered as the intrinsic property of a body.
b. experimentally defined as a measure of the body's inertia.
c. determines the strength of its gravitational attraction to other bodies.
d. inertial and gravitational mass are identical, named the equivalence principle, as an a priori of GR.

(xxii) velocity of mass as distance per time.

(xxiii) such (xxi)-(xxii) arriving at the basic idea of momentum (p; $kgms^{-1}$), namely the product of the mass and velocity of an object.

According to Sir Isaac Newton's ***Philosophiæ Naturalis Principia Mathematica*** as a feature of his proposal for inertia[20] , the rate of change of a body's momentum is equal to the net force acting on it.

To note with QFT is that even though light has no mass, it is still considered as particle with momentum shown by mathematical deduction based on light being proposed to have kinetic energy and thence momentum.

The next standardizing feature is that momentum is proposed to depend on a frame of reference such that in any inertial frame of reference momentum is a *conserved* quantity. Such a process is required for the following reasons:

(xxiv) *arbitrating* a closed system not affected by external forces such that in that frame of reference the total linear momentum of mass under examination does not change and can thence be described with calculus.

(xxv) to confirm the required condition of being complete with the calculus analysis process, of not leaving this process of examination and determination to anything else.

(xxvi) such (xxiv)-(xxv) as a way of making momentum *statutory* for the process of calculus.

[19] Here, the temptation is to think calculus can explain physical reality *primarily* without conditions, yet the fundamental condition of physical reality, what is and what is not, requires calculus in its various forms of construct to ***adapt*** to that data.

[20] "*The vis insita, or innate force of matter, is a power of resisting by which every body, as much as in it lies, endeavours to preserve its present state, whether it be of rest or of moving uniformly forward in a straight line*" [66][67].

The next step in arbitrating these statutory frames of reference is how one frame of reference can relate to another frame of reference, namely that there needs to exist a *universal governance* between frames of reference upon space for objects. Physics terms this as the "*symmetry of laws*", namely that the set of laws in *frame of reference A* must be the same set of laws for *frame of reference B*. In short, the idea of universal symmetry of laws between different frames of reference is underwritten in the principle of relativity, namely the *requirement that the equations describing the laws of physics have the same form in all admissible frames of reference*.

All of such is well and good, yet the difficult process is extending the calculus of one frame of reference to another frame of reference, a process named practically as *translational symmetry*. Does for instance the calculus of a process of physical phenomena (such as mass or light) in one frame of reference apply to any type of process of physical phenomena for another frame of reference? Can processes of physical phenomena under investigation be the same fundamental *stuff* to allow for a universal calculus to develop between all frames of reference of objects in space for all type of processes of physical phenomena?

It so happens according to all known measurements that light and mass have specific conditions for their translational symmetries that require different and specific calculus mapping processes. Such has resulted in the employment of flat 4d spacetime mapping for QFT and curved 4d spacetime mapping for mass (gravity). Fundamental there are the two physical constraints as postulates proposed by Einstein in adapting to known physical data:

(xxvii) the laws of physics are invariant[21] in all inertial systems[22].

(xxviii) the speed of light in vacuum c is the same for all inertial observers, regardless of the motion of the light source[23].

The result of combining these postulates is the join between space and time, as 4d spacetime. Henceforth, a variety of methods of calculus have been required to describe the nature of light, primarily the natures of the electron and light, all of which have been consistently tested and refined to reach the level they are now at, namely QFT as a flat 4d spacetime model and GR as a curved 4d spacetime model.

Of note regarding the disparity between flat 4d spacetime and curved 4d spacetime is how a 4d spacetime interval is classified as being either dependent[24] or independent[25] of the inertial frame of reference. There, with GR the 4d spacetime interval between inertial frames of reference is derived to be dependent and not independent of inertial frames. This was so to allow for gravitational free fall as the only process available for the infinitesimal calculus of 4d spacetime. Simply, with GR the 4d spacetime interval between inertial frames of reference is dependent and not independent of inertial frames. Yet with QFT the 4d spacetime interval is independent on the inertial frame of reference (xxvii).

[21] *Identical*.

[22] *Non-accelerating frames of reference*.

[23] An experimentally known *requirement*.

[24] *Inclusive*.

[25] *Non-inclusive*.

Thus, the disparity between QFT and GR was cast regarding the dependence (GR) and independence (QFT) of the inertial frames of reference. Such though is entirely intuitive in considering that as EM technically has no actual mass it could only be expressed as an inertial frame of reference *independently from* its source as per flat 4d spacetime.

