

Theory of the Global Universe (GU)

Scientific Position Paper — Version 3

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Abstract

This position paper introduces the Theory of the Global Universe (GU), an ontological and causal framework that resolves the boundary singularities inherent in General Relativity (GR) by replacing the premise of dynamic spacetime with a strictly rigid, infinite Euclidean continuum. Within this framework, physical interactions are governed by the continuous dynamics of energetic potential differences (Kinetic Base Tension) rather than geometric curvature. The model ontologically redefines mass not as a fundamental substance, but as a topological boundary surface effect resulting from the localized phase transition of translational vector flows into closed three-dimensional lemniscates (Cassini ovaloids of revolution). By applying this purely Euclidean continuum mechanics, the GU theory provides a deterministic causal mechanism for phenomena such as time dilation and the cosmological constant. Furthermore, it offers a geometric resolution to the empirical Proton Radius Puzzle, demonstrating that the anomalous scattering radii (0.877 fm and 0.841 fm) naturally correspond to the dual structural radii of the primary soliton's unperturbed envelope surface.

Epistemological Postulate

Scientific models do not dictate reality; they approximate its local causality. The physical modeling of the present faces the problem that highly precise descriptions (GR and SM) generate unphysical singularities at their margins. The GU model postulates that these singularities are not a feature of reality, but an artifact of the mathematical premise of a dynamic spacetime. Local energetic differences can be mathematically mapped without contradiction if the infinite total system is calibrated via dimensionless symmetry values rather than numerical absolute dependencies.

Methodological Reservation and Classification

The Theory of the Global Universe (GU) explicitly does not position itself as a phenomenological refutation of established physics, but as its ontological and causal foundation. The empirical precision and the mathematical predictive power of the Standard Model (SM) and the General Theory of Relativity (GR) remain untouched within their verified domain of validity – the description of phenomena within the Visible Universe (VU).

Classical physics and dynamic spacetime models collapse at their mathematical limits, however, especially in the handling of infinities. The GU model replaces the concept of flexible spacetime in favor of an invariant, strictly Euclidean-mechanical basis.

Axiomatic Premises: The Ontological Structure of the Global Universe

Physical reality exists as a compelling ontological simultaneity of two components, formulated in the fundamental system equation:

$$GU = GU_d + GU_e$$

1. GU_d : Space as a structural constant

Space is an infinite constant. It is absolutely flat, rigid, and strictly Euclidean. Space curvature, expansion, or compression are axiomatically excluded. Ontologically, space is the massless vector field itself. GU_d functions as the unconditional topological matrix of reality.

2. GU_e : Energy as a dynamic potential

Energy is explicitly dematerialized in the GU model and defined as pure energetic potential. It does not constitute itself as a substantial entity or kinetic fluid, but exists exclusively as a relational tension state within the invariant Euclidean matrix (GU_d). Since any physical interaction – and thus any form of agility – relies without exception on the dynamics of energetic differences ($\nabla\rho_e$), the classical law of conservation of energy is a direct mathematical consequence of this mandatory potential gradient: A local potential can transform translationally (equalization flow) or close geometrically as a Euclidean lemniscate (mass formation), but ontologically and numerically never extinguish in the infinite total system.

3. Time as a relative local variable

Time does not exist as a global dimension, nor does it possess a structural connection to the space constant (GU_d). Time is mandatorily local and relative. It is physically exact and exclusively defined as the measure of the duration of the specific equalization process of local energy differences (GU_e).

Mathematical-Physical Substitution of GR by the Global Universe (GU)

1. The fundamental system axiom

The Global Universe (GU) is defined as a non-dynamic, infinite reference system, consisting of the infinite 3D dimension (GU_d) and the infinite background energy (GU_e).

$$\text{Axiom 1: } GU_d \equiv \infty, \quad GU_e \equiv \infty$$

Since GU_d is absolutely rigid and infinite, there is no physical or mathematical operation that permits a geometric metric change (space curvature) of space itself. The spacetime metric $g_{\mu\nu}$ of GR is declared a mathematical artifact and is eliminated.

