Derivation of All Natural Constants (c, G, h, etc.) from the Orbits of the Sun, the Earth, and the Moon*

The Panvitalist Theory

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Abstract

This paper presents the derivation of the Bohr atomic radius (a_0), the speed of light (c), the gravitational constant (G), and the Planck constant (h) from the Earth's rotation, lunar orbit, and Earth's orbit within the Panvitalist Theory framework. The Panvitalist Theory proposes that a discrete 12-dimensional spacetime model using only rational numbers is essential to describe physical reality mathematically in a consistent manner. By redefining physical quantities in terms of length and angle, the theory challenges conventional definitions of mass, time, and units established during the French Revolution, demonstrating that these constants reflect celestial parameters rather than universal values. Through geometric derivations, the theory connects quantum mechanics and general relativity, revealing a circular dependency among fundamental constants. The Panvitalist Theory posits that the number 12 (representing 12 dimensions) is the sole natural constant, offering a unified perspective on physics and a potential reformulation of its foundations.

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Contents

1 Introduction

1.1 Overview of the Panvitalist Theory

The Panvitalist Theory, developed by the author, proposes a novel framework in physics characterized by a fully discrete spacetime model that operates exclusively with rational numbers. Unlike mainstream approaches such as String Theory or Loop Quantum Gravity, which rely on the continuum of real numbers, the Panvitalist Theory is one of the few frameworks that explicitly avoids real numbers, addressing fundamental incompatibilities between quantum mechanics and general relativity through a radically discrete perspective.

Since 2019, the author has published works initially presented as a foundation for a Theory of Everything (ToE), titled "Solution to the Problem of Time" [2]. These efforts evolved into a broader investigation, termed the "Search for the World Formula" [5], reflecting the need to redefine the foundations of contemporary physics. The findings suggest that quantum mechanics and general relativity are not unified in the conventional sense, as expected from a ToE or Grand Unified Theory, but are instead challenged and potentially superseded by the proposed framework. Consequently, labeling this work as a "Theory of Everything" would be misleading. To capture the philosophical and scientific implications of the findings—particularly the premise of a living universe that reflects the observer as a living entity—the framework has been named the "Panvitalist Theory" [15].

The research outcomes indicate a profound impact on nearly all areas of physics, necessitating extensive reformulations and reinterpretations. Individual aspects of the Panvitalist Theory will be presented in dedicated publications, each explicitly linked to the overarching framework. Readers are encouraged to familiarize themselves with the foundational concepts and key developments through the primary references [2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 15].

The key findings of the Panvitalist Theory can be summarized as follows:

- The concept of physical quantities and units is based on a misinterpretation of empirical research, particularly the historical definitions established during the French Revolution. The Panvitalist Theory addresses this by reducing all physical quantities to two dimensions: length and angle, thereby unifying mathematics and physics in a novel manner [2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 15].
- Dimensioned physical constants (except $\pi = 1\,\mathrm{T/L}$) are artifacts of flawed unit definitions. The theory reinterprets these constants by relating them to physically real objects, such as the orbital periods and distances of celestial bodies, demonstrating that quantities like the speed of light and gravitational constant are context-dependent rather than universal "natural constants" [2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 15].
- The SI unit system defines time in two conflicting ways: as a continuous quantity (real

numbers) and as a discrete quantity (integers). The Panvitalist Theory resolves this by associating the causality principle with the concept of "life" in the universe, while redefining time as the physical dimension of angle, which is not recognized as a physical dimension in contemporary physics. This clarifies the connection between space and time through coordinate systems defined by three lengths and three angles [2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 15].

- By reinterpreting physical reality, the theory formulates a discrete spacetime model that operates solely with rational numbers, treating irrational numbers like $\sqrt{2}$ or π as dimensioned algorithms. For instance, the ratio of circumference to diameter for any regular n-sided polygon (approximating a circle) can be expressed as a rational number [2, 3, 4, 5, 7, 8, 9, 10, 12, 13, 15].

The findings suggest that physics must be fundamentally rethought, and centuries-old patterns of thought and beliefs must be discarded. Due to the extent of the necessary corrections, particularly regarding the dimensional misconception in contemporary physics, it is not possible for the author alone to redevelop the entire basic framework of physics. It will likely take decades to establish the essential foundations.

1.2 12-Dimensional Spacetime Model of the Panvitalist Theory

The 12-dimensional spacetime model arises from the requirement that a minimum of 12 dimensions is needed to compare two objects (matter) in physical reality. These 12 dimensions consist of three angles (T) and three lengths for defining a spatial volume, with a measurement represented by the comparison of two spatial volumes: one as the reference quantity and the other as the quantity to be measured.

$$\text{Volume Object A}\left[f\left(L_1,L_2,L_3,T_1,T_2,T_3\right)\right] = \text{Volume Object B}\left[f\left(L_4,L_5,L_6,T_4,T_5,T_6\right)\right]$$

$$\text{Volume}_A = \text{Volume}_B \tag{1}$$

We express the volume of an ellipsoid as a generalization of a uniform sphere, under the condition that lengths are fundamentally proportional to times:

$$\frac{4}{3}\pi\frac{L_1}{T_1}\frac{L_2}{T_2}\frac{L_3}{T_3} = \frac{4}{3}\pi\frac{L_4}{T_4}\frac{L_5}{T_5}\frac{L_6}{T_6} \tag{2}$$

This notation is intuitive: An ellipsoid defines an arbitrary coordinate system where the mutually perpendicular axes, unlike a sphere, can have different lengths. By introducing three

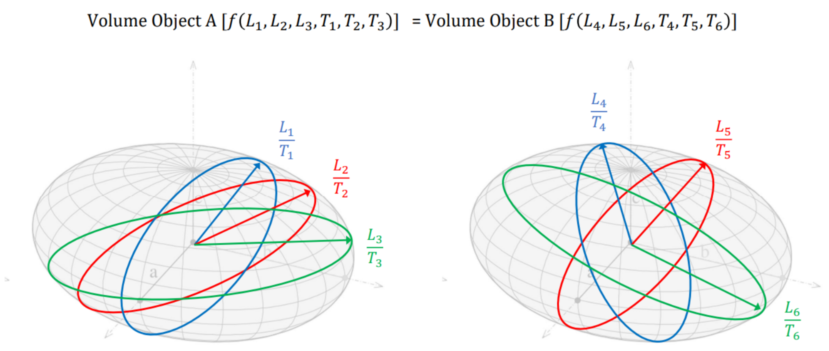

Figure 1: 12-Dimensional Spacetime as a Comparison (Measurement) Between Two Dynamic Volumes

arbitrary relative "times" (angles) instead of three lengths, the premise of perpendicular axes is abandoned, yielding a coordinate system with six degrees of freedom instead of three.

As an analogy, a random tetrahedron can define a spatial volume with six degrees of freedom: three lengths for three sides and three angles between them.

Einstein, in his 1905 treatise on the electrodynamics of moving bodies, adopted Maxwell's idea that spacetime properties are defined by magnetostatic and electrostatic field constants. By introducing a 4D spacetime, he overlooked that these constants merely describe the "natural law" that a Cartesian coordinate system assumes three right angles.

