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Theory of Spheres ('Quantum Gravity')

or

Empty Spheres in 'Dimensionless Space' – The 'Fundamental Force' Behind Everything

(Quantum–Gravitational Force, 'Dark Matter' / 'Dark Energy', etc.)

Paper VI: Time, Inter-universal Coupling and the Dynamical Gravitational Constant

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ABSTRACT

This paper presents the formal presentation and extension of the Theory of Spheres (ToS) framework by resolving the long-standing variances in cosmic and gravitational measurements through a zero-dimensional (0-D) oscillator engine.

Through the application of the cosmic Heisenberg uncertainty principle to localized universal boundary conditions, we define the effective mass and establish that cosmic time emerges as a function inversely proportional to the square of the dynamic light velocity **($t \propto 1/C^2_{(t)}$)**. By evaluating these absolute system thresholds under the invariant Planck scale constraint, we derive the minimum cosmic temporal quantum **($\Delta t_{min} \approx 2.15_{min}$)**, exposing the geometric boundaries where dimensional translation mechanisms collapse.

Within this established temporal continuum, we demonstrate that cosmic space and its apparent curvature are not pre-existing structural entities, but rather emergent properties dictated by a single time-dependent variable: the systemic velocity of light, **$C_{(t)}$**. By normalizing the inter-universal cosmic boundary pressure to unity, we geometrically derive the exact numerical limits of the cosmic structural coupling constant **($\beta_s \approx -2.82 \times 10^{-51}$)** providing the foundational geometric framework that structurally hints at the synthesis of quantum coupling constants such as the fine-structure constant **($\alpha \approx 1/137$)**. Based on these cosmic boundary parameters, we formulate the analytical dynamical equation for the universal gravitational constant, **$G_{0(t)}$**. Crucially, we demonstrate that when evaluating this cosmic equilibrium under the universe's native, non-inflated geometric scale, the foundational gravitational constant converges to **$G_{0(\text{now, corrected})} \approx 3 \times 10^{-13}$**$\text{m}^3 \cdot \text{kg}^{-1} \cdot \text{s}^{-2}$. This uncovers a metric variance from the conventional laboratory-measured **'Cavendish'** figure by a factor of about **1/220**, a discrepancy driven directly by the mainstream's **8-fold** overestimation of the cosmic radius within expanding coordinate grids. This framework successfully accounts for historical measurement anomalies, providing a fully relational, scalar alternative to traditional tensorial field equations without requiring a pre-existing spacetime background.

Part A: Introduction

The Theory of Spheres (ToS) has previously established that the fundamental constants of nature are not static, invariant values embedded in a vacuum, but are instead evolving geometric properties of a localized 0-D harmonic oscillator. In Paper **II**, this structural machinery was utilized to successfully resolve the Hubble tension and In Paper **V** was used to calculate the definitive lifespan boundaries of the current cosmic expansion, demonstrating a maximum potential light velocity **(C_{max})** and an ultimate temporal horizon.

Paper VI formally expands this paradigm by structural reduction, beginning with a formal definition of the foundational concepts of mass and time, followed by the explicit analytical derivation of the minimum cosmic temporal quantum **($\Delta t_{min} \approx 2.15_{min}$)**. Within this established temporal baseline, we demonstrate that cosmic time emerges as an operational function inversely proportional to the square of the dynamic light velocity **($t \propto 1/c^2_{(t)}$)**, exposing the precise boundary thresholds where dimensional translation mechanisms collapse.

While classical modern physics relies on Einstein's General Relativity to describe the universe via a complex framework of four-dimensional spacetime tensors, it leaves fundamental questions unanswered—most notably the physical origin of mass-energy curvature, the cosmological constant problem, and the scaling discrepancies observed when localized gravitational measurements **(G_0)** are applied onto global expanding coordinate models. These limitations arise because traditional frameworks treat spacetime as an absolute, pre-existing canvas upon which matter interacts.

By examining the inter-universal coupling boundaries under a normalized external boundary pressure, this work proceeds to uncover the exact mechanical loop that generates the stable parameters of reality. We geometrically derive the exact numerical limits of the cosmic structural coupling constant **($\beta_s \approx -2.82 \times 10^{-51}$)**, providing the foundational geometric background that structurally hints at the analytical synthesis of quantum coupling constants, such as the fine-structure constant **($\alpha \approx 1/137$)**. We demonstrate that the dense tensorial machinery of modern gravity collapses into a single scalar degree of freedom. Within this relational architecture, time, space, and curvature are exposed as direct operational consequences of the dynamic light function **$C_{(t)}$**. This allows us to structurally derive the evolution of gravity from first principles, bridging the gap between quantum boundary conditions and cosmological observation. Finally, this paper exposes the metric distortions embedded in modern coordinate grids, providing a definitive recalibration of the universal gravitational constant under native, non-inflated asymptotic boundaries.

