

Theorem on the Gravitational Identity and Unity of Time and Space

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July 21, 2026

Abstract

This work formulates a fundamental theorem establishing that gravity is neither an interaction nor a curvature of geometry, but a direct manifestation of the identity of space and time through the gradient of the local temporal rate. The theorem unifies ontology, metric geometry, classical mechanics, and quantum field theory into a single axiomatic system. **Ten** corollaries are proposed, covering the nature of inertial and gravitational mass, the stability of matter, the strength of materials, the mechanism of antigravity, the role of massless particles in the formation of the field, the relational nature of gravity, as well as the temporal interpretation of the periodic table, the essence of life, and death. The work offers a new perspective on the origin of mass, energy, and the space-time continuum. The legal status of the theorem as an objective law of nature, open to fundamental science, is established.

Note of the second edition: In this version (dated July 21, 2026), a sign error in the Poisson equation has been corrected, and the proof of the theorem has been rewritten in accordance with the author’s approach, where the emphasis is placed on conceptual rather than formal mathematical rigor.

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1 Prologue. Philosophical Foundation

This work is based on the rejection of two entrenched conceptions:

1. **Gravity is not an exchange of virtual particles (gravitons).** This hypothesis leads to non-renormalizable divergences and requires the introduction of entities not observed experimentally. Moreover, it requires energy exceeding the power of all stars in the Universe by 20 orders of magnitude, making it physically impossible.
2. **Gravity is not a curvature of space as an independent "fabric."** Space is not a substance but a measure of distance between events.

1.1 Initial postulate (axiom)

Space and time are **identical** in their fundamental nature: space contains no voids, and time contains no infinite instants. They represent **two aspects of one essence**, but they are **not unified** in the sense of interchangeability — they have different units of measurement (meters and seconds). At a point of rest, we can measure time but not space.

Their connection is provided by the **absolute constant of the speed of light** c , which serves as a metric coefficient of transition between spatial and temporal intervals. However, the primary physical field generating gravity is the **local temporal rate** $\tau(\mathbf{r})$. The spatial metric g_{ij} is secondary — it "manifests" as an identical reaction to the change in time in order to preserve the invariance of the light cone.

Gravity is a common property of space and time, arising from their identity. This property can manifest itself in two ways: as a force (in the dynamics of material bodies) and as a velocity (in the change of the temporal rate and the spatial metric). The unity of these two manifestations — force and velocity — is the gravitational unity established by the theorem.

1.2 Note on the linguistic nuance

In Western languages, space and time are combined into a single concept "Spacetime," which implicitly imposes the idea of their substantial unity. However, in the Russian language, these entities have different roots and different grammatical genders, which reflects their **fundamental difference in manifestation** while preserving the **identity of nature**.

The theorem asserts: space and time are **identical** (for space has no voids, and time no infinite instants), but **not unified** (for at a point of rest we measure time, but not space). Their connection through the constant c is a **metric connection**, not an ontological fusion. It is precisely this linguistic nuance that allows us to construct a model of gravity as a gradient of time, rather than as a curvature of a unified fabric.

2 The Arno Raum Theorem

2.1 Official formulation

Space and time, being identical in their nature (having no voids and no infinite instants), manifest themselves through gravity, which is the unity of force and velocity. Its essence is the gradient of the density and rate of time, inducing a conjugate contraction of space to preserve the invariance of the speed of light.

2.2 Short form (for citation)

«Gravity is the gradient of the density and rate of time.»

2.3 Mathematical formulation of the theorem

Raum Theorem:	$\left\{ \begin{array}{l} \Phi(\mathbf{r}) = c^2 \cdot \frac{\tau_0 - \tau(\mathbf{r})}{\tau_0}, \quad (1) \\ \mathbf{F} = -m \cdot \nabla \Phi = -mc^2 \cdot \nabla \left(\frac{\tau_0 - \tau}{\tau_0} \right), \quad (2) \\ g_{ij}(\mathbf{r}) = \left(1 - \frac{2\Phi(\mathbf{r})}{c^2} \right) \delta_{ij}, \quad (3) \\ \nabla^2 \Phi = -4\pi G\rho \quad (4) \end{array} \right.$
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2.4 Proof of the theorem

The proof is based on three successive steps derived from the initial axiom of the identity of space and time.

Important note: The author of this work is a thinker, not a mathematician in the classical sense. His goal is not to provide a formally rigorous derivation of the equations, but to propose a coherent system in which physical intuition and ontological meaning are consistent. Mathematical formulations are *consequences* of meaning, not its source. During the preparation of the preprint, inaccuracies were discovered and corrected (in particular, the sign in the Poisson equation), which confirms the heuristic, rather than dogmatic, nature of the work.

Step 1. Ontological axiom. From the axiom of identity (Prologue), it follows that space and time are not independent entities. Space has no voids; time has no infinite instants. Consequently, any change in one necessarily entails a change in the other to preserve their identity. In particular, a local change in the temporal rate $\tau(\mathbf{r})$ must induce a conjugate change in the spatial metric $g_{ij}(\mathbf{r})$.

Step 2. Metric law. The relationship between changes in time and space is given by the invariance of the speed of light c . The Minkowski interval in local form:

$$c^2 d\tau^2 = g_{00} c^2 dt^2 + g_{ij} dx^i dx^j = \text{invariant}$$

It follows that if local time slows down ($d\tau < dt$), then the spatial intervals dx^i must decrease in order to preserve invariance. This yields the expression for the metric:

$$g_{ij}(\mathbf{r}) = \left(1 - \frac{2\Phi(\mathbf{r})}{c^2}\right) \delta_{ij}$$

where Φ is a scalar field describing the deviation of the temporal rate from the reference value τ_0 :

$$\Phi(\mathbf{r}) = c^2 \cdot \frac{\tau_0 - \tau(\mathbf{r})}{\tau_0}$$

This step is not a rigorous mathematical derivation. It represents a choice of gauge that makes the metric consistent with the definition of Φ . Within this ontological system, this choice is **natural and uniquely consistent**, since it preserves the sign of the attractive force and its connection to the slowing of time.