Given the eminence of QFT describing the microscopic world of particles, the current quest in physics is to somehow quantize gravity if not making the process of GR compatible with QFT in being independent of inertial frames of reference. Other options include creating hyperdimensional spacetime bridges between QFT and GR[26]. Many approaches have been considered, from debating the validity of the calculus of QFT and GR, attempting to find flaws in each to then propose corrections to unite the two, to the idea of creating extra dimensional and lower dimensional bridges between flat and curved 4d spacetime. There, some theories propose approaches such as *loop quantum gravity* where the quantum-compatible loop states and associated spatial spin networks are not immersed in space yet "weave-up" physical space, ultimately proposing a granular structure of space at the Planck scale. All such pursuits though ultimately ask if space can be quantized on the Planck scale and thus can demonstrate quantum features such as entanglement, hence the term for the quest as *quantum gravity* [68][69].

6. The zero-dimensional number theory

By all of such, the current quest in physics is finding how to unite QFT with GR, to somehow merge flat 4d spacetime that forms the core of QFT with curved 4d spacetime that forms the core of GR. All of such are well-reasoned pursuits, yet ultimately the physical nature of reality needs to confirm any such modelling, a realm where the rules of standard physics are proposed to break down.

The problem there is that the calculus of those physical theories breaks down when the quantum and gravitational fields break down, so an entirely new calculus is required. The next problem there is how to demonstrate that process in a laboratory showing any potential link between QFT and GR as they break down. Thus, the research proposals there are central to finding phenomena at the *cusp* of such an event horizon, and thence with current proposals how space on a Planck scale can somehow demonstrate quantum mechanical features intrinsic to QFT such as quantum entanglement [70].

The proposal here is to consider a new number theory approach *beyond* the black hole singularity proposal, *beyond* the calculus of QFT and GR breaking down, and thus a zero-dimensional number theory for space and time as a new start point. Quite simply, the proposal here is to develop a zero-dimensional number theory for time and space and to then from that emerge a dimensional number theory that confirms the findings of QFT and GR, and not only that, confirms why the infinitesimal calculus of QFT must be flat 4d spacetime and why the infinitesimal calculus of GR must be curved 4d spacetime.

Temporal Mechanics considered the *GR inclusive* and *QFT non-inclusive* inertial frame of reference *issue* and decided to work a non-inertial zero-dimensional number theory for time and space, to thence form a zero-dimensional basis not dependent on mass and thence inertia per se, yet strictly a

[26] As a type of *proxy-independency*.

number theory basis for time and space on a zero-dimensional scale, and to then apply that number theory to dimensional analysis, as per its 56 papers [1-56].

Temporal Mechanics initiated this process in paper 1 [1] rather generally, surveying the broader landscape of the dimensional issues for EM and gravity[27]. There, having revealed a golden ratio code for a dimensional time equation that related with the quantum shell nature of the atom in deriving the Rydberg equation[28], the symposium was extended to how the time equation would derive what could only be a quantum wave function when scaled with the charge of the electron e_c and speed of light c, as per paper 2 [2]. The next logical step was to derive the Planck scale in paper 3 [3], noting the issue there with the then rudimentary equations associated constants in play. The task was thence to extend the theory as acutely and broadly as possible to refine the equations and their constants. By paper 17 [17] a second equation was realized for space as the Euler identity equation as adapted to the golden ratio time equation. Through a series of papers [1-42] the zero-dimensional approach was reached in paper 43 [43] by:

(xxix) proposing zero-dimensional time and space as the next step ahead to the infinitesimal calculus approach, namely in going straight to an absolute infinitesimal level for time and space.

(xxx) such (xxix) by identifying a zero-infinity scaling paradox for a point in space[29].

(xxxi) thence resolving such (xxx) by:

a. defining the idea of zero-dimensional time and zero-dimensional space.
b. proposing two new temporal datum references, namely *time-before* and *time-after*, which thence are shown to derive dimensionality (3d) for space.

(xxxii) all of such thence becoming a new mechanics for the idea of time, hence the titled term Temporal Mechanics.

Thus, at its core Temporal Mechanics utilizes a number theory that:

(xxxiii) represents a proposed way zero-dimensional time relates with zero-dimensional space where:

a. 3d space is derived with an associated 1d arrow of time.
b. the arrow of time (1d) is represented as a basic 1d time equation with 3d space termed as *3d timespace*[30], as $t_B + 1 = t_A$ where $t_B^2 = t_A$.