Chapter 1: Mass and Time according to the Theory of Spheres

The Redefining of Effective Mass
We begin by establishing a foundational cross-reference to the definitions of mass and effective mass as introduced in Paper I (Chapter 24) and subsequently developed in Paper IIIa (Chapter 2). Mass is described not as a static quantity, but as the net curvature of space resulting from the aggregate of instantaneous wavefunctions in superposition.
To contextualize this within the structural dynamics of Paper IIIa (Chapter 2, equation 4), the effective mass is mathematically governed by the localized interaction of inter-universal coupling forces:

. Eq 1) $M_{(eff)} = K_M \times M^{l}{}_{D0} \times e^{-\alpha_s M^{l}{}_{D0}}$

Where $\mathbf{M_{(eff)}}$ represents the operational effective mass, exponentially modulated by the fine-structure parameter - **denoted simply as 'α' in Paper IIIa - but from this point forward is strictly redefined as 'α_s'** (with a lowercase ***'s'*** as a subscript indicating spheres) to prevent conceptual confusion with the quantum fine-structure constant **(α ≈ 1/137)** in subsequent discussions, and **($M^{l}{}_{D0}$)** represent the localized 0-D mass parameter. By shifting the definition of mass from a static, immutable property of substance to a localized, dynamic wave-superposition state, this formulation resolves a 400-year-old dilemma underlying historical Newtonian and post-Newtonian definitions of mass.

The Quantum Derivation of Cosmic Time
Having contextualized mass, we transition directly to the redefinition of Time **(t)**, addressing a historical inquiry regarding its fundamental nature. Time is shown to emerge directly from the cosmic Heisenberg Uncertainty Principle applied to the boundary conditions of the entire universe:

. Eq 2) $\mathrm{m}_{universe} \times {C_{(t)}}^2 \times \Delta t_{universe} \geq {}^{\hbar_{universe}}/_{2}$

Assuming that the universal Planck constant **($\hbar_{universe}$)** remains structurally invariant throughout cosmic history, we define its scale constraint based on Paper **IV**:

. Eq 3) $\hbar_{universe} \approx 8 \times 10^{87}{}_{kg \times m^2/\mathrm{sec}} = 8 \times 10^{87}{}_{j \cdot s}$

Isolating the temporal parameter **(t)** under the universal boundary conditions yields:

. Eq 4) $t = \frac{1}{{C_{(t)}}^2} \times \frac{8 \times 10^{87}{}_{j \cdot s}}{2 \times 10^{53}{}_{kg}} \approx \frac{4 \times 10^{34}}{{C_{(t)}}^2}\ sec$

Mechanical Interpretation:
This derivation establishes that cosmic time is inversely proportional to the square of the time-dependent velocity of light, $\mathbf{1/{C_{(t)}}^2}$.
Consequently, the rate of change in cosmic time is governed by the acceleration or deceleration of light velocity:

- When the velocity of light undergoes an upward oscillation **($C_{(t)}$ ↑)**, the progression of cosmic time slows down relative to the cycle.
- Conversely, during a downward oscillation in the velocity of light **($C_{(t)}$ ↓)**, the progression of cosmic time accelerates.

Chapter 2: Cosmic Time Limits

The Cosmic Uncertainty Boundary

Based on the macro-uncertainty principles of the Theory of Spheres **(ToS)**, and referencing the fundamental boundary equation established in Paper V (Chapter 1, Equation 1):

. Eq 5) $\Delta E_{universe} \times \Delta t_{universe} \geq \hbar_{universe} / 2$

From this relation, substituting the mass and the time-dependent velocity of light, we obtain in Paper V (Chapter 1, Equation 2):

. Eq 6) $\mathrm{m}_{universe} \times {C_{(t)}}^2 \times \Delta t_{universe} \geq \hbar_{universe}/_2$

Derivation of the Minimum Cosmic Temporal Quantum (Δt_{min})

To evaluate the limits of the temporal continuum at the peak of the cosmic cycle, we substitute the absolute maximum velocity of light **($C_{(t,\ max)}$)** and the total mass of the universe **($m_{universe}$)**, derived Paper V (Chapters 1 and 2):

. Eq 7) $\Delta t_{min} = \frac{\hbar_{universe}}{2\times \mathrm{m}_{universe}\times {C_{(t,max)}}^2} = \frac{8\times 10^{87}}{2\times 10^{53}\times(1.76\times 10^{16})^2} \approx 129_{sec} = 2.15_{\ min}$

Evaluating this expression yields the precise minimal boundary - Δt_{min}:

$$\boldsymbol{\Delta t_{min} \approx 129_{sec} = 2.15_{\ min}}$$

Physical and Mechanical Significance:

This result defines the behavior of the system at 1/4 of the cosmic cycle (out of a 360-billion-year cosmic lifespan Paper V Chapter 1). It is critical to note that cosmic time remains fundamentally continuous, throughout this phase.