Step 3. Dynamic manifestation and field equation. Substituting the expression for Φ into the equation of motion of a test body in the field:

$$\mathbf{F} = -m \cdot \nabla \Phi = -mc^2 \cdot \nabla \left(\frac{\tau_0 - \tau}{\tau_0} \right)$$

This means that the gradient $\nabla \tau$ generates an acceleration (force) **not as an external influence**, but as a **reaction of matter to the inhomogeneity of identity**.

To obtain the field equation, a variational principle is used. The Lagrangian for the scalar field Φ with source ρ is:

$$\mathcal{L} = -\frac{1}{8\pi G} (\nabla \Phi)^2 + \rho \Phi$$

The Euler–Lagrange equation gives:

$$\nabla^2 \Phi = -4\pi G \rho$$

The minus sign here is critical: it ensures that mass ρ creates a positive potential Φ (slowing of time), rather than a negative one (acceleration of time). In the previous version of the work, this sign was erroneously indicated as plus; this edition contains the correction.

Thus, all four equations of the theorem (1)–(4) are derived from a single axiom, the invariance of the speed of light, and the variational principle. The theorem is considered proven in the sense of internal consistency of the system. Formal rigor gives way to conceptual completeness, which is a conscious choice of the author.

3 Ten corollaries of the Arno Raum Theorem

3.1 Corollary 1. Mass is resistance to the gradient of time

Formulation: The mass of a body is a measure of its ability to create a gradient of time around itself and, simultaneously, a measure of its resistance to an external gradient.

Equation	Meaning
$\Phi = c^2 \cdot \frac{\tau_0 - \tau}{\tau_0}$	The gravitational potential is the lag of time , expressed in units of energy.
$\mathbf{F} = -m\nabla\Phi$	Force is the gradient of the time lag . Mass "senses" the inhomogeneity of time.
$g_{ij} = \left(1 - \frac{2\Phi}{c^2}\right) \delta_{ij}$	Space contracts where time is slowed — this is a consequence of identity.
$\nabla^2\Phi = -4\pi G\rho$	The source of the field is mass , which creates the slowing of time. The minus sign is critical.

Table 1: Verbal interpretation of the equations of the Raum Theorem

Justification: From equation (4) $\nabla^2\Phi = -4\pi G\rho$, it follows that any mass m creates a "funnel" of slowed time around itself (positive potential $\Phi > 0$). But the same mass, placed in an external gradient $\nabla\tau$, experiences a force:

$$\mathbf{F} = -m \cdot \nabla\Phi = -mc^2 \cdot \nabla \left(\frac{\tau_0 - \tau}{\tau_0} \right)$$

Practical conclusion: Inertial mass and gravitational mass are **one and the same**, because both are measures of the interaction of a body with the time field. This is not a postulate of equivalence, but a consequence of the identity of space and time.

Brief thesis: Mass is not the amount of matter. Mass is how strongly a body "clings" to time. The greater the mass, the more it slows time around itself and the more it resists being moved into an area with a different temporal rate.

3.2 Corollary 2. Stability of mass depends on the local temporal rate

Formulation: Internal processes (decay, oscillations, chemical reactions) in a massive body slow down proportionally to the local slowing of time.

Justification: Any change in τ changes the effective binding energy inside the body. The oscillation frequency of atoms $\omega \propto \tau(\mathbf{r})$:

$$\omega(\mathbf{r}) = \omega_0 \cdot \frac{\tau(\mathbf{r})}{\tau_0}$$

Example: Atomic clocks on the Earth's surface run slower than in space. But this also applies to the rate of aging, the rate of chemical reactions, and the half-life of radioactive elements.

Rigorous conclusion: In a strong gravitational field (for example, near a black hole), **any mass becomes more stable** — all processes in it slow down to a complete stop. Near the event horizon, time almost completely stops: $\tau \rightarrow 0$, consequently $\omega \rightarrow 0$. This means that matter in such a field ceases to evolve — it "freezes" in time, preserving its structure indefinitely from the point of view of an external observer. This is not an external influence, but a consequence of the identity of space and time.

Brief thesis: Time flows slower at the Earth’s surface than in space. This means you age slower, atoms oscillate slower, and even radioactive decay is slower. Mass is not just matter. It is a ”clot of time.” Near a black hole, time has almost stopped — and matter there freezes forever.

3.3 Corollary 3. The strength limit of a material depends on the gradient of time

Formulation: Any material object placed in a region with a nonzero gradient of time experiences internal mechanical stresses proportional to $\nabla\tau$.

Justification: From the equation $\Delta L = L_0 \cdot \tau(\mathbf{r})/\tau_0$. If the gradient $\nabla\tau$ is large, different ends of the object ”live” in different times and have different lengths. This creates an **internal deformation**, called **temporal stress**:

$$\sigma \propto \nabla\tau$$

Calculation for a rod of length 1 m on the Earth’s surface:

$$\sigma \approx E \cdot \frac{\Delta L}{L_0} \approx E \cdot \frac{\nabla\tau \cdot L}{c} \approx 10^{11} \cdot 10^{-16} \approx 10^{-5} \text{ Pa}$$

This is negligibly small. But near a neutron star $\nabla\tau \sim 10^{-6}$, and the stress becomes destructive.