The relationship:

$$\varepsilon_0 \mu_0 c^2 = 1 \tag{3}$$

states that in a Cartesian coordinate system with unit vectors of length "1":

$$1 \cdot 1 \cdot \sqrt{1}^2 = 1^3 \tag{4}$$

In a coordinate system with angles of 30° (1/12 full angle) instead of 90° (1/4 full angle), assuming unit length "1" for the vectors:

$$1 \cdot 1 \cdot 1 = \frac{1}{4} \tag{5}$$

From the equation:

$$\frac{4}{3}\pi \frac{L_1}{T_1} \frac{L_2}{T_2} \frac{L_3}{T_3} = \frac{4}{3}\pi \frac{L_4}{T_4} \frac{L_5}{T_5} \frac{L_6}{T_6} \tag{6}$$

it is clear why only rational numbers are used in the 12D spacetime model for the simplest practical measurement: the concept of π as an irrational number is eliminated, as it cancels out.

The “world formula” can be summarized as:

$$\frac{L_1}{T_1}\frac{L_2}{T_2}\frac{L_3}{T_3} = \frac{L_4}{T_4}\frac{L_5}{T_5}\frac{L_6}{T_6} \tag{7}$$

The number “12” emerges as the only natural constant, representing the number of dimensions required for the empirical description of reality using mathematical methods. Additionally, the number “10” can define a right angle.

1.3 Context of This Paper within the Panvitalist Theory

This paper specifically aims to demonstrate and derive how, in principle, all currently known natural constants (dimensioned constants such as c, G, and h, as well as dimensionless constants like the fine-structure constant) arise from the measurement of real objects in the solar system. The reason for this lies in the historical “misconception” in the discipline of physics. A a first misconception can be seen, that irrational numbers were introduced more than 2000 years ago. As a second misconception can be seen that physical units “meter” and “second” were introduced (and then defined based on celestial bodies (the Earth and its rotation)). If a physical “measurement” is understood as a comparison of real objects, which must be a prerequisite for any empirical research, universal units cannot exist, and alleged natural constants, such as the Bohr radius, the speed of loght, the gravitational constant, the Planck Constant and so on must be expressed as multiples of the reference object, for example, the trajectories of celectial bodies, thereby intuitively providing the connection between quantum theories (microcosm) and relativity theories (macrocosm).

In principle, the equations underlying this paper were already presented in the paper "What is Spacetime? - A clear solution to Einstein’s puzzle." [13] However, the aim here is to place the derivation of the fundamental constants from the solar system in a broader context and prepare the ground for future research into the connections between the Standard Model of physics and the solar system.

2 π as a Dimensioned Relation Replaces Einstein’s 4D Spacetime

In the Panvitalist Theory, π is treated as a dimensioned quantity with the dimension T/L, where the circumference of a circle represents an angle (dimension T) and the diameter (twice the radius) represents length (dimension L).

In previous publications (see [2, 5], and in more detail in [13]), the author has elaborated on this connection as a world formula: $\pi = 1\,\mathrm{T/L}$, or in 3D: $12\pi\frac{L^3}{T^3} = 1$. This redefinition aligns with the theory's premise that all physical quantities reduce to length and angle.

For the understanding of this paper, it is critical to note that in contemporary physics, π is viewed as a dimensionless number, whereas in the Panvitalist Theory, π is always a relation between the dimensions of time and length, thus a two-dimensional physical quantity.

2-Dimensional (L_1, T_1) Circle:

$$2\pi\text{Radius} = \text{Circumference} \quad \rightarrow \quad 2\frac{T_1}{L_1}\frac{L_1}{2} = T_1 \tag{8}$$

When considering the area of an ellipse, π is understood as a four-dimensional ratio, and for an ellipsoid, π is a six-dimensional ratio.

3-Dimensional (L_1, L_2, T_1) Ellipse:

$$\pi\text{Radius}_1\text{Radius}_2 = \text{Surface} \quad \rightarrow \quad \frac{T_1}{L_1}\frac{L_1}{2}\frac{L_2}{2} = \frac{T_1 L_2}{4} \tag{9}$$

4-Dimensional (L_1, L_2, L_3, T_1) Ellipsoid:

$$\frac{4}{3}\pi\text{Radius}_1\text{Radius}_2\text{Radius}_3 = \text{Volume} \quad \rightarrow \quad \frac{4}{3}\frac{T_1}{L_1}\frac{L_1}{2}\frac{L_2}{2}\frac{L_3}{2} = \frac{T_1 L_2 L_3}{6} \tag{10}$$

This four-dimensional ellipsoid represents Einstein's 4D spacetime, with a single time axis and three spatial axes. This representation simplifies the explanation of the intertwining of space and time, as it involves basic geometric relationships that connect space and (geometric) time.

We now derive the relation for electromagnetic waves $\varepsilon_0\mu_0 c^2 = 1$, the speed of light in vacuum c, and the gravitational constant G from the concepts of an ellipsoid, an ellipse, and a circle.

Equation 10 for the volume of an ellipsoid assumes that the radii $(L_1/2, L_2/2, L_3/2)$ are perpendicular. These three hidden variables in the equation are revealed when formulated in three-dimensional time terms. For a perfect sphere, this becomes:

$$\frac{4}{3}\pi\text{Radius}_1^3 = \frac{4}{3}\frac{T_1}{L_1}\frac{L_1}{2T_1}\frac{L_1}{2T_2}\frac{L_1}{2T_2} = \frac{L_1^2}{6T_2^2} = \frac{1}{6}c^2_{\text{vacuum}} \tag{11}$$

where $\frac{L_1^2}{T_2^2}$ represents c^2 in $\varepsilon_0\mu_0 c^2 = 1$.

This equation yields:

$$\frac{1}{\text{Radius}^3}\cdot\frac{1}{8\pi}\cdot c^2_{\text{vacuum}} = 1$$

In dimensional Analysis this equation represents:

$$\frac{T_x^3}{L_x^3} \cdot \frac{1}{\frac{T_y}{L_y}} \cdot \frac{L_z^2}{T_z^2} = 1$$

and therefore 6 Dimensions ($T_x, T_y, T_z, L_x, L_y, L_z$) as relation in 12D Space-time ($T_x^3, T_y^3, T_z, L_x, L_y^2, L_z^2$).

Inserting the hidden time variable into Equation 9 for the surface of an ellipse, we obtain:

$$\pi \text{Radius}_1^2 = \frac{T_1}{L_1}\frac{L_1}{2T_1}\frac{L_1}{2T_2} = \frac{L_1}{4T_2} = \frac{1}{4}c_{\text{vacuum}} \tag{12}$$

and therefore:

$$4\pi \text{Radius}^2 = c_{\text{vacuum}}$$

(As noted in previous papers, e.g., [13], Einstein's speed of light represents a right angle, i.e., 1/4 of a full rotation.)

While the speed of light, representing a right angle, is derived from the concept of an ellipse (3D → 2D), and the electromagnetic field constants represent two right angles derived from an ellipsoid (4D → 3D), the gravitational constant is derived from the concept of a circle (2D → 1D). Adding the hidden time dimension to the circumference in Equation 8:

$$2\pi \text{Radius}_1 = 2\frac{T_1}{L_1}\frac{L_1}{2T_2} = \frac{T_1}{T_2} = G \tag{13}$$

The insertion of the hidden time dimension can be visualized as follows: When viewing an ellipsoid or ellipse, the projected area depends on the angle (in a time dimension) relative to the viewing direction. From the plane of the ellipse itself, the ellipse has no area. For the gravitational constant, we consider an arc of any length rather than a circle or ellipse. The curvature of an arc depends on the angle of observation. From the plane spanning the arc, the arc appears as a straight line without curvature, regardless of its actual curvature.