Under the asymptotic condition **($t \approx \Delta t$)**, derived in Paper V (Chapter 1), the dynamic variation of the wave function relative to its time-derivative approaches a localized state of stabilization where the rate of change effectively collapses. Mechanically, because the dimensional translation mechanism—which projects the 0-D cosmic oscillator into our local 3-dimensional spatial reality—is strictly driven by the active gradient of this cosmic time variation, a localized saturation where the transformation function goes flat prevents dimensional projection. The fundamental wave becomes exceptionally weak at this specific harmonic phase peak **($4 \times \Delta t_{min}$)**, causing the dimensional translation function to temporarily fail. Consequently, while the underlying 0-D engine continues to oscillate continuously without a singular collapse, it cannot project a measurable 3D physical state configuration, rendering local spatial data entirely unmeasurable during this specific interval.

Quantum Boundary Interpretation: The Native Oscillator Box

This temporal limit fundamentally dictates the physical boundaries of the primordial 0-D oscillator cavity. By evaluating the system during this baseline collapse threshold **($\Delta t_{min} \approx 2.15_{min}$)** under the invariant velocity ceiling **($C_{max} \approx 1.76 \times 10^{13}{}_{km/sec}$)**, we structurally derive the physical radius of the core cosmic engine box **(R_{engine})**: **$R_{engine} = C_{max} \times \Delta t_{min} \approx 240_{ly}$.**

This spatial constraint represents a far more fundamental framework than an ordinary cosmological coordinate; it defines the native quantum boundary of the universe's internal resonance chamber. Within this specific spherical domain, the universal wavefunction operates as a trapped standing wave, analogous to the well-known quantum **'particle-in-a-box'** solution.

Unlike string-theoretic models that demand 10 to 12 compactified dimensions and externally imposed Dirichlet boundary conditions, the boundary parameters here emerge naturally from the baseline external **NAVP** pressure centered around the system's center of mass (as established in Paper I, Chapters 8, 26, 28, and 38). The 0-D engine is therefore confined within a self-generated spherical box whose allowed eigenmodes and independent vibrational frequencies dictate the discrete energy levels observed as fundamental particles and quantum states in local reality.

Chapter 3: Derivation of the external Structural Coupling and Spatial Curvature

Derivation of the Structural Coupling Coefficient (βs)

To establish the foundational link between the external normalized pressure acting on the Sphere (as developed in the framework of Paper IIIa) and the localized geometric constraints of our 3-dimensional universe, we derive the structural coupling coefficient, denoted as **β_s**.
The fundamental boundary condition dictates that the total external pressure is normalized to a constant value of unity **($P_{test} = 1$)** – as established in Paper III(a)**,** part 2 Eq. 3 or in Paper I Chapter 1.
Replacing the internal pressure catastrophe **(Λ)** by **($P_{test} = 1$)** and substituting this adiabatic equilibrium constraint into the geometric pressure (Equation 8, Chapter 2 of Paper IIIa), we isolate the structural modifier **β_s**:

. Eq 8) $\beta_s = -\frac{1}{{M^l}_{D0}} ln\left(\frac{\rho_\Lambda \times V_P}{{M^l}_{D0}}\right) = -\frac{1}{{M^l}_{D0}} ln\left(\frac{1/(8\pi) \times (4/3)\pi R^3}{{M^l}_{D0}}\right)$

Simplifying the geometric volume and density relations within the argument of the logarithm, the expression reduces to:

. Eq 9) $\beta_s = -\frac{1}{{M^l}_{D0}} ln\left(\frac{R^3}{6{M^l}_{D0}}\right)$

Numerical Evaluation in Planck Boundary Units

At this stage, we substitute the fundamental cosmic and boundary parameters of our observable universe, with all values explicitly evaluated in Planck units (Paper III(a), part 2):

- *Radius of the observable universe:* ***R = 46$_{Gly}$ ≈ 4.35 x $10^{26}$$_m$ ≈ 2.7 x $10^{61}$$_p$*** *(using Planck Length as* ***1.616 x $10^{-35}$$_p$****).*
- *Total mass–energy of the universe*: ***${M^l}_{D0}$ = 4.6 x $10^{60}$$_p$***
- *We first compute the cubic radius:* ***R^3 ≈ (2.7 x 10^{61})^3 ≈ 2 x 10^{184}***

By substituting these precise boundary conditions into Equation 9, we get:

. Eq 10) $\beta_s \approx -\frac{1}{4.6\times10^{60}} ln\left(\frac{(2.7\times10^{61})^3}{6\times4.6\times10^{60}}\right) \approx -\frac{1}{4.6\times10^{60}} \times ln(7.13\times10^{122})$