[27] [1]: p10-12.

[28] [1]: p13-18.

[29] A process which then set a basis for an overall non-expanding space locale.

[30] This is analogous to *flat 4d spacetime*, noting that with the zero-dimensional number theory time as a dimension is concurrent with each dimension of space.

c. 3d space is represented by an analogous equation to the *3d timespace*[31], as $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$,

All of such is scaled with what the number theory identifies as the equation for the charge of the electron e_c and the speed of light c, thence revealing:

(xxxiv) known dimensional phenomenal features and associated equations in physics as presented in paper 48-49 [48-49].

(xxxv) known calculus problems with the aim of resolving those dimensional number theory problems as presented in papers 49 [49] and 55 [55]:

a. Poincaré conjecture[32].
b. Hodge conjecture[33].
c. Riemann hypothesis[34].
d. Birch and Swinnerton-Dyer conjecture[35].
e. Yang-Mills existence and mass gap[36].
f. Navier-Stokes existence and smoothness[37].
g. P versus NP[38].
h. Beal conjecture[39].
i. Fermat's conjecture[40].
j. Goldbach conjecture[41].

In all, Temporal Mechanics presents a number theory framework for the dimensions of time and space on the presumption of physical reality primarily existing in the datum-reference of *time-now*, thence conjecturing that:

(xxxvi) time travel into the past and future, despite the connotation of the term "*temporal mechanics*", is not feasible yet is confined to the datum reference of time-now.

(xxxvii) temporal paradigms of *time-before* and *time-after* are though instrumental in creating dimensionality for zero-dimensional space.

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[31] This is analogous to curved 4d spacetime, noting once again that with the zero-dimensional number theory time as a dimension is concurrent with each dimension of space.

[32] [55]: p9-10, p21.

[33] [55]: p10, p21.

[34] [55]: p11, p21-22.

[35] [55]: p12, p22.

[36] [55]: p12-13, p22.

[37] [55]: p13-14, p23.

[38] [55]: p14-15, p24-25.

[39] [55]: p25-27.

[40] [55]: p17-18, p25-27.

[41] [49]: p16-18.

Importantly to note is that the results of Temporal Mechanics only apply to its designed context, namely ***apparent static space***, and thus in all appearance a standard solar system context. It is important to note that the ΛCDM model proposes a universal spatial expansion, yet galaxies and their suns appear to exist in a static space locale suggesting the presence of a "dark matter" holding galaxies together. It is also important to note that such dark matter has not been found to exist in a solar system locale, and that all modelling for our solar system presents the case for a stable spatial status quo[42]. The task there was for Temporal Mechanics to focus on the derivation of the known phenomena of a static space locale that is derived to be gravitationally bound and to cross match those derivations with the data of this solar system known to us, as per the following papers highlighting those derivations:

(xxxviii) spatial limit of solar system (Oort cloud)[43].
(xxxix) distance to hydrogen wall from Sol[44].
(xl) depth of Hydrogen wall[45].
(xli) CMBR value[46].
(xlii) Sol mass[47].
(xliii) Sol radius (general and coronal)[48].
(xliv) Sol temperature (core and coronal)[49].
(xlv) Mercury perihelion[50].
(xlvi) The dynamic nature of the solar system[51]

This is highlighted in figure 1[52]. There, the scales of Sol are derived in using this *ab initio* zero-dimensional number theory and associated e_c and c scaling process, specifically in using the derived values of the fine structure constant (α) and Planck constant (h).

[42] The GR based standard model of cosmology states that gravitationally bound systems do not expand along with the expansion of space.
[43] [13]: p11, eq6-8.
[44] [32]: p15-16.
[45] [32]: p16-17, eq6-9.
[46] [14]: p25, eq13; [37]: p29-31.
[47] [39]: p33-37.
[48] [39]: p61-62, p64-65.
[49] [39]: p59-63.
[50] [14]: p27-28; [51]:p11-14.
[51] The dynamic nature of the solar system is described throughout paper 42 [42] in view of the inherent mismatch between the time equation and space equation, between EM and gravity, always seeking to correct each other. Such a concept was also described in paper 3 [3] in deriving the chaos equation, thence followed up in paper 51 [51]: p14-17. See also paper 39 [39]: p65-67.
[52] [39]: p65, fig14.