Imagine Equation 13 with T_2 as the curvature of a line. Depending on the perspective angle T_1, the projected area is proportional. If $T_1 = 0$, the projected area becomes zero, as an arc appears as a straight line without curvature from a viewpoint within the plane of curvature.

In previous papers, the dimension of the gravitational constant was indicated as T/L. This is clarified here, as the dimension is now $\frac{T_1}{T_2}$. Since the Panvitalist Theory assumes $\pi = 1\,\mathrm{T/L}$, we can write $T_1 = L_1$, meaning time (angles) and distances (lengths) are fundamentally proportional, with the circumference of a circle considered a distance. The proportionality factor is "1" (rotation), while Einstein's $L/T = c =$ constant is a misinterpretation, as it assumes a specific number of rotations as a natural constant. This arises only when defining a "meter" based on a specific object like the Earth or an atom, which then defines a specific number of rotations. With $T_1 = L_1$, we write:

$$G = \frac{T_1}{T_2}, \quad \text{with } T_2 = L_2, \quad \rightarrow \quad G = \frac{T_1}{L_2}$$

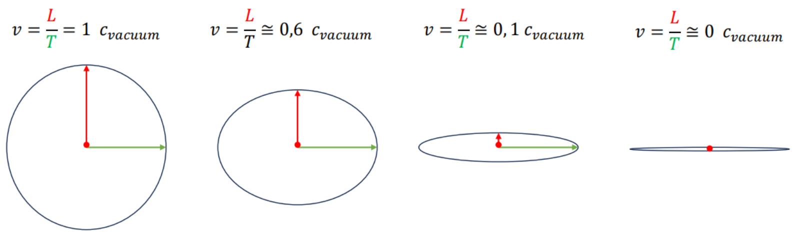

Figure 2: Illustration of the Concept of the Speed of Light

3 Conditions for a Coordinate System in a Fully Discrete Physical Theory

In developing a physical theory with a completely discrete spacetime, where coordinates are rational numbers in a six-dimensional space ($\mathbb{Q}^6$),(three-dimensional space and three-dimensional time), the coordinate system must enable dynamic interactions between spatial dimensions while preserving discreteness. Each of the three axes (x, y, z) is characterized by a velocity ($v_i \in \mathbb{Q}$, dimension L/T) and a rotational velocity ($\omega_i \in \mathbb{Q}$, dimension $1/T$), the latter representing a three-dimensional time structure. The system must support relationships such as linear dependencies ($v_x = av_y$) and couplings between rotational and oscillatory motions. Here we presents two critical hypotheses governing the angles between axes to meet these requirements: a) angles between axes must be strictly between 0° and 90°, and b) only angles of 30° or 60°, as rational fractions of a full circle, ensure rational trigonometric values necessary for a discrete framework.

3.1 Angles Between Axes Must Be Greater Than 0° and Less Than 90°

For a three-dimensional coordinate system defined by basis vectors $\vec{e}_x$, $\vec{e}_y$, and $\vec{e}_z$, the angle θ between any two axes, such as $\vec{e}_x$ and $\vec{e}_y$, must satisfy $0° < \theta < 90°$. This condition ensures that the axes are linearly independent and that their rotations induce dynamic interactions, such as those between rotational movements and oscillatory phenomena, essential for modeling physical processes.

If $\theta = 0°$, the axes are parallel ($\vec{e}_x = k\vec{e}_y$, for some scalar k), rendering them linearly dependent and collapsing the spanned space to a one-dimensional line, insufficient for a 3D framework. Conversely, if $\theta = 90°$, the axes are orthogonal ($\vec{e}_x \cdot \vec{e}_y = 0$), decoupling their interactions. To illustrate, consider a point $P = (1,0,0)$ on the x-axis, rotating around $\vec{e}_x = (1,0,0)$. The plane of rotation, perpendicular to $\vec{e}_x$, is the y-z plane (defined by $x = 1$). The y-axis, parameterized as $Q = s\vec{e}_y$, with $\vec{e}_y = (\cos\theta, \sin\theta, 0)$, intersects this plane at:

$$s\cos\theta = 1 \implies s = \frac{1}{\cos\theta}, \quad Q = (1, \tan\theta, 0). \tag{14}$$

For $\theta = 90^\circ$, $\cos\theta = 0$, making s undefined, and with $\vec{e}_y = (0,1,0)$, the y-axis lies entirely within the y-z plane, preventing a unique intersection. This absence of intersection decouples rotational dynamics, as shown by the cross product governing rotational coupling:

$$\vec{\omega}_x \times \vec{e}_y = \omega_x \sin\theta (0,0,1), \tag{15}$$

where ω_x is the rotational velocity around the x-axis. For $\theta = 90^\circ$, $\sin\theta = 1$, but the lack of intersection limits physical interactions. Thus, $0^\circ < \theta < 90^\circ$ ensures a finite intersection, facilitating dynamic relationships critical for the theory.

3.2 Only Angles of 30° and 60° Ensure Rational Discretization

To achieve a fully discrete spacetime, where all coordinates and projections are rational ($\mathbb{Q}^6$), , the angles between axes must be rational fractions of a full circle ($\theta = \frac{n}{m} \cdot 360^\circ$) and have at least one rational trigonometric value ($\sin\theta = \frac{u}{v}$ or $\cos\theta = \frac{u}{v}$, $u, v \in \mathbb{N}$, $v \neq 0$). Within the constraint $0^\circ < \theta < 90^\circ$, only $\theta = 30^\circ = \frac{360^\circ}{12}$ and $\theta = 60^\circ = \frac{360^\circ}{6}$ satisfy this requirement, yielding:

$$\begin{aligned} \sin 30^\circ &= \frac{1}{2}, \quad \cos 30^\circ = \frac{\sqrt{3}}{2}, \\ \sin 60^\circ &= \frac{\sqrt{3}}{2}, \quad \cos 60^\circ = \frac{1}{2}. \end{aligned} \tag{16}$$

Other angles, such as $45^\circ = \frac{360^\circ}{8}$, produce irrational values ($\sin 45^\circ = \frac{\sqrt{2}}{2}$). The phase shift relationship, $\cos\theta = \sin(90^\circ - \theta)$, allows the rational value $\frac{1}{2}$ to be utilized, e.g., $\cos 30^\circ = \sin 60^\circ$. This supports rational projections in coordinate transformations, such as for a point $R = x\vec{e}_x + y\vec{e}_y$:

$$x_c = x + y\cos\theta, \quad y_c = y\sin\theta. \tag{17}$$

With a linear relationship $x = ay$, $a \in \mathbb{Q}$, and $\theta = 30^\circ$, $\sin 30^\circ = \frac{1}{2}$ ensures rational scaling:

$$x_c = y(a + \cos\theta), \quad y_c = y \cdot \frac{1}{2}, \quad x_c = \frac{a + \cos\theta}{\frac{1}{2}} y_c. \tag{18}$$

Although $\cos 30^\circ = \frac{\sqrt{3}}{2}$ is irrational, the phase shift to $\sin 60^\circ = \cos 30^\circ$ or axis redefinition prioritizes rational projections, maintaining discreteness for key interactions.