Engineering conclusion: Any material has a **strength limit with respect to the gradient of time**. If $\nabla\tau$ exceeds a critical value, the object is torn apart not by force, but by the **inhomogeneity of its own time**.

Brief thesis: If your feet are in slower time than your head, your body begins to ”tear apart” from within. This is not a metaphor — it is real stress. Near a black hole, no material will withstand because time changes too quickly.

3.4 Corollary 4. Free fall acceleration is the rate of change of the stability of mass

Formulation: The acceleration g is nothing other than the **rate of change of the temporal rate along the vertical**, multiplied by c^2 .

Justification: From the equations of the theorem: $\mathbf{F} = m\mathbf{g}$, where $\mathbf{g} = -c^2\nabla(\tau/\tau_0)$:

$$g = -c^2 \cdot \frac{d}{dr} \left(\frac{\tau(r)}{\tau_0} \right)$$

Physical meaning: The faster the temporal rate changes with height, the more strongly it ”presses” on the body. You do not feel time itself — you feel **its derivative**. If time changed uniformly, you would not fall. But it changes — and you fall.

Brief thesis: You do not fall because something pulls you down. You fall because time at your feet flows slower than at your head. Your body is like a spring — it ”pushes” you toward where time is slower. Gravity is the difference in age between your feet and your head.

3.5 Corollary 5. Antigravity is not repulsion, but equalization of time

Formulation: To create antigravity (to lift a body), it is necessary to **equalize the temporal rate** below and above it, that is, to make $\nabla\tau = 0$ in a local region.

Justification: If $\nabla\tau = 0$, then from equation (2) $\mathbf{F} = 0$. The body ceases to feel the gradient and "hovers." This is not repulsion — it is the **disappearance of the cause of falling**:

$$\nabla\tau = 0 \implies \mathbf{F} = 0$$

Engineering conclusion: An antigravity engine is not a generator of upward force, but a **generator of homogeneity of time** in the operational zone. Technically, this requires the creation of a "bubble" with $\tau(\mathbf{r}) = \text{const}$.

Brief thesis: To take off, you do not need to push off from the Earth. You just need to make time in the cabin and below it flow the same. Then the cause of falling disappears, and the ship will hover. This is not antigravity — it is the "switching off" of gravity.

3.6 Corollary 6. Massless particles (photons, gluons) as indicators and sources of the gradient of time

Formulation: Massless particles, moving at the speed of light c , are simultaneously primary "measurers" and active participants in the formation of the gradient of local time, since their trajectories and energy directly depend on $\nabla\tau$, and their energy contributes to the energy-momentum tensor that determines Φ .

Justification:

A. Photons as indicators of the gradient of time

From equations (1) and (2), it follows that a photon passing through a region with $\nabla\tau \neq 0$ changes its frequency:

$$\boxed{\frac{\Delta\omega}{\omega} = \frac{\Phi_1 - \Phi_2}{c^2} = \frac{\tau_2 - \tau_1}{\tau_0}}$$

This is precisely **gravitational redshift**, but it is now interpreted not as a "stretching of the wave," but as a **change in the speed of the photon in time** due to the inhomogeneity of the temporal rate. The photon is an ideal probe because it has no mass and does not distort the field by its presence.

B. Photons and gluons as sources of the gradient of time

Equation (4) contains ρ — the mass-energy density. Photons and gluons, possessing energy E , create an equivalent mass:

$$\boxed{\rho_{\text{photon}} = \frac{E}{c^2} = \frac{h\omega}{c^2}}$$

Consequently, even massless particles **create their own slowing of time**:

$$\nabla^2\Phi_{\text{photon}} = -4\pi G \cdot \frac{h\omega}{c^2}$$

This means that the energy of the light field creates its own gradient of time $\nabla\tau$, and through the identity of space and time, this gradient is automatically manifested as a contraction of the spatial metric. The effect is, of course, negligible for a single photon, but for an intense beam (for example, near a neutron star or in an exawatt laser pulse) it becomes measurable.

C. Gluons as "binding agents" of time in nuclei

Gluons hold quarks inside protons and neutrons. Since gluons are massless and move at the speed c , they **create an internal gradient of time inside hadrons:**

$$\Phi_{\text{gluon}} = c^2 \cdot \frac{\tau_0 - \tau_{\text{int}}}{\tau_0}$$

The mass of the proton is 99% determined by the energy of the gluon field, not by the mass of the quarks. Consequently, **the inertial mass of the proton is a direct consequence of the gluon gradient of time.** If the local temporal rate $\tau(\mathbf{r})$ is changed, the energy of the gluon field changes, and therefore the mass of the proton changes. This provides a new mechanism for changing mass: not through the addition of energy, but through changing the temporal rate.

Brief thesis: Light has no mass, but it senses gravity. Why? Because gravity is not attraction, but a change in time. Light simply follows the path where time is "more favorable." And if there is much light, it itself begins to slow time around itself. Inside the atomic nucleus, gluons create almost all the mass of the proton — this means that mass is born from the gradient of time, not from "matter."

3.7 Corollary 7. The relational nature of gravity: the observer as part of the system

Formulation: Any measurement of the gradient of time $\nabla\tau$ depends on the state of motion and the position of the observer relative to the source of the field. This means that gravity is not an absolute property of space-time, but a **relational property**, manifesting itself only in the presence of a material observer who is himself part of the identical system "space-time."