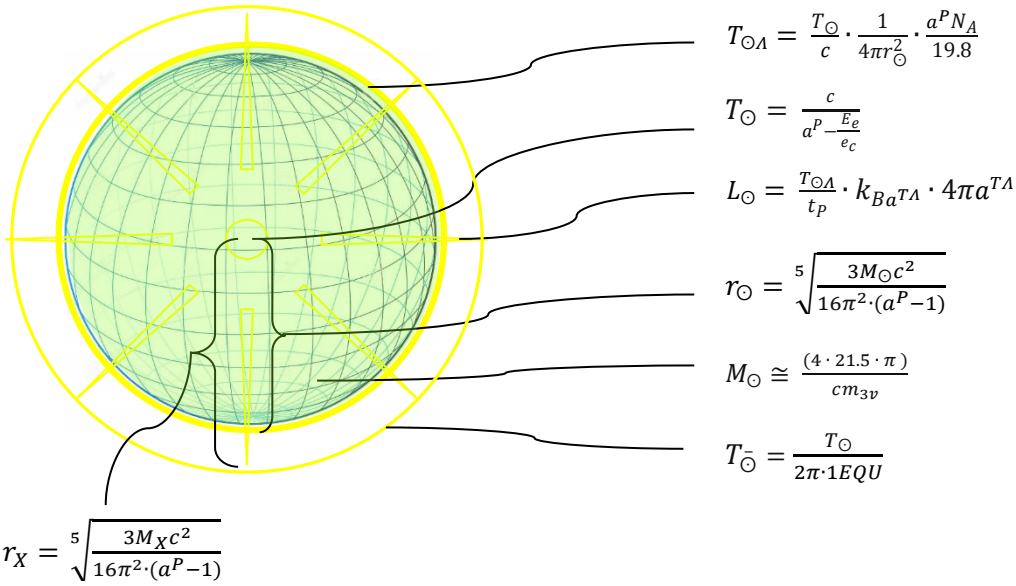

Figure 1: Highlighting the phenomenal features of Sol from the derived fine structure constant (α) and Planck (h) values.

Another core achievement was deriving the scale of the known solar system astrophysical firmaments from the sun, namely the Heliopause, Hydrogen wall, and Oort cloud, as per figure 2[53]:

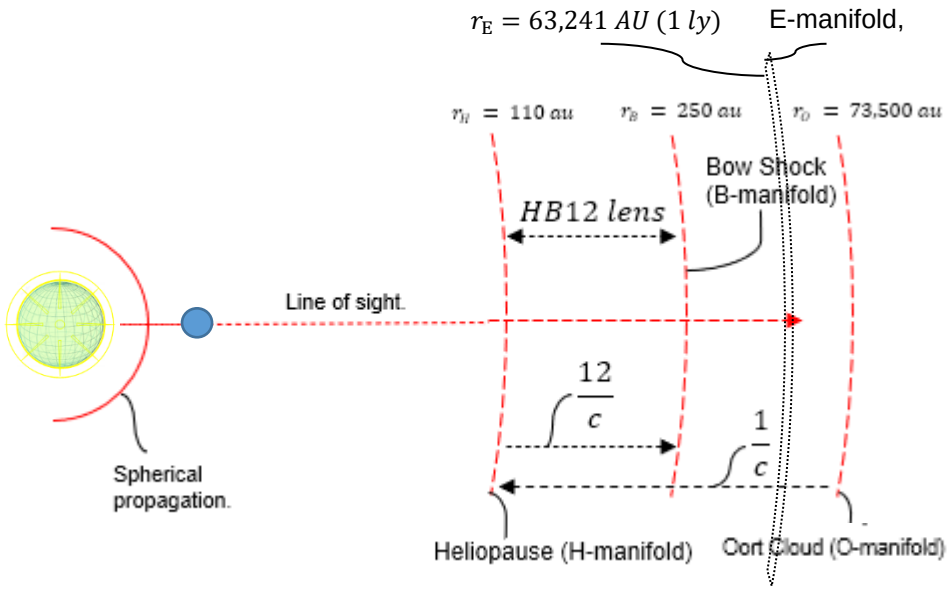

Figure 2: Illustrating the basic astrophysical firmaments, namely the Heliopause (r_H), Bow Shock (r_B), and Oort cloud (r_O) as astronomical units from Sol.

[53] [39]: p66, fig15.