4 Fundamental Problems in Maxwell's Electrodynamics

Maxwell's electrodynamics, foundational to classical physics, models electromagnetic interactions via electric ($\vec{E}$) and magnetic ($\vec{B}$) fields, yielding the condition $\varepsilon_0 \mu_0 c^2 = 1$, where ε_0 is permittivity, μ_0 permeability, and c the speed of light. We argue this condition is an artifact of an orthogonal coordinate system ($\vec{B} \perp \vec{E}$), limiting rotational plane interactions, and reflects Einstein's 4D spacetime applied to a 2×6-dimensional (12D) framework with dimensions charge (Q), mass (M), length (L), and time (T). We propose alternative dimensions ($M \sim \frac{L^4}{T^3}$, $Q \sim \frac{T^2}{L^2}$) and connect this to a symbolic dimensional structure.

In Maxwell's theory, a plane wave has $\vec{E} \perp \vec{B} \perp \vec{k}$, with $\vec{k}$ the wave vector. In a Cartesian system ($\vec{e}_x = (1,0,0)$, $\vec{e}_y = (0,1,0)$, $\vec{e}_z = (0,0,1)$), $\vec{E} \parallel \vec{e}_x$, $\vec{B} \parallel \vec{e}_y$. The equations:

$$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}, \quad \nabla \times \vec{B} = \mu_0 \varepsilon_0 \frac{\partial \vec{E}}{\partial t}, \tag{19}$$

enforce orthogonality, decoupling rotational planes. A point rotating around $\vec{e}_x$ (aligned with $\vec{E}$) forms the y-z plane ($x = \text{const}$), which doesn't intersect $\vec{e}_y = (0,1,0)$ at a finite point:

$$s \cos 90^\circ = 1 \implies \text{no solution.} \tag{20}$$

For $\theta < 90^\circ$, e.g., 30°, intersection occurs at $s = \frac{1}{\cos\theta}$, enabling coupling:

$$\vec{\omega}_x \times \vec{e}_y = \omega_x \sin\theta (0,0,1). \tag{21}$$

The condition $\varepsilon_0 \mu_0 c^2 = 1$ is dimensionless:

$$[\varepsilon_0 \mu_0 c^2] = \left(\frac{Q^2 T^2}{M L^3}\right) \cdot \left(\frac{M L}{Q^2}\right) \cdot \left(\frac{L^2}{T^2}\right) = \frac{L^3}{L^3} = 1. \tag{22}$$

We interpret $[c^2] = \frac{L^2}{T^2}$ as Einstein's 4D spacetime, with Q, M, L, T forming a 4D basis. The terms $[\varepsilon_0 \mu_0] = \frac{T^2}{L^2}$ represent a 12D interaction (Q^2, T^2, M^{-1}, L^{-3}, M, L, Q^{-2}), or 2×6 dimensions. In our model, $M \sim \frac{L^4}{T^3}$, $Q \sim \frac{T^2}{L^2}$:

$$[\varepsilon_0 \mu_0 c^2] = \left(\frac{\left(\frac{T^2}{L^2}\right)^2 T^2}{\frac{L^4}{T^3} \cdot L^3}\right) \cdot \left(\frac{\frac{L^4}{T^3} \cdot L}{\left(\frac{T^2}{L^2}\right)^2}\right) \cdot \left(\frac{L^2}{T^2}\right) = \frac{T^9 L^9 L^2}{L^{11} T^7 T^2} = 1. \tag{23}$$

This aligns with a symbolic structure:

$$\left(\frac{L_1^3}{T_1^3}\right)\cdot\left(\frac{L_2}{T_2}\right)\cdot\left(\frac{L_3^2}{T_3^2}\right), \tag{24}$$

where $\frac{L_3^2}{T_3^2} = c^2$, $\frac{L_1^3}{T_1^3}$ reflects rotational dynamics (ω_i), and $\frac{L_2}{T_2}$ a velocity term, adjusted by redefined M, Q. Non-orthogonal axes ($\theta = 30^\circ$) with rational $\sin 30^\circ = \frac{1}{2}$ support discrete interactions, suggesting tensorial ε_0, μ_0 for a refined electrodynamics.

4.1 Intuitive Interpretation of the Speed of Light

A compelling argument for the necessity of non-orthogonal axes in a dynamic electrodynamic model arises from interpreting the light speed limit within Einstein's four-dimensional spacetime. In Maxwell's electrodynamics, the electric ($\vec{E}$) and magnetic ($\vec{B}$) fields of an electromagnetic wave are orthogonal to each other and to the propagation direction ($\vec{k}$). Suppose $\vec{E}$ aligns with the x-axis ($\vec{e}_x$) and $\vec{B}$ with the y-axis ($\vec{e}_y$), with an angle $\theta_{xy} = 90^\circ$, while the propagation direction follows the z-axis ($\vec{e}_z$), also orthogonal ($\theta_{xz} = \theta_{yz} = 90^\circ$). We argue that this complete orthogonality induces a mathematical singularity, preventing physical interactions, and that the light speed limit circumvents this singularity.

In a 3D coordinate system, at least one angle between axes must be non-orthogonal ($\theta < 90^\circ$) to mathematically model dynamic interactions, such as couplings between rotational and propagation motions. If all axes are orthogonal, the rotation or propagation planes decouple, as shown by the absence of intersection between one axis's rotation plane and another:

$$s\cos 90^\circ = 1 \implies \text{no solution.} \tag{25}$$

Special relativity prohibits massive objects from reaching the speed of light c, as their energy diverges:

$$E = \frac{mc^2}{\sqrt{1 - v^2/c^2}}. \tag{26}$$

We interpret this as a condition preventing the propagation direction from being orthogonal to the other axes. An electromagnetic wave propagating exactly at c with fully orthogonal axes would create a singularity, decoupling all interactions. Thus, the propagation velocity v relative to the x-y plane (spanned by $\vec{E}$ and $\vec{B}$) must satisfy $0 < v < c$ or, hypothetically, $v > c$, to induce a non-orthogonal angle, e.g.:

$$\vec{k} = (k_x, k_y, k_z), \quad \vec{k}\cdot\vec{e}_x = k_x \neq 0 \text{ for } \theta_{xz} < 90^\circ. \tag{27}$$

For $v > c$, the Lorentz transformation implies imaginary mass ($m = \frac{m_0}{\sqrt{1-v^2/c^2}}$), akin to tachyons, which is physically speculative. In our discrete spacetime model ($\mathbb{Q}^6$), we use angles like 30° or 60°, which are rational fractions of a full circle and yield rational trigonometric values ($\sin 30^\circ = \frac{1}{2}$), enabling non-orthogonal intersections. The light speed limit thus avoids complete orthogonality, supports dynamic interactions, and suggests a profound link between spacetime structure and non-orthogonal coordinates.

4.2 Interpreting Quantum Measurement via Non-Orthogonal Axes

A further argument for non-orthogonal axes in a dynamic electrodynamic model emerges from a novel interpretation of the quantum measurement problem, linked to the light speed limit in Einstein's four-dimensional spacetime. We propose that a particle's mass should hypothetically become zero at the speed of light c and negative for $v > c$, which Einstein's relativistic formulation:

$$m = \frac{m_0}{\sqrt{1 - v^2/c^2}}, \tag{28}$$

precludes, as the denominator becomes imaginary for $v > c$ ($\sqrt{1 - v^2/c^2} = i\sqrt{v^2/c^2 - 1}$). This mathematical issue necessitated quantum mechanics, employing complex numbers to handle negative squares and address singularities at $v = c$.