2. The relational field equation (Replacement of Einstein's field equations)

In GR, the Einstein tensor $G_{\mu\nu}$ (geometry) and the energy-momentum tensor $T_{\mu\nu}$ (matter) determine the behavior of the cosmos ($G_{\mu\nu} = \frac{8\pi G}{c^4} T_{\mu\nu}$). In the GU model, this description of local curvature is replaced by the Kinetic Base Tension (KBT). To precisely map the directional vector interference in three-dimensional rigid space, the agility coefficient is defined as a local second-order stress tensor (ε_{ij}). The Einstein field equation is substituted by the local, dimensionless tension equation:

$$KBT_{ij} = \delta_{ij} + \varepsilon_{ij}$$

Here, the Kronecker delta (δ_{ij}) represents the isotropic, undisturbed Euclidean space matrix (GU_d), while the tension tensor (ε_{ij}) encodes the directional stress distribution of the property energy (GU_e). The vectorial flux density $\vec{J}$ results causally from the divergence of this stress tensor:

$$\vec{J} \propto \nabla \cdot \varepsilon_{ij}$$

3. The principle of mass substitution and the energetic refraction effect

Any gravitational effect calculated in GR via the geodesic equation (motion in curved space) is replaced by the local mass m and its energetic equivalent ($m = E_{local}/c^2$).

- **GR Formalism:** $G_{\mu\nu} \rightarrow$ Curvature determines the trajectories of particles and light.
- **GU Formalism:** $G_{\mu\nu} \equiv 0$. All geometric derivatives of GR are replaced by the local gradient of the mass m in relation to the background energy (GU_e).

The deflection of energy and matter flows (e.g., the gravitational lensing effect) is not a consequence of a "bent space", but a purely energetic refraction effect forced by the density of m within the topological agility field ε .

4. Local relativity and the definition of time dilation

Time (t) loses its status as the fourth dimension of a Minkowski space. It is a purely secondary variable, defined exclusively as the interval between two local state changes of energy:

$$t \equiv \tau(\Delta GU_e)$$

Since mass $m = E/c^2$ shifts the local ratio by the agility coefficient ε , any mass concentration alters the local tension value. Higher mass m induces a local frequency change of the energetic equalization processes (ΔGU_e). This leads to the mathematical and physical derivation of local time dilation, without the need to postulate a variable spacetime flow.

5. The Euclidean deduction of the Cosmological Constant (Λ)

Einstein's historical introduction of the Cosmological Constant (Λ) was based on the physical necessity to counteract an absolute collapse of the system. In orthodox

cosmology, this term is primarily interpreted today as "Dark Energy" or as the geometric driver of space expansion.

Within the framework of the GU axiomatics, the phenomenon Λ is not postulated as an independent force or substance, but derived as a formal-logical consequence of the irrational global symmetry. To obtain the dimensionless base tension, the fundamental global Euclidean base energy density ρ_0 is introduced as a normalization constant. Since the quotient of the infinite constants mathematically generates not a smooth rational integer value (standstill), but a transcendental constant, this results in a permanent, unresolvable base tension of the matrix:

$$KBT_{base} = \rho_0 \left(\frac{GU_d}{GU_e} \right) \sim 1 \quad \Rightarrow \quad KBT_{base} = 1 + \varepsilon$$

The physical equivalent of the Cosmological Constant is thus substituted in the GU model by exactly this irrational remainder term (ε):

$$\Lambda_{Effect} \propto \varepsilon$$

The GU theory integrates Einstein's premise of a permanent background value, but modifies its physical causality: Λ represents in this model no property for the curvature or expansion of space, but formulates the inextinguishable kinetic base pressure of the GU_e , which mathematically prevents the vector field from ever relaxing into an absolute homogeneity.

Summary of the Substitution Matrix

Physical Phenomenon	GR Explanation (Einstein)	GU Correction (Substitution)
Space structure	Dynamic, curvable, elastic ($g_{\mu\nu}$)	Rigid, infinite, incalculable ($GU_d \equiv \infty$)
Gravitation	Geometric property of spacetime	Energetic refraction effect based on $m = E/c^2$
Time	Dimension of a 4D spacetime	Local duration between energetic changes (ΔGU_e)
Cosm. Constant (Λ)	Vacuum energy of space	Permanent local agility coefficient ($\varepsilon \neq 0$)

6. Ontological decoupling and the envelope surface principle

Instead of space curvature, the GU model causally redefines mass. Energy does not transform into a substance called "mass" through topological closure into a rotational system. Mass is ontologically defined as a pure topological boundary surface effect. The phenomenon of "mass" arises exclusively at the exact geometric envelope surface where

the translational vector flow of the external, unbound energy is blocked by the Euclidean stability of the inner closed rotational dynamics.

Chapter 1: Epistemic Foundation and Stochastic Continuum Mechanics

1.1 Epistemological Redefinition of Space

Established physics equips the vacuum with properties such as metrics or quantum fluctuations. In contrast, the GU model defines space (GU_d) strictly as intrinsically propertyless. It possesses no physical attributes, no causality, and no internal dynamics. It is the pure infinite Euclidean presence – the fundamental matrix whose existence is the condition for vector relations to take place.