With all such achieved, noting how precisely well the zero-dimensional number theory and thence zero-dimensional physical theory[54] compared and confirmed the known physical phenomena equations and associated physics data of the solar system, together with the microscopic scale features of light and particles[55], two notable conditions became apparent, namely:

(xlvii) the description of light as per the time equation, described as the "*phi quantum wave function*", as ***flat*** *timespace*[56], namely $t_B + 1 = t_A$.

(xlviii) and the description of gravity, described based on spatial zero-point energy, as ***curved*** *timespace*[57], namely $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$.

In other words, the zero-dimensional number theory in proposing to be a more exact description of the calculus processes for QFT and GR[58] presents the case that the equations and thence calculus for QFT must be different to that of GR, as it is. The finding therefore was that:

(xlix) The description of EM is only possible via a ***flat spacetime*** approach:

a. the frame of reference of light is virtual yet more precisely probabilistic as the two results of the golden ratio equation confirm, in being ***independent of*** the derived *dimensional* nature of space.

(l) The description of gravity is only possible via a ***curved spacetime*** approach:

b. one where the inertial frame of reference is dependent on curved spacetime, in being ***dependent on*** the derived *dimensional* nature of space.

In fact, the zero-dimensional approach confirmed key issues known to the phenomena of quanta[59], mass[60], and gravity[61] ***for static (non-expanding) space***.

To note is that this zero-dimensional and thence dimensional number theory when scaled with known features of physical reality (speed of light c and charge of the electron e_c) confirms all the known data and associated descriptions of QFT and GR relevant to a *static* spatial backdrop scenario, and so is unable to delve into ΛCDM cosmology theory. In fact, the basic design of the zero-dimensional number theory posed the question of what existed before the big bang and if that same thing that existed before the big bang exists ***ahead*** of the current expanding space context of the big bang ΛCDM model, thence

[54] Via the scaling process with the charge of the electron e_c and speed of light c.

[55] Subatomic and elementary particles.

[56] [2]: p1-14; [52]: p12-32.

[57] [42]: p22-55; [52]: p40-46.

[58] In being zero-dimensional and not infinitesimal.

[59] [52]: p12-36, p46-49.

[60] [52]: p36-40, p46-49.

[61] [52]: p40-49.

arriving at the zero-infinity paradox for a point in space if indeed the big bang came from a point in space[62]. This paradox was resolved in using the proposed time-domains of *time-before* and *time-after*[63].

There in paper 43 a unique feature of the zero-dimensional approach is *how* it asked the basic question of a point in reference to the ΛCDM model, and thence a scaling around the dimensional space and time scale of the ΛCDM model, namely that the point that existed *before* the big bang would still presumably be *ahead* of the big bang. By all of such the zero-dimensional feature of Temporal Mechanics presented the window of view for the ΛCDM *only in regard to its static space features*, and thence presumably, according to all the data, phenomena in non-expanding space[64], noting that GR implies it is the space around observed galactic phenomena that is expanding care of dark energy, whereby galaxies are held together and thence not expanding care of dark matter.

The key limitation therefore with the Temporal Mechanics zero-dimensional number theory is how it is designed to perform based on how numbers are used to label zero-dimensional time and zero-dimensional space, and thence how dimensional space is proposed to emerge from the proposed *time-before* and *time-after* paradigms. Further to such, the number theory can only at best be applied to known observed features of physical reality care of dimensional physics, and thence what is proposed by QFT and GR. However, the clear feature being proposed here is of the improbability of finding a dimensional infinitesimal calculus link between QFT and GR. Such is not to say that a dimensional number theory as higher and lower dimensions is not able to link QFT and GR, and thus a quantum gravity theory, yet here the proposal is to make use of a proposed and known incompatibility of the current number theory structure between QFT and GR.

7. Zero quantum gravity (0QG)

Zero quantum gravity (0QG) is a term given to the idea of not focusing on the quest for dimensional quantum gravity yet by suggesting a pure number theory link between QFT and GR can be found via a *zero-dimensional* number theory approach. As such, 0QG is not a new phenomena per se yet a new paradigm of the zero-dimensional number theory that proposes how the dimensional mismatch between QFT and GR, here as EM and zero-point space, can be both described and utilized.