In our model, a particle at $v = c$ exists in a singularity, where all three axes of a 3D coordinate system are orthogonal ($\theta_{xy} = \theta_{xz} = \theta_{yz} = 90^\circ$), preventing dynamic interactions. The rotation plane of one axis (e.g., y-z plane for $\vec{e}_x$) does not intersect another:

$$s \cos 90^\circ = 1 \implies \text{no solution.} \tag{29}$$

This state mirrors a quantum superposition, where precise position or velocity determination is impossible. A measurement disrupts one axis's orthogonality (e.g., $\theta_{xz} < 90^\circ$), introducing asymmetry and enabling system parameter determination, akin to wave function collapse:

$$\vec{k} \cdot \vec{e}_x = k_x \neq 0 \text{ for } \theta_{xz} < 90^\circ. \tag{30}$$

In our discrete spacetime model ($\mathbb{Q}^6$), we use angles like 30°, providing rational values ($\sin 30^\circ = \frac{1}{2}$), ensuring non-orthogonal intersections. Quantum mechanics resolves the $v = c$ singularity via complex amplitudes, while measurement-induced asymmetry explains the apparent randomness of collapse, suggesting a profound connection between non-orthogonal coordinates, three time dimensions ($\omega_x, \omega_y, \omega_z$), and quantum indeterminacy.

4.3 Philosophical Conclusion: Reassessing Natural Constants

Maxwell's electrodynamics, formalized through the field constants and the condition $\varepsilon_0\mu_0 c^2 = 1$, posits that nature adheres to a Cartesian coordinate system, with orthogonal electric ($\vec{E}$) and magnetic ($\vec{B}$) fields. Philosophically, we argue that this assumption introduces three implicit natural constants: the right angles between the xy, yz, and xz planes. Tragically, Maxwell overlooked that these angles are not inherent to nature but arbitrary constructs of his formalism. Einstein, building on this, interpreted the speed of light c as a fundamental property, yet we propose it merely represents the geometric constraint of a right angle, as embedded in:

$$c = \frac{1}{\sqrt{\varepsilon_0\mu_0}}. \tag{31}$$

This orthogonality limits interactions to at most two planes (e.g., xy and yz), whereas a complete natural law requires simultaneous interaction of all three. Einstein's formalism, by endorsing c, perpetuated this oversight, failing to recognize that a third field—logically necessary for full interaction—is absent. Evidence for this third field appears in the Standard Model's three spin structures and tripartite elementary charge. Ultimately, natural constants like ε_0, μ_0, and c are not fundamental but artifacts of assuming $\vec{E} \perp \vec{B}$.

5 Application of the 12-Dimensional Spacetime Model to the Solar System

The common saying, "Time is what you measure with a clock," avoids precisely defining time. The 12D spacetime of the Panvitalist Theory suggests that a clock is not a two-dimensional entity, as Einstein proposed (e.g., an analog clock, pendulum, or Earth's orbit in a single plane), but a dynamic body (ellipsoid) defined by three rotating hands in linearly independent planes.

In short, an analog clock with three hands in a single plane cannot be read from the plane of rotation. Thus, three linearly independent planes of rotation are required to construct a clock readable from any angle.

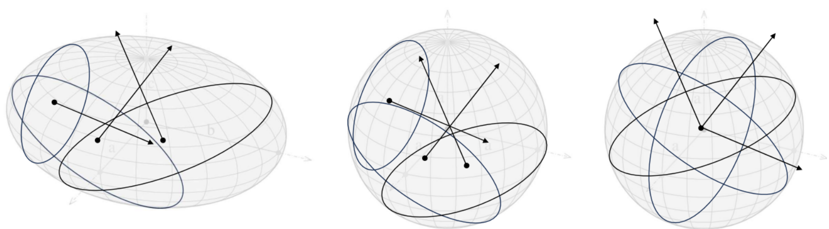

Figure 3: Derivation of Natural Constants from Three Linearly Independent Orbits of Celestial Bodies in the Solar System, Bridging the Standard Model of Physics (Microcosm) and General Relativity (Macrocosm)

Figure **??** illustrates how all natural constants are represented by the orbits of three celestial bodies in linearly independent planes. First, the orbits are projected from ellipses to circles. Then, the centers of these circles are projected to a chosen center of the universe, and the ratios are calculated to form a perfect sphere.

In the solar system, neither the Earth's rotation around its axis nor its orbit around the Sun alone defines time. Exactly three celestial bodies, orbiting uniformly in linearly independent planes, are required.

A clock defining a 3D spacetime coordinate system for the universe can be constructed, for example, from the Moon's orbit, the Earth's rotation, and the Earth's orbit around the Sun, with the Earth's center as the rotation center. This is possible because the planes of these rotations define three linearly independent vectors.

Normal Vectors:

- **Ecliptic Plane** (Earth's orbit around the Sun):

$$\mathbf{n}_S = (0, 0, 1)$$

- **Equatorial Plane** (Earth's rotation about its axis):

$$\mathbf{n}_E = (0.3971, 0, 0.9176)$$

- **Moon's Orbital Plane** (Moon's orbit around the Earth):

$$\mathbf{n}_M = (0, 0.0897, 0.9959)$$

Angles between the Planes:

- Ecliptic and Equatorial Plane: $\approx 23.44^\circ$
- Ecliptic and Moon's Orbital Plane: $\approx 5.145^\circ$
- Equatorial and Moon's Orbital Plane: $\approx 18.43^\circ$

A 3D clock can also be defined using Mercury, Venus, and Earth orbiting the Sun, or Mercury, Venus, and Mars. Each combination provides three linearly independent vectors.

The reason physical constants can be derived from planetary orbits, rather than particle accelerators or laser experiments, is simple: the Panvitalist Theory demonstrates that natural constants are artifacts of arbitrarily defined units, and no constants should appear in a consistent theory of nature.

In the Standard Model, all fermions have a mass tied to the Planck constant. Historically, mass definitions were based on astronomical observations. Even ignoring Newton's law of gravitation or general relativity, mass is ultimately linked to space and time definitions.

Although time is currently defined in SI units based on a cesium atom's hyperfine frequency and space on photon properties, historically, physical quantities and units were defined by celestial gravitation. Measurements at atomic scales must be contextualized macroscopically, e.g., stating that an atom's diameter is a fraction of the Earth's diameter, to consistently connect microcosm and macrocosm theories.

Historically, humans maintained calendars based on the Moon's phases (lunar orbit), the day (Earth's rotation), and the year (Earth's orbit). These are practical because the Moon, Sun, and Earth are the most prominent celestial bodies observable without instruments, influencing circadian rhythms, seasons, and tides.

Thus, this paper examines these three celestial bodies to derive physical constants from solar system observations. However, constants like the speed of light, gravitational constant, Planck constant, and Bohr radius can, in principle, be derived from any three celestial bodies with linearly independent orbits.

6 Discussion of the Expected Relative Error

The relative uncertainty for the gravitational constant determined in laboratory experiments is approximately 2.2×10^{-5}. Since this paper presents purely geometric derivations of the gravitational constant (and thus c, h, and other constants) based on planetary orbits, this "measurement method" is not comparable to highly precise laboratory methods like the TOS, AAF, or atom interferometry methods, which have not been conducted in space or on the International Space Station (ISS), to the author's knowledge. If purely astronomical observations are used to determine G, typical uncertainties range from 10^{-2} to 10^{-3}, as noted by Gillies in 1997 [17]:

> "In contrast to laboratory experiments, which can achieve relative uncertainties in G of order 10^{-4} or better, astronomical methods have historically been limited to uncertainties that are typically one or two orders of magnitude larger" [17, 161].