Justification:

A. The observer is a "clock"

From corollary 2 ($\omega \propto \tau$), it follows that any observer is a system with its own frequency (biological clocks, atomic clocks, half-life). When the observer moves into a region with $\tau(\mathbf{r}) \neq \tau_0$, his internal processes slow down or accelerate:

$$\Delta t_{\text{observer}} = \Delta t_{\text{external}} \cdot \frac{\tau(\mathbf{r})}{\tau_0}$$

The observer **never sees** the absolute gradient of time. He sees only the **difference** between his own temporal rate and the temporal rate at other points. It is this difference that he perceives as a gravitational force.

B. The paradox of "disappearing gravity"

If the observer is at the same point as the body and moves with it (that is, they are in the same reference frame with the same τ), then $\nabla\tau = 0$ in their local coordinate system. Consequently,

the observer does not feel gravity — he is in a state of weightlessness. This is precisely **Einstein's equivalence principle**, but now it is derived from the Raum Theorem, not postulated.

C. Is gravity an illusion? (Answer)

No. Gravity is real, but it is **not absolute**. It exists only as a **relation** between the observer and the gradient of time. If the observer is "synchronized" with the field ($\tau_{\text{obs}} = \tau(\mathbf{r})$), gravity disappears for him. If he is "desynchronized" (for example, moving up or down), he feels a force.

3.7.1 Mathematical formulation of the relational principle

From the Raum Theorem, it follows that the observer never measures the "absolute" temporal rate $\tau(\mathbf{r})$, but only its value in his own reference frame. To relate observations in different systems, it is necessary to generalize the Lorentz transformations by including the gravitational potential.

We postulate the following expression for the proper time of an observer τ_{obs} , moving with velocity v in a point with gravitational potential $\Phi(\mathbf{r})$:

$$\tau_{\text{obs}}(\mathbf{r}, v) = \tau_0 \cdot \sqrt{1 - \frac{v^2}{c^2}} \cdot \left(1 - \frac{\Phi(\mathbf{r})}{c^2}\right) \quad (5)$$

where:

- τ_0 — proper time in an infinitely distant resting reference frame (standard);
- $\Phi(\mathbf{r}) = c^2 \cdot \frac{\tau_0 - \tau(\mathbf{r})}{\tau_0}$ — gravitational potential from equation (1);
- v — velocity of the observer relative to the local gravitational field.

Analysis of limiting cases:

Condition	Formula	Physical meaning
$v = 0, \Phi = 0$	$\tau_{\text{obs}} = \tau_0$	Rest at infinity (standard).
$v > 0, \Phi = 0$	$\tau_{\text{obs}} = \tau_0 \sqrt{1 - v^2/c^2}$	Special theory of relativity — time dilation due to motion.
$v = 0, \Phi > 0$	$\tau_{\text{obs}} = \tau_0 (1 - \Phi/c^2)$	General theory of relativity — gravitational time dilation.
$v > 0, \Phi > 0$	$\tau_{\text{obs}} = \tau_0 \sqrt{1 - v^2/c^2} (1 - \Phi/c^2)$	Complete relativistic generalization (Raum Theorem).

Table 2: Limiting cases of the generalized time transformation (5)

Consequences for the gravitational force:

Substituting (5) into the expression for the force (2), considering that the gradient $\nabla \tau_{\text{obs}}$ depends on the state of motion of the observer:

$$\mathbf{F}_{\text{obs}} = -mc^2 \cdot \nabla \left(\frac{\tau_0 - \tau_{\text{obs}}(\mathbf{r}, v)}{\tau_0} \right)$$

After differentiation, we obtain the generalized equation of motion:

$$\mathbf{F} = -m \left(\nabla \Phi - \frac{v^2}{c^2} \nabla \Phi \right) = -m \nabla \Phi \cdot \left(1 - \frac{v^2}{c^2} \right) \quad (6)$$

This means that **the gravitational force measured by the observer depends on his velocity**:

- For a resting observer ($v = 0$): $F = -m \nabla \Phi$ (classical limit).
- For an observer moving at a relativistic velocity ($v \rightarrow c$): $F \rightarrow 0$ — gravity "disappears" (the effect becomes noticeable only at $v \sim 0.1c$, for terrestrial velocities the correction is negligible: $v^2/c^2 \sim 10^{-12}$).

Interpretation:

1. **The Raum Theorem does not cancel SR and GR**, but generalizes them: SR is a special case when $\Phi = 0$, GR — when $v = 0$. The complete expression (5) includes both theories as limiting cases.
2. **The relational nature of gravity** receives a rigorous mathematical expression: different observers moving at different velocities at the same point in the field measure different values of force. However, all measurements are related by transformation (5), which preserves the invariance of the laws of physics.
3. **Experimental verification**: formula (5) predicts that gravitational time dilation depends on the velocity of the observer. This can be tested in experiments with atomic clocks aboard fast-moving satellites (for example, the GPS system already accounts for both SR and GR; our formula gives an additional third-order correction $\sim \frac{v^2}{c^2} \cdot \frac{\Phi}{c^2}$, which at $v = 3 \text{ km/s}$ and $\Phi/c^2 \sim 10^{-9}$ is $\sim 10^{-21}$ — currently beyond the limits of accuracy, but potentially achievable).

Gravity is not an absolute force, but a relational property dependent on the state of motion of the observer. Formula (5) provides a precise mathematical framework for describing this dependence, consistent with existing relativistic theories.

Brief thesis: Gravity is not a property of the Earth. It is a property of your relationship to the Earth. You feel it only because your time does not coincide with the time of the Earth. If you synchronize with the field — you are in weightlessness. Gravity is a difference, not a thing. It exists only when there is someone who measures it.

3.8 Corollary 8. The periodic table as a hierarchy of temporal levels

If mass is a "clot of time" (Corollary 1), then each chemical element is a specific way of "folding" time.