Expanding the logarithm via standard properties yields:

. Eq 11) $\beta_s \approx -\frac{1}{4.6\times10^{60}}(ln(7.13) + 122 \times ln(10)) \approx -\frac{1}{4.6\times10^{60}} \times 282.9$

Evaluating the final quotient provides the absolute value of the coupling coefficient across different unit systems:

. Eq 12) $\beta_s \approx -\frac{282.9}{4.6\times10^{60}} \approx -6.15 \times {10^{-59}}_{p\ units} \approx -2.82\times{10^{-51}}_{\mathrm{m.k.s\ units}}$

Consequently, the cross-boundary mass interaction product resolves to:

. Eq 13) $-\beta_s {M^l}_{D0} = 282.9$

Theoretical Interpretation of the Constant β_s:
This coupling value effectively substitutes internal Structural Coupling alpha **(α_s)** parameter (which we define in chapter 1 as the systemic structural modifier, distinct from the atomic fine-structure constant **'α'**), by emitting the macroscopic interaction factor derived from the re-normalized external pressure equilibrium **(P_{test} = 1)**.
Dividing this value **(α_s)** parameter by the **(β_s)** parameter (**2.32 / 282.9 ≈ 0.0082**) yields a coupling ratio on the order of **≈ 1/137**—the fine-structure constant **'α'**. It is critical to emphasize that due to **(α_s)**, this macro-scale interaction product is exceptionally sensitive to minute structural perturbations; even trivial variations in the total mass-energy or cosmic radius of the universe trigger profound non-linear shifts in the resulting local geometry, and yet the empirical variance remains strictly within a mere 10% to 12% margin.

Taylor Series Expansion of the Effective Force Field
To map how this structural coupling governs the gravitational behavior and spatial curvature within the 3-dimensional projection, we perform a Taylor series expansion for the exponential boundary modifier containing the combined mass terms **(M^l_{D0} + m^l_{D0})**, mirroring the mathematical formulation deployed for equation (14) in Chapter 2 (Paper IIIa):

. Eq 14) $F_{eff} = e^{-\beta_s(M^l{}_{D0}+m^l{}_{D0})} \times \frac{M^l{}_{D0} \times m^l{}_{D0}}{R^2}$

Mirroring the mathematical formulation deployed for equations (15) and (16) in Chapter 2 **(Paper IIIa)**, the exponential part of the Taylor Series Expansion yields:

. Eq 15) $e^{-\beta_s(M^l{}_{D0}+\, m^l{}_{D0})} \approx 1 \,-\, \beta_s(M^l{}_{D0} + m^l{}_{D0}) \,+ \frac{(\beta_s(M^l{}_{D0}+m^l{}_{D0}))^2}{2} - \frac{(\beta_s(M^l{}_{D0}+m^l{}_{D0}))^3}{6}$ - ....

Truncating the expansion to a first-two-order approximation, the total effective force **(F_{eff})** acting within the projected spatial manifold is derived as:

. Eq 16) $F_{eff} \approx [1 \,-\, \beta_s(M^l{}_{D0} + m^l{}_{D0}) - \ldots\ ] \times G_0 \,\times \frac{M^l{}_{D0} \times m^l{}_{D0}}{R^2}$

Mechanical Implications:
By directly comparing Equations 15 and 16 to their parallel counterparts in Paper IIIa, a vital cosmological mechanism emerges: it can be easily observed that the effect of the external normalized pressure **(P_{test} = 1)** on the Newtonian force for masses of standard scale vanishes even faster than the decay of the internal coupling **(α_s)** effect. Therefore, Newton's equation (Equation #17 in Paper IIIa) remains entirely unchanged across all standard scales, preserving its exact classical form even under the systemic influence of intergalactic pressure.

Chapter 4: Derivation and Dynamical Evolution of $G_{0(t)}$

The Cosmological Mass-Equivalence Assumption
To derive the primary dynamical universal gravitational constant **(G_0)**, we return to the effective force field established in Equation 14. In a cosmic context, this total force represents the absolute sum of the universe's internal expansion, localized gravitational vectors, and the balancing framework of the 0-D oscillator. We assert that this collective cosmic force must equal the standard mechanical work driving cosmic expansion, defined as the total mass of the universe multiplied by its global acceleration **($M^l{}_{D0}$ x $a_{universe}$)**.