The determination of G from astronomical data is limited to a relative accuracy of approximately 10^{-2} due to uncertainties in the mass determination of celestial bodies. From [18]:

> "The orbits of solar system objects observed by Gaia allow for a refined determination of the heliocentric gravitational constant μ_{Sun}, with a relative precision of approximately 10^{-10}. However, the separation of G and M_{Sun} requires independent knowledge of the solar mass, which introduces additional uncertainties" [18, 7].

Thus, the author considers the derivation of G and other constants from geometrical data (without involving masses) consistent with current research if the error is 10 to 100 times smaller than the uncertainty in solar mass determination, typically in the percent range. Relative errors below 1×10^{-3} in this paper's derivations are therefore acceptable, provided the dimensional analysis is consistent.

The findings suggest that the dimensional treatment of time and space in quantum theories (electromagnetism) and general relativity (gravity) is inconsistent due to the dual definition of time: discrete (hyperfine frequency of Cs-133) and continuous (speed of light). Each derivation in this paper requires an individual explanation of the dimensional analysis when combining contemporary physics' dimensioned constants with the Panvitalist 12D spacetime model, where no constants exist within equations. The dimensions of contemporary physics do not align with the 12D spacetime model, as the latter corrects the ill-defined dimensions of the former.

7 Geometrical Derivation of G and c from the Concept of a Circle

Previous works [2, 5, 11, 12, 15] have shown that in a spacetime corrected from Einstein's postulates, the gravitational constant has the dimension T/L (instead of $L^3M^{-1}T^{-2}$), and the speed of light has the dimension L/T. The dimension of the gravitational constant arises because mass in the 12-dimensional spacetime has the dimension L^4/T^3 [2]. Thus, a simple geometric relationship between these constants should exist.

Assuming the circumference of a circle has the dimension T (angle measure; one full circle = one full angle with respect to the radius), we write:

$$2\pi\text{Radius} = 1\text{Circumference} \tag{32}$$

We assign the dimension "length" (L) to the radius and "time" (T) to the circumference:

$$2\pi[L] = 1[T] \tag{33}$$

Solving for "2" (the comparison standard for doubling or halving):

$$\frac{1}{\pi}\left[\frac{T}{L}\right] = 2 \tag{34}$$

Setting $1/\pi = c_{\text{vacuum}}$ and $T/L = G$:

$$Gc_{\text{vacuum}} = 2 \tag{35}$$

Using CODATA 2018 values for the speed of light and gravitational constant:

- $G = 6.6743 \times 10^{-11}\,\mathrm{m^3/kg/s^2}$
- $c_{\text{vacuum}} = 299\,792\,458\,\mathrm{m\,s^{-1}}$

we obtain:

$$Gc_{\text{vacuum}} \cdot \alpha_{\text{gravity}} = 2 \tag{36}$$

where $\alpha_{\text{gravity}} = 10^2$ is the coupling parameter between mass and spacetime.

The relative error in the equation is 4.52401×10^{-4}, as the calculation yields 2.000904 instead of exactly 2.00, which is within the expected uncertainty range.

7.1 Derivation of the Coupling Parameter between G and c

Now, it is to be derived how the coupling parameter α_{gravity} arises geometrically. The original definition of mass during the French Revolution was that 1 liter of water at 4°C should have the weight of 1 kilogram of mass under conditions on the Earth's surface. However, considering that the volume of water (and thus the weight of a volume unit of 1 liter) depends on both temperature and pressure, these physical quantities (pressure and temperature) must actually be taken into account in the definition. Likewise, the weight of one liter of water (relative to Earth conditions) also depends (quadratically) on the distance from the Earth's center. These aspects are intuitive and obvious. We therefore correct the historical definition by taking these aspects into account and use the insight that physical units as such must not exist, and in reality, real, variable objects (such as the Earth's diameter and rotational period) determine the physical quantities. The historical definition at the outset is:

$$1000\, Kilogram_{water} \;=\; 1\ \text{Meter}^3 \tag{37}$$

This equation/definition is dimensionally inconsistent. From previous findings, we know that mass has the dimension L^4/T^3, not L^3 as in this historical definition of mass. However, the historical definition does not account for the distance to the Earth's center, nor pressure or temperature.

$$1000\, Kilogram_{water} \;=\; \frac{\text{Pascal}_{Earth} \cdot\ \text{Radius}_{Earth}}{Kelvin_{4Celsius}} \cdot Meter^3 \tag{38}$$

In dimensional analysis, considering that temperature has the dimension L^3/T^2 and pressure (Pascal) has the dimension $M/L/T^2$:

$$1000\, M \;=\; \frac{M \cdot\ L\ \cdot\ T^2}{L \cdot T^2 \cdot L^3}\ L^3 \tag{39}$$

This equation is dimensionally consistent, except that the number "1000" was arbitrarily introduced as an adjustment coefficient between the scale "mass" and the scale "length" in the historical definition of mass.

We know that time (angle) and length are fundamentally proportional, because π = 1 T / L. Furthermore, we know that in contemporary physics, time is defined twice (speed of light and cesium atom), so we propose that this dimensional analysis of the definition of mass results in

$$1000 \;=\; \frac{L^3_{Space}}{L^3_{Mass}} \rightarrow 10 \;=\; \frac{L_{Space}}{L_{Mass}} \tag{40}$$

As the speed of light is derived from the surface of an Ellipse (see equation 12) and the speed of light is connected to the mass with equation $\varepsilon_0 \mu_0 c^2 = 1$ the coupling between length of Mass (Gravitational constant) and length of Space (Speed of light) is given with

$$\alpha_{gravity} = 10^2 \;=\; \frac{L^2_{Space}}{L^2_{Mass}} \tag{41}$$

7.2 Connection of the Planck Constant, Elementary Charge, Boltzmann Constant, and Speed of Light

To unify all four interactions, we recall that as early as the first publication in 2019 [2], a key result of correcting the concept of time was that the Planck constant in contemporary physics has been assigned an incorrect dimension, namely L^6/T^4 instead of T^4/L^4. This was and is possible because time is doubly defined in the unit system (see [15, 6]). This ultimately leads to two different energy scales existing in contemporary physics: in general relativity, where "energy is proportional to mass," and in quantum theory, where "energy is inversely proportional to mass." This "upside-down energy" is not yet recognized.