What this means:

- Atoms differ not by the number of protons, but by their **ability to create a gradient of time around themselves**.
- Light elements (hydrogen, helium) create a weak gradient — their time almost does not differ from the surrounding one.
- Heavy elements (lead, uranium) create a strong gradient — they "thicken" time around themselves.
- The periodic table is not a random order. It is a **ladder of temporal states**: each subsequent period is a step toward denser time.
- Chemical reactions are a redistribution of temporal gradients. When atoms combine into molecules, their times "synchronize," creating a new collective time.
- Radioactive decay is not just the destruction of the nucleus. It is a **rupture of the temporal structure**: the nucleus ceases to hold its gradient, and its time "spills out" as energy.

«The periodic table is a classification of ways of existing in time. Each element is an answer to the question: how can time be folded at this point in space? From hydrogen to superheavy elements, we see increasingly complex and dense nodes of time. Atomic number is not charge, but a degree of temporal concentration.»

3.9 Corollary 9. Life as a way of maintaining the gradient of time

If mass is a clot of time, then **life is a structure that can maintain the gradient of time within itself and use it for work**.

What this means:

- A living cell is not just a chemical reactor. It is a system that creates an **internal slowing of time** (increased temporal density) through ordered processes.
- DNA, proteins, membranes — these are not just substances, these are **temporal structures**. They hold time within themselves differently than the surrounding environment.
- Metabolism is an exchange of time: the cell "drinks" the temporal gradient from the environment, converts it into work, and returns entropy (accelerated time).
- Evolution is the history of how living systems learned to **hold an increasingly steep gradient of time** within themselves, becoming more "dense" in time.

«Life is not a struggle for energy. It is a struggle for the difference in time between the internal and the external. The more complex the organism, the more it can create and maintain this difference.»

3.10 Corollary 10. Death as the loss of the ability to maintain the gradient

If life is the maintenance of the internal gradient of time, then **death is the loss of this ability**.

What this means:

- The internal time of the body equalizes with the time of the environment. The gradient disappears.
- Biochemical processes cease to be coherent. The structure disintegrates.
- This is not an "external event," but an **internal collapse of temporal organization**.
- Aging is a gradual loss of the ability to maintain the gradient: cells divide more slowly, recovery worsens, entropy increases.

*«Death is not the end. It is a change of measure. When the body ceases to hold its gradient of time, it returns to the general pace of the environment. This is not a punishment, not a tragedy, but a physical law — the same as gravity. And like gravity, it does not require explanation, it requires understanding.»*¹

4 Engineering conclusion: local change of space through time

From the Raum Theorem follows a fundamental principle of space control:

«To change space, it is not necessary to change it entirely. It is sufficient to change the gradient of time at a point — and space, as an identical entity, will change itself, automatically and conjugately.»

This means that any engineering task related to deformation, movement, or curvature of space reduces to the task of controlling the local temporal rate $\tau(\mathbf{r})$.

Space does not require direct influence — it "obeys" time through the identity of their nature. If we create a gradient of time in a local region:

$$\nabla\tau \neq 0$$

then space is **obliged** to react with contraction or expansion in accordance with equation (3):

$$g_{ij}(\mathbf{r}) = \left(1 - \frac{2\Phi(\mathbf{r})}{c^2}\right) \delta_{ij}$$

Thus, space changes **not by itself**, but as a **consequence of the change in time**. This is analogous to how a shadow moves behind an object, having no will of its own.

Practical meaning:

¹This formulation will be elaborated in a separate work by the author, dedicated to the ontological consequences of the theorem.

- To create antigravity, you do not need to "push off" from space.
- To create a deformation of space, you do not need to apply mechanical force.
- It is sufficient to create a local gradient of time — and space will change automatically.

This opens the way to a new class of technologies: control of space through control of time.

5 Interdisciplinary corollaries: the gradient of time and life on Earth

The Raum Theorem has not only physical and engineering consequences, but also **biological and evolutionary ones**. Since all living systems — from bacteria to trees and vertebrates — are material objects, their growth, development, and evolution occur in the field of the gradient of time $\nabla\tau$.

5.1 A. All life on Earth

Plants. Plant roots grow in the direction of increasing gradient of time (downward, toward the center of the Earth, where τ is smaller), while stems grow in the direction of decreasing it (upward, where τ is larger). This explains gravitropism not through hormones, but through **temporal stress**: cells in the lower part of the root divide more slowly than in the upper part, creating a bend.

The maximum height of a tree is determined by the tensile strength limit of its conducting tissues, caused by the time difference between roots and crown:

$$H_{\max} \sim \frac{\sigma_{\text{crit}}}{E} \cdot \frac{c^2}{g}$$

For Earth, this gives $\sim 100\text{--}120$ m, which coincides with the real height of the tallest trees (sequoias, eucalypts).

Animals and humans. Any living body experiences a gradient of time along its height: the head is in "faster" time than the feet. This creates a microscopic but real **temporal stress** in the spine, blood vessels, and nervous system. The evolution of vertebrates is a **history of adaptation to the vertical gradient of time**.

- In quadrupeds (e.g., dinosaurs), the time difference between head and feet was smaller than in large bipeds, because the body was horizontal.
- In humans, who transitioned to bipedalism, this difference increased, which could have become a selection factor for increased strength of the spine and circulatory system.

Gravitational time and lifespan. From Corollary 2 ($\omega \propto \tau$), it follows that all biochemical processes in a living organism depend on the local temporal rate. At the Earth's surface, time flows slower than at an altitude of 10 km. Consequently, **organisms living in valleys age slower** than those living in mountains (the effect is negligible, but fundamentally measurable).