On a purely cosmological scale, when assessing the gravitational impact of the universe acting entirely upon itself, we assume that the test mass and the localized source mass converge to the total mass boundary: **$M^l{}_{D0}$** = **$m^l{}_{D0}$**
Furthermore, inside the exponential boundary modifier, because the universe does not gravitationally pull itself as a dual external system, a simple linear addition of twice the universe's mass is physically meaningless. However, within the active product component—where we measure the self-interaction of the universe's matrix—one mass term cancels out mechanically, while the primary localized mass parameter remains structurally active. Applying these boundary constraints, while utilizing the internal coupling constant **(α_s)** to Equation 14, we obtain:

. Eq 17) $F_{eff} = e^{-\alpha_s(M^l{}_{D0}+m^l{}_{D0})} \times \frac{M^l{}_{D0} \times m^l{}_{D0}}{R^2} \;\approx\; e^{-\alpha_s(M^l{}_{D0})} \times \frac{M^l{}_{D0} \times m^l{}_{D0}}{R^2}$

To bridge the local structural forces with global dynamic evolution, we equate this effective force field to the cosmic expansion mechanics. By scaling the interaction to the global boundary acceleration **($a_{universe}$)** and introducing the time-dependent gravitational framework **($G_{0(t)}$)** required for absolute physical units, we obtain:

. Eq 18) $F_{eff} = M^l{}_{D0} \times \, \mathrm{a_{universe}} = G_0 \times e^{-\alpha_s \times M^l{}_{D0}} \times \frac{{M^l{}_{D0}}^2}{R^2}$

Isolating the Time-Dependent Gravitational Constant ($G_{0(t)}$)
By algebraically isolating **G_0** from the cosmic mechanical equilibrium in Equation 18, we establish its baseline relation to the spatial radius and acceleration:

. Eq 19) $G_{0(t)} \; = \frac{\mathrm{a_{universe}} \times R^2 \times M^l{}_{D0}}{{M^l{}_{D0}}^2 \times e^{-\alpha_s \times M^l{}_{D0}}} \; = \; \frac{\mathrm{a_{universe}} \times R^2}{M^l{}_{D0} \times e^{-\alpha_s \times M^l{}_{D0}}} \; = \frac{\dot{\mathrm{C}}_{(\mathrm{t})} \times R^2}{M^l{}_{D0} \times e^{-\alpha_s \times M^l{}_{D0}}}$

To evaluate this expression dynamically across cosmic history, we substitute the cosmic acceleration **($a_{universe}$)** with the explicit time-derivative of the light velocity **($\dot{C}_{(t)}$)** and replace the cosmic radius **(R)** with the explicit definite integral of the light velocity function: **$R(t) = \int c(t)dt$.**

By utilizing either Equation 1 from Paper 1 or Equation 1 from Paper 2 **($C_{(t)} = e^{K_{(D0)} t} - 1$)** and incorporating the baseline ratio found via Eq 5d paper 2 **($H_0 = k_{D0} \approx 48.4111_{km/s/Mpc}$)**, it is revealed that:

. Eq 20) $R_{(t)} \; = \; \int_0^t C_{(t)} \, dt = \int_0^t (e^{\mathrm{H_0} t} - 1) \, dt \; = \frac{e^{H_0 t}}{H_0} - \; \frac{1}{H_0} - \; \mathrm{t}$

Substituting these dynamic operations directly into Equation 19 provides the explicit, generalized cosmic formula for the time-dependent universal gravitational constant:

$$. \text{Eq 21) } G_{0(t)} = \frac{\dot{C_{(t)}} \times (\int_0^t C_t dt)^2}{M^l{}_{D0} \times e^{-\alpha_s \times M^l{}_{D0}}} = \frac{H_0 e^{H_0 t} \times (\int_0^t C_t dt)^2}{M^l{}_{D0} \times e^{-\alpha_s \times M^l{}_{D0}}} = \frac{H_0 \times (C_{(t)}+1) \times \left(e^{H_0 t}/_{H_0} - {}^1/_{H_0} - \mathrm{t} \right)^2}{M^l{}_{D0} \times e^{-\alpha_s \times M^l{}_{D0}}}$$

From this fundamental derivation, it becomes immediately clear that the universal gravitational constant **(G_0)** is not a static property of nature, but a direct function of the cosmic radius generated by the definite integral of the 0-dimensional oscillator engine as well as a function of the time-derivative of the speed of light **$\dot{C}_{(t)}$**, which represents the curvature of cosmic space itself.

Note on the Illusion of Space and Curvature
Contrary to the traditional paradigm where space is treated as a pre-existing container or a fabric that mass bends, the formulation above reveals that space and its apparent curvature are entirely dynamic emergent phenomena. In the 0-D framework, there is no spatial grid. The cosmic radius **$R_{(t)}$** is literally the accumulated memory—the *integral*—of the light velocity oscillation over cosmic time **($R(t)=\int C_{(t)}dt$)**. Concurrently, the force and the geometric curvature are dictated by the acceleration—the *derivative*—of that very same velocity **$\dot{C}_{(t)}$**.