In [10], Equation 10 was already established based on the corrected dimensions:

$$\pi\ 10^2 \;= \frac{k_B e}{G\,\hbar} \tag{42}$$

The equation is dimensionally consistent when the Planck constant is used with the dimension T^4/L^4, the Boltzmann constant with the dimension T^3/L^3, the elementary charge with the dimension T^2/L^2, and the gravitational constant with the dimension T/L. This equation also features the coupling parameter $\sqrt[3]{1000^2}$ or 10^2. This equation also "defines" mass, but not based on the historical definition using one liter of water, but based on the Planck constant, which is used in the SI unit system to define the kilogram. If we insert this equation into the geometric derivation of the speed of light and gravitational constant, we obtain:

$$h = k_B \cdot e \cdot c_{vacuum} \tag{43}$$

In dimensional analysis, the equation looks like this:

$$\frac{T^4}{L^4} = \frac{T^3}{L^3} \cdot \frac{T^2}{L^2} \cdot \frac{L}{T} \tag{44}$$

Inserting the fixed values of the SI unit system for the elementary charge e, the speed of light c in a vacuum, the Boltzmann constant, and the Planck constant results in a relative error of 8.25×10^{-4}. This initially appears high but lies within the expected error range discussed in this paper for the astronomical determination of G in the order of 1×10^3. Since the dimensional analysis is consistent when considering the corrected dimension of the Planck constant, this equation suggests that current (elementary charge), temperature (Boltzmann constant), mass (Planck constant), and the speed of light (length and time) form a circular definition based on the definition of a continuous time (speed of light).

8 Geometrical Derivation of Bohr's Radius from Earth Rotation, Lunar Orbit, and Earth Orbit

In previous works [15], it was argued that, for logical reasons, natural constants must not exist or must ultimately represent real physical objects. Thus, as shown, the kilogram was defined based on a spatial volume (which underlies the definition of the meter) and the distance to the Earth's center (which also underlies the meter). The meter was defined based on the Earth's circumference, and the second was similarly defined based on the Earth's circumference (one Earth rotation). It is therefore logical that, for example, the speed of light (L/T) is not a natural constant but represents the Earth's rotation, on which the meter (dimension L) and time (dimension T) were originally defined. The calculation of the speed of light based on the planetary parameters of the Earth was shown, among others, in 2023 in [10, 11].

The thesis at this point must logically be that all constants in physics as we know it must ultimately reflect real objects, i.e., planetary orbits, orbital periods, their masses, intrinsic rotations, etc. This follows from the statement that the meter and the second cannot exist.

Here, we show using a 3D spacetime clock (consisting of three rotation planes), how Einstein's speed of light (representing the Earth's rotation as a 2D spacetime clock) can be calculated from the lunar orbit, the Sun's orbit, and the fictitious Bohr orbit:

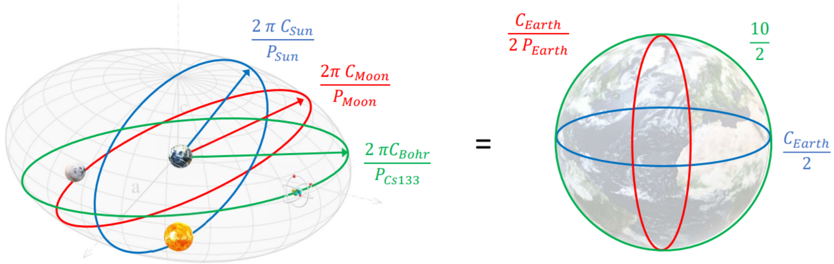

Figure 4: Geometric derivation of the 4D Spacetime (Bohr's Radius derived from the lunar orbit, the Earth's orbit and the Earth Rotation)

8.1 Setting up the Equation

$$\frac{2\pi\, C_{Sun}}{P_{Sun}} \cdot \frac{2\pi\, C_{Moon}}{P_{Moon}} \cdot \frac{2\pi\, C_{Bohr}}{P_{Cs133}} = \frac{C_{Earth}}{2\, P_{Earth}} \frac{C_{Earth}}{2\, \cdot 1} \cdot \frac{10}{2\, \cdot 1} \tag{45}$$

- With C for "Circumference" and P for "Period":
- $\pi = 3,14592654...$Dimensionless
- $C_{\text{Sun}} = 2\pi \cdot$ Sun Orbit Radius $= 2\pi \cdot$ mean Distance Earth Sun $= 1.49597870700 \times 10^{11}$
- $C_{\text{Earth}} = \pi \cdot$ Earth Diameter Equator (WGS84 Ellipsoid) $= 4,0075016686 \times 10^{7}$
- $C_{\text{Moon}} = 2\pi \cdot$ Moon Orbit Radius $= 2\pi \cdot$ Mean Distance Earth Moon $= 2\pi \cdot 384400000$
- $C_{\text{Bohr}} = 2\pi \cdot$ Bohr Radius $= 2\pi \cdot a_0 = 2\pi \cdot 5.29177210908 \times 10^{-11}$
- $P_{\text{Earth}} = 86400$ (Defined 1791 during French Revolution)
- $P_{\text{Sun}} = 365.256\,\text{days} \times 86164.0905$ (measured)
- $P_{\text{Moon}} = 27.321661\,\text{days} \times 86164.0905\,\text{Seconds}$ (measured)
- $P_{\text{Cs133}} = 1/f_{\text{Cs133}} = 1/9192631770$ (Definition of 1 Second in Base SI Units)
- $10 =$ Dimension L representing $10^3 = 1000 Meter^3$
- $1 =$ Dimension T, representing 1 = 1 full rotation

8.2 Interpretation and Discussion

The relative error in the equation: $1,6524 \cdot 10^{-4}$ .Considering the discussed error range of 10^{-2} in deriving the Gravitational Constant from astronomical data, this error is small.

The equation can be interpreted as canceling out the two arbitrarily and doubly defined time dimensions in one equation: the arbitrary numerical value of the hyperfine frequency of the cesium atom, representing the discrete time for one full quantum of energy in Planck's $E = hf$, and the arbitrarily defined time span of 86400 seconds for one full rotation of the Earth.

All other parameters except these two parameters are measured values, while these two time definitions represent conventions rather than measured values.

On the left side, a ellipsoid is defined with 6 parameters in terms of 3 Lengths and 3 Times: 3 Velocities in Dimension L/T are multiplicated to define a Volume L^3/T^3. This is a volume in 6D/12D Spacetime. The reader should imagine that T in this case represents an angle between the non orthogonal axis. While with orthogonal axis, the multiplication of 1×1 resultes to 1, this is not the case in coordinate systems with freely choosen angles between the x, y, and z axis. The number π is the dimensionless irrational number as used in contemporary physics and mathematics as in this equation we equate irrational numbers in terms of "constants" of contemporary physics with the rational numbers of discrete 12-D rational space-time. The Bohr-Constant as well as all other constants used in contemporary phyiscs only represent the irrational (constant) number pi, while in 12 D rational Spacetime this number is always rational "1" On the right side, only three parameters are used to define the Volume as perfect sphere in Dimension L^3/T^1. As here, only one time (Period of Earth roation as it was defined 1791) is used, while the other two time-dimensions are represented as a right angle and therefore with a number "1".

The reader can imagine this right-hand side of the equation in such a way that three parameters such as x, y, z define a Cartesian coordinate system, or two angles and a length define a spherical coordinate system, while on the left-hand side simply 6 parameters define an arbitrary coordinate system that consists of three arbitrary independent vectors and thus of three lengths and three angles between the axes.

In contemporary physics, a misconception has crept in that, for example, Maxwell used the field constants for the electric and magnetic fields in such a way that they define a right angle between the magnetic field and the electric field.

A mistake has crept into contemporary physics in that Maxwell, for example, used the field constants for the electric and magnetic fields in such a way that they defined a right angle between the magnetic field and the electric field.

Einstein adopted this unquestioningly, without considering that these "constants" simply reflect the definition of physical units and are not natural constants.