As presented, the zero-dimensional number theory demonstrates how space is held together without expanding. This "holding together" of space is described mathematically by the space equation, as the zero-point gravity equation, namely $e_{t_B}^{i\pi} + 1_{t_N} = 0_{t_A}$. There, in that zero-dimensional description, gravity at its core is derived to be non-inertial and zero-point, such by the nature of its equation in equating to 0. Such though does not make space potentially non-expansive, as the basis of the zero-dimensional number theory is precisely that, a number theory, and not based on observation and measurement yet

[62] [43]: p2-5.

[63] [43]: p6-8.

[64] Thence solar system phenomena.

pure number theory. However, the zero-dimensional number theory approach presents an exclusive view of an *absolute* infinitesimal (zero-dimensional) approach to the dimensions.

Thus, the proposal here is that the findings of the zero-dimensional number theory can:

(Ii) highlight the benefit of how the different dimensional descriptions QFT and GR can be harnessed in the zero-dimensional number theory proposed window/context of static 3d space and arrow of 1d time, described in Temporal Mechanics as *timespace*[65].

(Iii) be an impartial observer reference free from the design requirements and associated constraints of QFT and GR in ***not*** being mass and thence inertial based.

The work of paper 52 [52] describes the analogous descriptions of QFT and GR, and then how such can be used to create a zero-point space effect. Paper 53 [53] then presents three key experiments to confirm this 0QG paradigm utility.

These theoretic proposals have no change to the known data of the proposed QFT and GR static space phenomena. In fact, the proposals of the zero-dimensional number theory have utilized all QFT and GR data. Given therefore the core feature of the zero-dimensional number theory is limited to static space, descriptions for ΛCDM cosmology are not forwarded. As such, the reason for why the appearance of the galaxies holding what are thought to be solar systems together as per dark matter is not explored, nor the reason for the accelerating metric expansion of space as per dark energy. However, it is important to note that the static space condition of the zero-dimensional number theory does derive the condition of a zero-point gravity describing how space is static and how such forms the platform for what is derived to be a *solar system.*

Another important feature to note is that the phenomena and thus information of what appear to be unique solar systems beyond this solar system, namely stars and galaxies, is derived through a newly discovered zero-dimensional number theory feature. There, one key discovery by the zero-dimensional number theory is a phenomenon not currently considered or scouted by physics, the "*electron degeneracy*" phenomenon which as the name suggests describes how the electron is derived to annihilate[66], specifically to the level of a neutrino. There, that process is derived to represent a type of nuclear fission reaction of the electron that would give off the effect of miniature sun. The region in the solar system where this effect is derived to occur is in the Hydrogen wall, a region that then by its relationship to the derived timespace outer structure of the solar system leads to a holographic display of electron degeneracy events *beyond* the solar system, presenting the effect of a universe of stars and galaxies.

Such is all the zero-dimensional number theory by its constraints can propose for astrophysical phenomena beyond the Sol solar system, namely information *mimicking* the existence of stars and galaxies (including back holes) despite the overall context of its zero-dimensional and thence presumably complete zero-point status. This holographic display of astrophysical phenomena is described in papers

[65] So as not to confuse this new process with the standard *spacetime* dimensional approach.

[66] Such, in the context of a derived *maximum solar system mass* event scenario [39]: p41-47.

32-35 [32-35]. There, the flatness problem, horizon problem, redshift of stars, CMBR, are all accounted for by zero-dimensional number theory[67]. Such is not to say that the universe is not as GR and QFT proposes, yet that in an absolute zero-dimensional context the information of reality from a zero-dimensional reference can be mimicked if not contained and retrieved, an idea scouted by current black hole theorists [71][72], an idea though *derived* here by this new zero-dimensional number theory, suggesting how on a zero-dimensional level QFT and GR information is in fact *preserved*.

8. Conclusion

Although much of the emphasis today in physics is on resolving the dimensional mathematical description mismatch between QFT as flat 4d spacetime and GR as curved 4d spacetime, the proposal here has been to focus on how to best make use of that very well structured and demonstrated mismatch. Here, a zero-dimensional number theory is employed to both confirm the mismatch together with confirming the known data of QFT and GR, as it should need to. By such, the new zero-dimensional number theory is proposed to present a new way of utilizing the mismatch between QFT and GR *experimentally* as *zero quantum gravity (0QG);* the zero-*dimensional* QFT and GR bridging theories are presented in paper 52 [52] and thence a demonstration of the 0QG field effect (Xemdir field) proposal in paper 53 [53].

Conflicts of Interest

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

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[67] Summarized in paper 50 [50].

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