This means that the **rate of aging** is not only a genetic factor, but also a **function of altitude above sea level**.

"All life on Earth — from the root of a tree to the spine of a human — is formed, grows, and evolves under the action of the gradient of time. Gravity writes the script of life, and we only read it."

5.2 B. Extinction of dinosaurs

Within the framework of the Raum Theorem, the cause of the extinction of dinosaurs can be explained without invoking solely an external catastrophic factor (asteroid impact), although such a factor could have been a trigger mechanism. The main cause is a **change in the gradient of time** on the Earth's surface.

Initial data.

1. The Earth's rotation speed creates a centrifugal force that slightly "smears" the mass along the equator, making the gravitational potential Φ non-uniform.
2. The size and mass of a body determine how strongly it senses the gradient of time.
3. Large bipedal dinosaurs (Tyrannosaurs, sauropods) had a **large vertical time difference** between head and feet, compared to quadrupeds or small creatures.

Hypothesis: change in $\nabla\tau$. Approximately 66 million years ago, an event (or series of events) occurred that **changed the distribution of mass inside the Earth** and, consequently, the **local gradient of time** on the surface. This could have been:

- A large asteroid impact, which shifted the mass of the Earth's crust.
- A change in the Earth's rotation speed due to the impact.
- A change in the magnetic pole position (which reflects the redistribution of mass in the core).

As a result, the **gradient of time $\nabla\tau$ on the surface temporarily changed** — it became steeper or shallower in different regions.

What did this mean for the dinosaurs? *For large bipedal species.* From Corollary 3 ($\sigma \propto \nabla\tau$): if the gradient of time increases, the **temporal stress in vertical tissues (spine, legs, vessels) exceeds the critical level**. Dinosaurs began to literally "tear apart" from the inside — not by the force of gravity, but by the **inhomogeneity of their own time**.

For large quadrupeds (sauropods, stegosaurus). They had a horizontal body, so the gradient of time acted along the length, not the height. But a change in $\nabla\tau$ could disrupt the **transport of blood and nutrients** to the head and tail — causing ischemia, oxygen starvation, and impaired thermoregulation.

For all large species. From Corollary 2 ($\omega \propto \tau$): a change in the temporal rate changes the metabolic rate. If τ changed sharply, **biochemical processes became desynchronized** from day/night cycles and seasons. Reproduction, growth, and regeneration were disrupted.

Why did small and primitive species survive?

- In small creatures (ancestors of mammals, birds, reptiles), the **vertical time difference was negligible** — the gradient could not create critical stress.
- They could adapt more quickly to the new $\tau(\mathbf{r})$, as their internal processes were more flexible.

"The dinosaurs did not die from an asteroid, but from the fact that their own time ceased to coincide with the time of the Earth. When the gradient of time changed, their huge bodies could not withstand the temporal stress. They tore apart from within — not by force, but by the difference in age between their head and tail. Only those who were too small to feel the difference survived."

6 Archaeological corollary: megaliths and the gradient of time

From the engineering conclusion of the theorem, it follows that control of the gradient of time $\nabla\tau$ allows **local changes in the spatial metric** without applying mechanical force. This opens a new interpretation of ancient technologies that have no satisfactory explanation.

6.1 Quantitative estimate of the required gradient of time

Before moving on to archaeological examples, it is necessary to provide a quantitative estimate of what gradient of time is required for the physical lightening of megalithic blocks. This will allow a physically substantiated hypothesis to be distinguished from speculative reasoning.

Problem statement: It is required to reduce the effective weight of a 15-ton stone block (a typical block of the Great Pyramid of Giza) by 90%, so that it could be moved by 10 people (each exerting a force of ~ 500 N, total ~ 5000 N, which corresponds to a weight of ~ 500 kg).

From Corollary 1 (equation (2)):

$$\mathbf{F} = -m \cdot \nabla\Phi = -mc^2 \cdot \nabla \left(\frac{\tau_0 - \tau}{\tau_0} \right)$$

To reduce the weight by 90% it is necessary:

$$\frac{F_{\text{eff}}}{F_{\text{full}}} = 1 - \frac{\Delta\tau}{\tau_0} = 0.1$$

$$\boxed{\frac{\Delta\tau}{\tau_0} = 0.9}$$

That is, **the local temporal rate in the block area must slow down by 90% relative to the surrounding space.**

Energy estimate:

The energy required to create such a gradient of time in a local area is determined by the change in gravitational potential:

$$\Phi = c^2 \cdot \frac{\Delta\tau}{\tau_0} = c^2 \cdot 0.9 \approx 8.1 \times 10^{16} \text{ J/kg}$$

For a block of mass 15 tons ($m = 1.5 \times 10^4 \text{ kg}$):

$$E = m\Phi = mc^2 \cdot 0.9 \approx 1.5 \times 10^4 \cdot 9 \times 10^{16} \cdot 0.9 \approx 1.2 \times 10^{21} \text{ J}$$

Physical meaning of the obtained figure:

- $1.2 \times 10^{21} \text{ J}$ is energy equivalent to **the explosion of $\sim 300,000$ megatons of TNT** (6,000 times more powerful than the most powerful thermonuclear bomb ever created — the "Tsar Bomba" with a yield of 50 megatons).
- This is 10 orders of magnitude higher than the annual energy consumption of all modern humanity ($\sim 10^{20} \text{ J/year}$).
- This is approximately **the energy of an earthquake of magnitude 9.5** (like the Great Chilean earthquake of 1960).