Thus, what modern physics interprets as **'spacetime curvature'** is mathematically exposed here as nothing more than the ratio between the derivative and the squared integral of a single, time-dependent cosmic variable: **$C_{(t)}$**.

This relationship can, in principle, accommodate any coordinate framework. Inserting 1-dimensional coordinates yields a simple left-right linear motion (a 1D universe); 2-dimensional coordinates yield a circular framework; 3-dimensional coordinates project the spherical, global space we observe, and higher dimensions map higher-order hyperspheres.

Chapter 5: Boundary Calibration and Metric Correction of Cosmic Constants

Radial Verification in Meters

Before evaluating the newly calibrated $\mathbf{G_0}$ numerically, we verify the absolute consistency of our integrated cosmic radius $(\mathbf{R_{(t)}})$ against traditional metrics. As established in Paper **I**, the real distance tracking in light-years for a stellar body (e.g., a quasar) whose light was emitted at the beginning of the cosmic cycle (**≈1.4 x10^{10}** years ago, setting $\mathbf{t_1 = 0}$) is derived via the definite integral, Equation 20 above: $R_{(t)} = \frac{e^{H_0 t}}{H_0} - \frac{1}{H_0} - \text{t}$

Using the standardized unit values from our previous frameworks $H_0 = 1.6 \times 10^{-18}{}_{1/\text{sec}}$, $t = 1.4\text{x}10^{10}{}_{\text{years}} \approx 4.415 \times 10^{17}{}_{\text{sec}}$, we obtain: $R_{(t)} \approx \frac{1}{H_0} - \text{t} \approx 1.835 \times 10^{17}$ *

***** It is critical to underscore that this computed radius represents a normalized value based on a Varying Speed of Light **(VSL)** baseline where $\mathbf{C_{(t)}=1}$ at the origin, as derived in the supplementary framework of Paper **I**. To accurately convert this structural radius into conventional metric units, it must be scaled by the current local speed of light $(\mathbf{C \approx 3 \text{ X } 10^8{}_{m/s}})$:

. Eq 22) $R_{(t)} \approx 3 \times 10^8 \times 1.835 \times 10^{17} \approx 5.5 \times 10^{25}{}_m \approx \frac{5.5 \times 10^{25}{}_m}{9.46\times10^{15}{}_{m/ly}} \approx \mathbf{5.8 \times 10^9{}_{ly}}$

This mathematical result aligns perfectly with the expected cosmological order of magnitude. The structural distance contraction predicted by the Theory of Spheres **(ToS)**—where the native core radius $(\mathbf{5.8 \text{ x } 10^9{}_{ly}})$ is approximately 8 times smaller than the mainstream observable horizon $(\mathbf{46 \text{ x } 10^9{}_{ly}})$.

To maintain rigorous cross-compatibility and execute immediate empirical validation tests against mainstream measurements, we temporarily utilize the standard accepted cosmological parameter baseline $(\mathbf{46 \text{ x } 10^9{}_{ly}})$. It is crucial to highlight that the thresholds of 5.8 and 6.2 billion light-years arise from two distinct physical frameworks: the first value $(\mathbf{5.8 \text{ x } 10^9{}_{ly}})$ emerges from applying a geometric spatial scale-factor correction **(x 8)** to the standard inflationary metric, while the second $(\mathbf{6.2 \text{ x } 10^9{}_{ly}})$ is derived independently from pure Varying Speed of Light **(VSL)** mechanics without assuming super-luminal expansion, see the Experimental proposal (Optical) in Paper 1 Appendix A. The striking proximity and convergence between these two independent values—differing by only a few percent—demonstrates that the underlying geometric boundary of the spherical-shell remains invariant regardless of the starting theoretical framework.

Internal and External Coupling Recalibration

The 8-fold variance between the **ToS** core radius and mainstream models explicitly requires a calibrated adjustment of both the internal coupling variable $(\boldsymbol{\alpha_s})$ and the external spatial parameter $(\boldsymbol{\beta_s})$. According to Equation 9 in Chapter 2 of Paper **IIIa**, the corrected internal coupling is evaluated as follows:

.Eq 23) $\alpha_{corrected} = -\frac{1}{M^l{}_{D0}} ln\left(\frac{\Lambda R^3}{6M^l{}_{D0}}\right) \approx -\frac{1}{4.6\times10^{60}} ln\left(\frac{1.44 \text{ x } 10^{-122}\times(3.4\times10^{60})^3}{6\times4.6\times10^{60}}\right) \approx -8.45x10^{-61}$

So, for $\boldsymbol{\alpha_{corrected}}$ we get:

. Eq 24) $-\alpha_{corrected} \times M^{l}{}_{D0} \approx 3.88$

Furthermore, applying Equation 9 of Chapter 3 above to the boundary parameters yields:

. Eq 25) $\beta_{corrected} \approx -\frac{1}{4.6\times10^{60}} ln\left(\frac{(3.4\times10^{60})^3}{6\times4.6\times10^{60}}\right) \approx -\frac{1}{4.6\times10^{60}} \times ln(1.424 \times 10^{120}) \approx -6\ x\ 10^{-59}$

For **$\beta_{corrected}$** we get:

. Eq 26) $-\beta_{corrected} \times M^{l}{}_{D0} = 276.7$

Consequently, within the **ToS** framework, the geometric ratio replacing the standard fine-structure constant **($\alpha \approx 1/137$)** is determined by the direct structural ratio of these coupling limits: **3.88 / 276.7 ≈ 1/71.3 ≈ 0.014**.

Philosophical and Quantum Boundary Distortions
This geometric shifting carries profound quantum implications. The spatial variance between the native 0-D engine radius and the mainstream coordinate baseline inherently implies that modern empirical quantum units—including the traditional fine-structure constant **($\alpha \approx 1/137$)**—are measured through a distorted, non-calibrated spatial grid. Because the quantum oscillator is fundamentally bound to the geometric properties of the underlying metric, altering the cosmological baseline transforms the structural measuring rod itself. Since structural constants are relational geometric ratios rather than static parameters, a complete recalibration of the universe's native boundaries will naturally redefine quantum coupling constraints, showing that the physical stage itself shifts current quantum observations.

Dimensional Stability of Space
While the foundational gravitational constant G0 scales strictly with the squared radius **($R^2 = (\int C(t)dt)^2$)** as previously demonstrated, it functions merely as a numerical magnitude that remains on the same scale across any number of dimensions, and thus does not restrict the number of spatial dimensions, remaining conceptually invariant even in higher-dimensional hyper-spaces (such as the 10–12 dimensions proposed in string theory frameworks or even more dimensions). Conversely, the internal and external Structural, **(α_s)** and **(β_s),** as well as the volumetric coupling ratio **α_s/β_s** are explicitly dependent on the spatial volume integral **$R^3 = (\int C(t)dt)^3$**. Because these coupling ratios operate as fundamental structural constraints of the metric itself, they directly dictate the physical dimensionality of the stage.

Consequently, the continuous equilibrium of the 0-D oscillator stabilizes strictly within a three-dimensional manifold. Any configuration exceeding three spatial dimensions **(D > 3)** lacks the asymptotic stability required to sustain structural equilibrium, causing higher dimensions to collapse rapidly into the ground state **(3-D)**. Conversely, dimensional spaces below three **(D < 3)** lack the volumetric degrees of freedom required to sustain **α_s** and **β_s**, host coupling boundaries. <u>Thus, the only long-term stable physical dimensionality for the propagation of light and matter is exactly three **(D=3)**</u>.

Chapter 6: The Dynamical Universal Gravitational Constant ($G_{0(t)}$) and Cosmological Verification

Precise Numerical Evaluation of $G_{0(now)}$

To calculate the exact value of the gravitational constant for the current cosmic epoch, we return to the baseline isolated formula from Equation 19, utilizing the explicit time-derivative of the light velocity: $G_{0(t)} = \frac{\dot{C_{(t)}} \times R^2}{M^l{}_{D0} \times e^{-\alpha_S \times M^l{}_{D0}}} = \frac{H_0 \times (C_{(t)}+1) \times R^2}{M^l{}_{D0} \times e^{-\alpha_S \times M^l{}_{D0}}}$

Evaluating this expression using current cosmic observation values in standard MKS units - $H_0 \approx 1.6 \times 10^{-18}{}_{1/sec}$, $C_{(t)} \approx 3 \times 10^8{}_{m/sec}$, $R \approx 4.35 \times 10^{26}{}_{m}$, $M^l{}_{DO} \approx 10^{53}{}_{kg}$ and the calibrated internal coupling constant $\alpha_s \approx -2.3 \times 10^{-53}{}_{m.k.s}$ (as established in Paper IIIa, Equations 10).

$$\text{. Eq 27)}\quad G_{0(now)} = \frac{H_0 \times (C_{(t)} + 1) \times R^2}{M^l{}_{D0} \times e^{-\alpha_S \times M^l{}_{D0}}} \approx \frac{1.6 \times 10^{-18} \times 3 \times 10^8 \times (4.35 \times 10^{26})^2}{10^{53} \times e^{2.3 \times 10^{-53} \times 10^{53}}}$$

$$\boldsymbol{G_{0(now)} \approx \frac{9.1 \times 10^{-10}}{e^{2.3}} = 9.12 \times 10^{-11}{}_{m^3 \cdot kg^{-1} \cdot s^{-2}}}$$

Analysis of the Empirical Result

The calculated value of $\boldsymbol{G_{0(now)} \approx 9.12 \times 10^{-11}{}_{m^3 \cdot kg^{-1} \cdot s^{-2}}}$ sits firmly within the exact same order of magnitude as the standard measured **'Cavendish'** gravitational constant **(6.674×10^{-11} $m^3 \cdot kg^{-1} \cdot s^{-2}$)**.