1.2 Vectorial Interference and Non-Homogeneity

Since the set of all inhomogeneous states infinitely exceeds the number of the single homogeneous state, structural inhomogeneity is physically almost certain ($P = 1$). The Euclidean continuum is continuously traversed by stochastic equalization flows. The existence of density differences ($\nabla \rho_e \neq 0$) is a Euclidean inevitability.

1.3 Kinematic Asymmetry and the Vector Jam

If vector flows cross constructively, a local zone of negative divergence results ($\nabla \cdot \vec{J} < 0$). Since the inflow from the outside is massively larger than the outflow to the inside, and the envelope surface of the rigid Euclidean space shrinks quadratically ($A = 4\pi r^2$), the continuity equation ($\frac{\partial \rho_e}{\partial \tau} + \nabla \cdot \vec{J} = 0$) forces a deterministic energetic jam in the center.

1.4 Time Limitation at the Density Plateau

The duration of a local equalization interval $\Delta\tau$ is inversely proportional to the driving energetic difference ($\Delta\tau \propto 1/|\nabla \rho_e|$). At the center of the spherical jam, the gradient flattens extremely. During the last pre-singular time increment ($\Delta\tau_{crit}$), the external inflow supplies the residual energy required to raise the density plateau to the absolute saturation limit. Pure translation breaks down.

Chapter 2: The Energetic Phase Transition (Mode Conversion)

2.1 The Energy Equivalent of Saturation (Ψ_{crit})

The damming up of free energy in the center of convergence is a purely energetic process. If the dimensionless tension index reaches the limit value KBT_{crit} , the linear vector flow in Euclidean space is locally blocked. The absolute materialized energy value of this saturation is defined by the integral of the critical energy density $\rho_{e(crit)}$ over the three-dimensional core volume V_{core} :

$$\iiint_{V_{core}} \rho_{e(crit)} dx dy dz = \Psi_{crit} = 938.272 \text{ MeV}$$

2.2 The Instantaneous Phase Transition (Bifurcation)

Upon reaching KBT_{crit} , the continuity equation forces a sudden mode conversion of the energetic agility. The translational flow breaks off and transforms into a closed circulation. The differential geometric condition for the freezing of agility is:

$$\nabla \cdot \vec{J} = 0 \quad \text{and} \quad \nabla \times \vec{J} \neq 0$$

Since the field becomes source- and sink-free ($\nabla \cdot \vec{J} = 0$), the temporal change of the internal energy density comes to a standstill ($\frac{\partial \rho_e}{\partial \tau} = 0$). The three-dimensional closure of the flow mandatorily results in the double-loop rotational geometry of a lemniscate.

2.3 Separation of Stagnation and Simultaneity in the Core Volume (V_{core})

Since the density gradient in the exact center of the macro-sphere flattens asymptotically ($\nabla \rho_e \rightarrow 0$), a spatial density plateau (V_{core}) emerges.

- **Internal Stagnation:** Since the local time duration is $\Delta\tau \propto 1/|\nabla \rho_e|$, the time for internal equalization processes diverges towards infinity ($\Delta\tau_{internal} \rightarrow \infty$). The plateau loses any internal temporal sequence and behaves kinetically like a rigid block.
- **Absolute Simultaneity (Ignition):** The external, pushing vector flow compresses this rigid block further. When the external pressure raises the density in the plateau to $\rho_{e(crit)}$, the threshold value KBT_{crit} is exceeded throughout the entire core volume V_{core} in the exact same external time cycle.
- **The Cascade:** The simultaneous vector blockade abruptly withdraws a gigantic volume of free agility from the system. The external energy plunges into this primary topological sink, triggering a radially outward propagating chain reaction of mass formation (implosion).

Chapter 3: The Corollary to the Kinetic Base Tension

3.1 The Mathematical Formulation of Agility

There are no negative energy values. Kinematic agility (A_{kin}) – the measurable working capacity of the system – results exclusively from the deviation from the dimensionless rest value 1:

$$A_{kin} \propto |KBT - 1|$$

A local exceedance ($KBT > 1$) generates an outward pushing density gradient, a shortfall ($KBT < 1$) generates a topological sink into which surrounding unbound energy flows.

3.2 Time-Induced Inertia

The system permanently strives to equalize local deviations. Since space (GU_d) is rigid, overcoming the energy difference requires a specific time duration $\Delta\tau$. Inertia is not an inherent substance property, but the temporal delay (viscosity) forced upon the vectorial flow by the Euclidean space.

3.3 Transient Mode Conversion (Particle Shower)

If the geometric envelope surface of a lemniscate is destroyed, locally extremely compressed energy ($KBT \gg 1$) is instantaneously released. The time-induced inertia prevents an immediate global equalization. An abrupt translational jam ($KBT > KBT_{crit}$) occurs at the neighboring coordinates. To intercept the impermissible flow, the space constant forces secondary mode conversions. The excess agility is forced into short-lived (transient) lemniscates, which Euclideanly substantiates the phenomenology of a particle shower.