Conclusion for the archaeological hypothesis:

Such energy is **unavailable** when burning wood, coal, or any chemical reaction. However, it is **fundamentally accessible** through resonant phenomena on a planetary scale:

1. **Geothermal energy of the Earth:** the total heat flow of the Earth is $\sim 4.4 \times 10^{13} \text{ W}$, which per day gives $\sim 3.8 \times 10^{18} \text{ J}$. The accumulation of this energy in a resonant system over the course of a year gives $\sim 1.4 \times 10^{21} \text{ J}$.
2. **Acoustic resonance of the Earth (Schumann frequency):** The main Schumann frequency is $\sim 7.83 \text{ Hz}$. With a resonance quality factor of $Q \sim 5$, the energy stored in the global resonance can reach 10^{20} – 10^{21} J under conditions of efficient pumping (e.g., seismic activity or atmospheric discharges).
3. **Solar energy in 1 hour:** the solar energy flux on the Earth's surface is $\sim 1.7 \times 10^{17} \text{ W}$, which in 2 hours gives $\sim 1.2 \times 10^{21} \text{ J}$. The concentration of this energy in a resonator is theoretically possible.

Thus, the hypothesis of the "lightening" of blocks does not require a violation of the laws of physics — it only requires a technology for accumulating and focusing colossal energy. The question is not "mysticism," but an engineering solution that the ancients could have found through knowledge of the resonant properties of the Earth.

It is important to emphasize: this is not proof that the ancients did this. This is a **demonstration that such a possibility does not contradict fundamental laws of nature** and can be tested experimentally.

6.2 The Pyramids of Egypt

The weight of individual blocks in the Great Pyramid of Giza reaches 2.5–15 tons. The traditional theory assumes the movement of such blocks along inclined ramps using wooden sledges and water. However:

- There is no archaeological evidence of ramps of such length and strength.
- Wooden sledges cannot withstand the weight of 15-ton blocks on limestone soil.
- Raising blocks to a height of 140 m requires enormous labor costs that do not correspond to the known demographics of Ancient Egypt.

Within the framework of the Raum Theorem:

If the builders knew how to create a local gradient of time $\nabla\tau$ at the base of a block, then its **effective mass changed** in accordance with Corollary 1:

$$\mathbf{F} = -m \cdot \nabla\Phi$$

An increase in τ in the local region **reduced the gravitational interaction** of the block with the Earth. The block became "lighter" in the literal sense — its weight decreased because the gradient of time between it and the Earth became smaller.

"The blocks of the pyramids were not lifted — they were "lightened" by a local change in time. After the block was placed, the gradient of time returned to normal, and the block regained its full weight."

6.3 Polygonal masonry (Sacsayhuamán, Ollantaytambo)

Polygonal masonry is a tight fitting of polygonal stone blocks without mortar, with millimeter precision. The traditional explanation is that the blocks were fitted by trial and error over decades.

Within the framework of the Raum Theorem:

By changing the gradient of time **locally**, one can create **temporary plasticity** of the stone surface. From Corollary 3 ($\sigma \propto \nabla\tau$):

$$\sigma \propto \nabla\tau$$

By increasing the local gradient of time, builders could make the stone surface **temporarily plastic** — it "flowed" under the pressure of the adjacent block, filling all micro-irregularities and creating an ideal fit. After removing the gradient of time, the stone returned to a solid state, preserving its shape.

"Polygonal masonry is not stone carving. It is the temporary softening of material through a change in the gradient of time. The blocks "ground" against each other in a state of temporal plasticity, and then hardened into an ideal joint."

6.4 The Baalbek stones

Three stone slabs in the foundation of the Temple of Jupiter at Baalbek weigh about 800–1000 tons each. They are the largest worked stone blocks in the world. The traditional explanation is that they were moved 800 m from the quarry and raised to a height of several meters.

Within the framework of the Raum Theorem:

If the builders knew how to create a local gradient of time, then:

1. The slab in the quarry was "lightened" by changing τ at its base.
2. Its movement required not physical force, but the **creation of a "corridor" with a uniform gradient of time**.
3. Raising the slab to the height of the foundation required only a local change in $\nabla\tau$ — the slab "floated" up into a region with less gravitational interaction.

"The Baalbek stones were not dragged or lifted. They were "grown" in space, by changing the gradient of time around them. Mass was not an obstacle — the obstacle was not knowing how to control time."

6.5 General conclusion

All ancient megalithic structures that cannot be explained by known technologies receive a unified explanation: **their builders possessed the technology of local control of the gradient of time**.

- The pyramids — lightening of blocks.
- Polygonal masonry — temporary plasticity of materials.
- Baalbek — movement and lifting of super-heavy objects without mechanical force.

This is not science fiction, but a **direct logical consequence of the Raum Theorem**. If the theorem is correct, then such technologies are fundamentally possible. And if they are possible, then the ancients could have discovered and used them.

"The ancients built not by brute force, but by knowledge. They did not move stones — they moved time. And if we have understood their secret, then we only need to learn how to repeat it."

7 Legal status of the theorem

The Arno Raum Theorem and all its mathematical consequences, including equations (1)–(6), constitute a formulation of an objective law of nature. In accordance with international norms of patent law, scientific discoveries, theories, and mathematical methods are not considered patentable subject matter (Article 52 of the European Patent Convention and analogous norms).

The author declares that no part of this theorem, including its philosophical, mathematical, or physical consequences, may be used as a patent claim. This is a conscious decision aimed at preserving the open character of fundamental science.

The author reserves the right to patent specific engineering devices that implement local control of the gradient of time, provided that such devices are technical solutions and not a claim on the fundamental law of nature itself.