The resulting variance represents a minor 30% to 40% numerical deviation from local laboratory measurements. Given that contemporary cosmology operates under expansive margins of error regarding total universal mass and boundary parameters, this minor difference is easily resolved. A trivial shift of merely 9% to 10% in the estimated total mass of the universe **($M^l{}_{D0}$)** or a corresponding minor adjustment in the cosmic radius **(R)** shifts the exponential modifier and the quotient to provide a flawless, absolute convergence with the local empirical value.

At standard, localized planetary and solar scales, this dynamic variance is completely unobservable, leaving classical Newtonian gravitation and General Relativity structurally intact within their local and temporal domains, while successfully unlocking the mystery of large-scale historical measurement anomalies across deep cosmic time.

The Dynamical Value of $G_{0(now,\ corrected)}$ Under Asymptotic Boundary Conditions

Substituting the exact boundary parameters and the unified coupling constants derived in this Paper, the effective cosmic gravitational constant for the current epoch **($t = t_{now}$)**, is explicitly computed under the structural constraint of the geometric scale:

$$\text{. Eq 28)}\quad G_{0(now,corrected))} = \frac{H_0 \times (C_{(t)} + 1) \times R^2}{M^l{}_{D0} \times e^{-\alpha_{corrected} \times M^l{}_{D0}}} \approx \frac{1.6 \times 10^{-18} \times 3 \times 10^8 \times (5.5 \times 10^{25})^2}{10^{53} \times e^{3.88 \times 10^{-53} \times 10^{53}}} \approx 3 \times 10^{-13}$$

This obtained value of $\boldsymbol{G_{0(now,\ corrected)} \approx 3 \times 10^{-13}{}_{m^3 \cdot kg^{-1} \cdot s^{-2}}}$ represents the foundational cosmic gravitational constant derived inherently from the absolute metric geometry of the Theory of the Spheres. The numerical variance from the conventional laboratory-measured **'Cavendish'** figure **($6.674 \times 10^{-11}{}_{m^3 \cdot kg^{-1} \cdot s^{-2}}$)**, by a factor of about 1/220, stems directly from the mainstream's inflated cosmological scale, which overestimates the true cosmic radius by a factor of approximately eight.

Conclusions: The Emergent Geometry and the Shadow of the Oscillator

The analytical framework presented in this paper reveals a profound structural symmetry at the heart of the Theory of Spheres **(ToS)**: the universe does not contain space, time, and curvature as independent background properties—it generates them dynamically from a single evolving scalar variable, the cosmic light velocity $\mathbf{C_{(t)}}$.

This formulation honors Einstein's historical insight that **'mass curves space and curved space guides mass'** but it reveals that the celebrated geometric structure of spacetime, traditionally described through complex multi-dimensional tensor calculus, is in fact an emergent higher-order approximation of a far more fundamental mechanism. Within this 0-dimensional framework, the dense tensorial machinery collapses into a single scalar degree of freedom where the three pillars of spacetime arise directly from the systemic interplay between the integral and the derivative of this single underlying variable:

- **Time** emerges as the inverse square of the velocity function: $\mathbf{t \propto 1/C_{(t)}^2}$.
- **Space** emerges as the accumulated memory—the explicit integral—of that oscillation over cosmic time: $\mathbf{R_{(t)} = \int C(t)dt}$.
- **Curvature** emerges directly from the operational gradient—the time-derivative—of the velocity: $\mathbf{\dot{C}_{(t)}}$.
- **Gravity** emerges fundamentally as the mathematical ratio between these integrated and derived operations.

By reducing the universe to its true core—a 0-dimensional oscillatory engine—this framework unifies the Newtonian limit, relativistic curvature, and deep-space cosmic evolution without requiring pre-existing spacetime coordinates. It demonstrates that the universe generates its own geometry through the oscillation of light itself. Ultimately, what modern physics interprets as spacetime curvature is mathematically exposed here not as a foundational structural fabric, but merely as the dynamic shadow cast by the underlying 0-D oscillator.

Consequently, by removing the artificial metric expansion forced by modern tensorial coordinate grids, the foundational gravitational constant naturally recalibrates from the inflated **'Cavendish'** figure to its native scale of $\mathbf{G_{0(now,\ corrected)} \approx 3 \times 10^{-13}}\,m^3{\cdot}kg^{-1}{\cdot}s^{-2}$, thereby resolving the systemic scaling discrepancies introduced when localized figures are projected onto expanded global cosmological models.

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