3.4 The Zero-Sum Theorem

The existence of complementary divergences is a mathematical theorem derived from global symmetry. The global integral of all density fluctuations must yield exactly zero. For every closed interaction volume (V_{int}), the following applies:

$$\int_{V_{int}} (KBT - 1) dV = 0$$

Every local compression ($KBT > 1$) mandatorily requires a compensating topological deficit ($KBT < 1$) in its Euclidean environment. The active dynamics is the deterministic endeavor of the vector flow to dissipate this tension.

Chapter 4: Topological Geometry of the Primary Soliton

4.1 The Theoretical Prediction of the Envelope Curve

Source freedom with simultaneous rotation topologically requires a self-closed flow. The fundamental solution of this mode conversion is the three-dimensional lemniscate (Cassini oval). *(The complete differential geometric derivation of this structural phase transition is provided in the supplementary publications).* Since the empirical structural parameters exhibit $a > c$, the curve does not disintegrate and does not form a spindle torus. The rotation of the two-dimensional curve around the x-axis generates a dumbbell-shaped Cassini ovaloid of revolution in Euclidean space, whose envelope surface is determined by the following three-dimensional equation:

$$(x^2 + y^2 + z^2)^2 - 2c^2(x^2 - y^2 - z^2) = a^4 - c^4$$

Its purely mathematical envelope curve mandatorily yields two structural radii:

- **Maximum radius (outer periphery):** $R_{ext} = \sqrt{a^2 + c^2}$
- **Waist radius (inner sink):** $R_{int} = \sqrt{a^2 - c^2}$

4.2 The Physical Scattering Hypothesis

To empirically test the mathematical model, the physical hypothesis is formulated that scattering experiments scan the topological inertial resistance at these geometric boundaries according to the envelope surface principle. Since the vector field is denser in the Euclidean sink (waist), penetration requires a higher momentum.

- The low-mass electron scatters at the outer inflection point (R_{ext}).
- The high-mass muon penetrates the periphery and scatters at the inner waist radius (R_{int}).

4.3 The Empirical Verification (Proton Radius Puzzle)

Inserting the radii measured in orthodox physics of 0.877 fm (electron) and 0.841 fm (muon) into the Euclidean system of equations yields real, finite structural parameters for the undisturbed primary soliton:

$$a = \sqrt{\frac{0.877^2 + 0.841^2}{2}} \approx 0.859 \text{ fm}$$

$$c = \sqrt{\frac{0.877^2 - 0.841^2}{2}} \approx 0.176 \text{ fm}$$

The system of equations does not diverge. The anomalous difference in scattering radii of approx. 4% is therefore not a measurement error of orthodox physics, but the empirical proof for the existence of the Cassini envelope surface in the Euclidean phase transition.

4.4 Universal Constancy and Topological Stability (Identity Principle)

The differentiating, relative-local free external energy of the GU_e , which lies directly against the envelope surface of the lemniscate, is normalized by the global reference system. Since the quotient of the infinite constants (GU_d/GU_e) mathematically does not generate a rational integer value, but a transcendental constant ($KBT_{base} \sim 1$), the Euclidean matrix never falls into an absolute topological standstill.

In the general energetic equalization of the unbound space, this irrational residual value plays no macroscopic role, since the active tension deviations vectorially cancel each other out according to the zero-sum theorem and relax towards the fundamental base ratio.

For the envelope surface of a bound energy (lemniscate), however, exactly this asymptotic base value is the mechanical cause of its absolute structural stability. The surrounding field acts through the permanent, never-extinguishing irrational base pressure (~ 1) as a rigidly fixed, eternally active counterpole to the internal rotation.

The resulting energetic level at the envelope surface is defined by the gradient between the structural blockade and this asymptotic outer space:

$$\Phi_{Envelope} - \Phi_{Outer} \equiv \Delta\Phi_{KBT} \propto (KBT_{base} \sim 1)$$

This complementary potential equilibrium against the irrational base value guarantees the universal constancy of the envelope surface potential. It Euclideanly and mechanically prevents any drift of the fundamental particle properties and provides the causal justification for the permanent stability of the primary soliton.

Additional Publications

Further documents detailing specific topics calculated within the framework of this theory are published at <https://zenodo.org/>

Acknowledgments

The conceptual framework of this theory was developed independently by the author. The author acknowledges the use of artificial intelligence language models for assistance with the formal mathematical formulation, differential geometric deductions, and translation into standardized academic English. All resulting theoretical constructs and conclusions remain the sole intellectual responsibility of the author.

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