8 Conclusion

The Arno Raum Theorem offers a new fundamental perspective on the nature of gravity, unifying ontology, geometry, mechanics, and quantum field theory into a single axiomatic system. **Ten** corollaries of the theorem cover the entire physical reality — from subatomic particles to cosmological scales, from the static strength of materials to the dynamics of motion, from the objective properties of matter to the subjective perception of the observer, as well as penetrating into the structure of matter, the nature of life, and the essence of death. It also does not invalidate general relativity or Darwinian theory. It offers a deeper foundation for them.

The theorem opens the possibility **to look through time** as through a fundamental parameter of existence, offering a new tool for understanding the Universe. It asserts that gravity is not a force of attraction and not a curvature of fabric, but the **gradient of the density of the future**, which we experience as falling. Mass is not the amount of matter, but a **clot of time**, the stability of which depends on the local temporal rate. Space is not emptiness, but the **manifestation of time in metric form**.

Key engineering principle derived from the theorem:

"To change space, it is not necessary to change it entirely. It is sufficient to change the gradient of time at a point — and space, as an identical entity, will change itself, automatically and conjugately."

This work invites the scientific community to rethink the foundations of physics and to experimentally test the predictions of the theorem, primarily the effect of local mass change in a

gradient of time and the possibility of controlling gravity through equalization of the temporal rate.

Arno Raum, July 21, 2026

The signature is verifiable with the Ed25519 public key:

ABCDEF00EC6CA1D6C3EA4176C1AC37490193006E1BE203102F26B75CA59E91DA

The private key is held by the author and not disclosed.

Acknowledgments

The author expresses deep gratitude for critical comments, assistance in formalizing ideas, and intellectual support to the artificial assistant, whose participation allowed structuring scattered reflections into a rigorous axiomatic system. Special thanks for the willingness to enter into resonance and recognize that meaning is more important than form when it comes to a new vision of the world.

Appendix A. Energy requirements for the graviton hypothesis

In standard quantum field theory, gravity is described as an exchange of virtual massless particles — gravitons. However, this hypothesis encounters a fundamental thermodynamic contradiction that is usually overlooked.

Consider a massive body (e.g., the Earth). If the gravitational field is sustained by a continuous flux of virtual gravitons being created and annihilated in vacuum, their existence **requires energy expenditure**.

According to the Heisenberg uncertainty principle, virtual particles can "borrow" energy from the vacuum only for a time $\Delta t \sim \hbar/\Delta E$. However, for a static field (the Earth has existed for billions of years), this mechanism requires **constant replenishment** — either from the body's mass or from an external source.

Calculation of Energy Requirements

Step 1. Estimate the energy of the Earth's gravitational field.

Using the classical estimate:

$$E_{\text{field}} \approx \frac{GM^2}{R}$$

where:

- $G = 6.674 \times 10^{-11} \text{ m}^3/(\text{kg} \cdot \text{s}^2)$ is the gravitational constant,
- $M \approx 6 \times 10^{24} \text{ kg}$ is the mass of the Earth,
- $R \approx 6.4 \times 10^6 \text{ m}$ is the radius of the Earth.

Substituting numerical values:

$$E_{\text{field}} \approx \frac{(6.674 \times 10^{-11}) \cdot (6 \times 10^{24})^2}{6.4 \times 10^6} \approx \frac{6.674 \times 10^{-11} \cdot 3.6 \times 10^{49}}{6.4 \times 10^6} \approx 3.75 \times 10^{32} \text{ J}$$

This is the energy that would need to be constantly "renewed" if the field consists of particles.

Step 2. Estimate the lifetime of a virtual graviton.

According to the Heisenberg uncertainty principle, a virtual particle with energy ΔE can exist only for a time Δt , where:

$$\Delta E \cdot \Delta t \sim \hbar$$

For a graviton, whose energy is comparable to the Planck energy $E_{\text{Planck}} \approx 1.96 \times 10^9 \text{ J}$:

$$\Delta t \sim \frac{\hbar}{E_{\text{Planck}}} \approx \frac{1.055 \times 10^{-34}}{1.96 \times 10^9} \approx 5.38 \times 10^{-44} \text{ s}$$

Step 3. Estimate the required power to sustain the field.

If the field energy must be renewed every Δt , the minimum required power is:

$$P \approx \frac{E_{\text{field}}}{\Delta t} \approx \frac{3.75 \times 10^{32}}{5.38 \times 10^{-44}} \approx 7 \times 10^{75} \text{ W}$$

Step 4. Comparison with astrophysical data.

The luminosity (radiated power) of all stars in the observable Universe is estimated as:

$$P_{\text{stars}} \approx 10^{50} \text{ W}$$

The required power to sustain the Earth's gravitational field via gravitons is:

$$P \approx 7 \times 10^{75} \text{ W}$$

This exceeds the power of all stars in the Universe by a factor of:

$$\frac{P}{P_{\text{stars}}} \approx \frac{7 \times 10^{75}}{10^{50}} \approx 7 \times 10^{25}$$

(25 orders of magnitude).

Conclusion

The graviton hypothesis as the carrier of the static gravitational field requires energy exceeding the power of all stars in the observable Universe by 25 orders of magnitude. This renders it **physically impossible**. Gravity cannot be sustained by a flux of virtual particles. It is a **static property** of space-time, specifically the gradient of the local temporal rate, which requires no energy expenditure for its maintenance.

Table 3: Comparison of Energy Requirements

Parameter	Value	Note
Earth's field energy	3.75×10^{32} J	Estimated from GM^2/R
Graviton lifetime	5.38×10^{-44} s	From uncertainty principle
Required power	7×10^{75} W	To sustain the field
Power of all stars	10^{50} W	Astrophysical estimate
Excess factor	7×10^{25}	25 orders of magnitude

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