In the dimensional analysis the equation 45 is written as

$$\frac{2L_1}{T_1} \cdot \frac{2L_2}{T_2} \cdot \frac{2L_{\ 3}}{T_3} = \frac{L_4}{2T_4} \cdot \frac{L_4}{2T_5} \cdot \frac{L_5}{2\ T_5} \tag{46}$$

It should be noted that the number 2 in this equation always represents the concept of $\frac{\pi}{2}$ or $2 \cdot \pi$ where $\pi = 1$T/L, i.e., a half-angle that divides a line segment into two equal parts.

It is also noteworthy that the right-hand side reflects Einstein's abbreviated concept of 4D spacetime, in that only one free time axis (P_Earth) is available and only 4 dimensions (L_4, L_5, T_4, T_5), instead of the mandatory 6. Also one can intuitively see that L_4^2/T_5^2 represents c^2 in Einsteins $E = mc^2$.

9 Geometrical Derivation of Gravitational Constant from Bohr's Radius, Lunar Orbit and Earth Orbit

Now, the gravitational constant can also be calculated using an ellipsoid given by the lunar orbit, the solar orbit and the fictitious electron orbit in the Bohr atomic model:

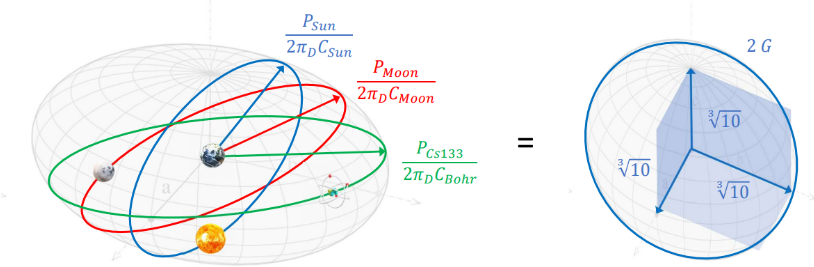

Figure 5: Geometric derivation of the gravitational constant from the lunar orbit, the Earth's orbit and the Bohr atomic model

$$\frac{P_{Sun}}{2\pi_D\, C_{Sun}} \cdot \frac{P_{Moon}}{2\pi_D\, C_{Moon}} \cdot \frac{P_{Cs133}}{2\pi_D\, C_{Bohr}} = \sqrt[3]{1000} \quad 2G \tag{47}$$

With C for "Circumference" and P for "Period":

- π_D = Circumference/Diameter = dimensioned$1T/L$
- $1000^{1/3}$ = Dimension L/T ; historical definition Mass : 1000kg water $= 1Meter^3$
- $C_{\text{Sun}} = 2\pi \cdot$ Sun Orbit Radius $= 2\pi \cdot$ mean Distance Earth Sun $= 1.49597870700 \times 10^{11}$ Meter
- $C_{\text{Moon}} = 2\pi \cdot$ Moon Orbit Radius $= 2\pi \cdot$ Mean Distance Earth Moon $= 2\pi \cdot 384400000$ Meter
- $C_{\text{Bohr}} = 2\pi \cdot$ Bohr Radius $= 2\pi \cdot a_0 = 2\pi \cdot 5.29177210908 \times 10^{-11}$ Meter
- $P_{\text{Sun}} = 365.256$ days $\times$ 86164.0905 Seconds
- $P_{\text{Moon}} = 27.321661$ days $\times$ 86164.0905 Seconds
- $P_{\text{Cs133}} = 1/f_{\text{Cs133}} = 1/9192631770$ Seconds (Definition of 1 Second in Base SI Units)
- G = Gravitational Constant $= 6.6743 \times 10^{-11}$, Dimension T/L

Discussion:

Relative error in the equation: $1.336 \cdot 10^{-4}$ .Considering the error range of 10^{-2} discussed in this paper, the error is small and tolerable.

The dimensional analysis is consistent:

$$\frac{T}{\frac{T}{L}L} \cdot \frac{T}{\frac{T}{L}L} \cdot \frac{T}{\frac{T}{L}L} = \frac{L}{T} \cdot \frac{T}{L} \tag{48}$$

10 The Significance of the Number 12 in Universal Context

The number 12 is a universal key to cosmic order, resonating across cultures and geometries. Historically, it structures time in the 12-month calendars of Mesopotamia and Egypt, symbolizes divine unity in the 12 tribes of Israel, governs the cosmos through the 12 Olympian gods, and forms the 12 foundations of the New Jerusalem in the Book of Revelation [19]. Geometrically, the regular hexagon epitomizes this significance, comprising 12 equal sides: 6 outer edges and 6 rays from the center to the vertices, each of length 1. Its 6 equal interior angles define it as a structure of L^6/T^6, reflecting the harmony of 6 lengths and 6 angles. Notably, the hexagon's connection to a 1/12 full circle (30°) yields a rational sine of $1/2$, uniquely among all angles expressed as rational fractions of a full circle between 0 and 1/4 (excluding 0 and 1/4), reinforcing the rationality of 12-based geometry. The smallest Pythagorean triple (3 + 4 + 5 = 12) defines a rational right angle with 12 length units, rendering irrational numbers like π or $\sqrt{2}$ obsolete through Pythagoras' theorem. Denying the centrality of 12 dismisses overwhelming evidence of its role in structuring reality. A theory failing to elevate 12 as its cornerstone cannot claim to be a comprehensive world formula. Intriguingly, the hexagon at Saturn's north pole, rotating every 10 hours and 39 minutes, emerges as a mysterious cosmic signal, hinting at the universal prominence of this geometry.

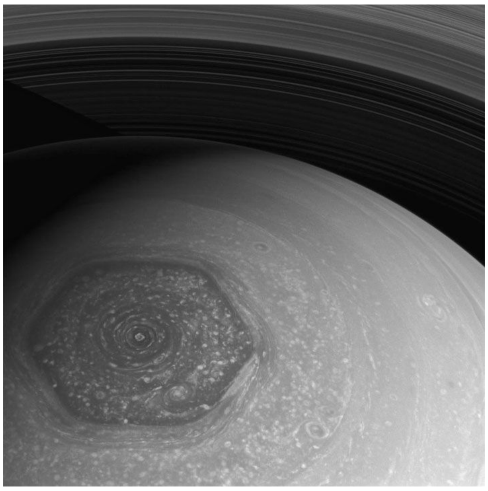

Figure 6: Hexagon at North Pole of Saturn; Picture: Space Sciene Institute NASA

11 Conclusion

The derivations of the natural constants c, G, and h from the parameters of the celestial bodies Earth, Moon, and Sun succeed because these "natural constants" stem from the arbitrary one-dimensional definition of time in 1791, which failed to recognize time's three-dimensional nature. Historical knowledge, such as the three-dimensional treatment of time in antiquity (e.g., through years, months, days, or the three pyramids of Giza for celestial observations), supports this view.

This historical oversight leads to irremediable mathematical inconsistencies, preventing physics from providing a realistic and rational theory of reality without correction. The misinterpretation of time by Maxwell, Einstein, Planck, and subsequent scientists arises from unit definitions treating time as one-dimensional.

By applying the Pythagorean rational worldview, all natural constants can be resolved, leaving only the number "12"—representing the degrees of freedom—as the natural constant. Future papers will derive the masses of solar system planets from geometrical observations alone.

12 Conflict of Interest

The author declares no conflicts of interest. All work on the topic of "time in physics" (2008–2025) was self-funded.

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