

T0-Theory: A Unified Physics from a Single Number

Comprehensive Summary of the Document Collection

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Abstract

The T0-Theory (Time-Mass Duality) represents a fundamental paradigm shift in theoretical physics. In simple terms, imagine the universe as a grand puzzle where everything – from the tiniest particles to the vast cosmos – fits together perfectly without loose ends. The central result of this work is the recognition that **all natural constants and physical parameters can be derived from a single dimensionless number**: the universal geometric constant $\xi \approx \frac{4}{3} \times 10^{-4}$. Think of ξ as the universe's "master key" – a tiny number born from the basic shape of three-dimensional space that unlocks explanations for gravity, light speed, particle weights, and more.

This collection of over 200 scientific documents systematically develops a complete physical theory that unifies quantum mechanics, relativity, and cosmology – based on the principle of absolute time T_0 and the intrinsic time-field-mass relationship. Put plainly, it's like rewriting the rules of physics so that time is steady and reliable (not bendy like in Einstein's view), while mass can shift like sand in the wind, all tied together through this elegant geometric idea. The foundational documents pursue a purely geometric pathway, deriving ξ from the three-dimensional structure of space, and from ξ constructing all other constants, including the fine-structure constant $\alpha \approx 1/137$, particle masses, and coupling strengths, without introducing additional free parameters. No more arbitrary numbers; everything flows from one simple source, making the universe feel less random and more like a beautifully designed whole. Notably, the theory posits a static universe without expansion, as detailed in the CMB document, eliminating the need for dark matter or dark energy concepts.

1 The Core Principle: Everything from One Number

The fundamental insight of T0-Theory can be summarized in one sentence:

Central Theorem of T0-Theory

All physical constants – gravitational constant G , Planck constant \hbar , speed of light c , elementary charge e , as well as all particle masses and coupling constants – can be mathematically derived from a single dimensionless number: the universal geometric constant

$$\xi = \frac{4}{3} \times 10^{-4},$$

emerging from the fundamental three-dimensional space geometry via

$$\xi = \frac{4\pi}{3} \cdot \frac{1}{4\pi \times 10^4}.$$

From ξ , the fine-structure constant follows as:

$$\alpha = f_\alpha(\xi) \approx \frac{1}{137.035999084},$$

ensuring α serves as a secondary electromagnetic coupling without primacy.

In everyday language, this means we've boiled down the "why" of physics to a single, space-inspired number – no magic, just geometry doing the heavy lifting.

2 Foundations of T0-Theory

2.1 Time-Mass Duality

In contrast to standard physics, where time is relative and mass is constant, T0-Theory postulates:

- **Absolute Time** T_0 : Time flows uniformly everywhere in the universe – like a universal clock that ticks the same for everyone, no matter where you are.
- **Variable Mass**: Mass varies with the energy content of the vacuum – picture mass as flexible, changing based on the "buzz" of empty space around it.
- **Intrinsic Time Field** $T(x, t)$: Each particle carries its own time field – every building block of matter has its personal timer, influencing how it behaves.

The fundamental relationship is:

$$m(x) = \frac{\hbar}{c^2 T(x, t)(x)} = m_0 \cdot (1 + \kappa \Phi(x)),$$

with κ traceable to ξ via geometric scaling. Mathematically, this duality treats time and mass as variables, ensuring the framework remains fully compatible with established mathematical structures while enabling a unified description of physical phenomena. Simply put, by letting time and mass dance together as adjustable partners, we keep the math clean and intuitive, bridging old ideas with new ones without breaking a sweat.

2.2 The Parameter ξ

The central parameter of the theory is:

$$\xi = \frac{4}{3} \times 10^{-4},$$

a pure geometric construct from 3D space that connects quantum mechanics with gravitation. This parameter encodes the fundamental coupling between energy and spatial structure, from which all hierarchies emerge. It's like the ratio that tells space how to "scale" energy – small but mighty, whispering the secrets of why electrons are light and protons heavy.

3 Derivation of All Natural Constants

3.1 From ξ Follows Everything

T0-Theory demonstrates that:

1. **Gravitational Constant:**

$$G = f_G(\xi, m_P, c, \hbar),$$

with all inputs reducible to ξ -scaled geometric units. Gravity? Just a ripple from space's geometry, tuned by ξ .

2. **Particle Masses** (electron, muon, tau, quarks): Particle masses follow a universal scaling law analogous to the ordering principles of atomic energy levels, where quantum numbers (n, l, j) dictate hierarchical structures in a similar fashion to atomic shells and subshells – think of particles stacking up like floors in a building, each level set by simple rules much like electrons orbiting in atoms. Thus,

$$\frac{m_e}{m_P} = g(\xi), \quad \frac{m_\mu}{m_e} = h(\xi), \quad \frac{m_\tau}{m_\mu} = k(\xi),$$

via universal scaling laws $\xi_i = \xi \times f(n_i, l_i, j_i)$. No more guessing why some particles are 200 times heavier; it's all patterned like a cosmic family tree.

3. **Coupling Constants** (electroweak, strong, electromagnetic):

$$\alpha_W = f_W(\xi), \quad \alpha_s = f_s(\xi), \quad \alpha = f_\alpha(\xi).$$

These "strengths" of forces? Derived like branches from the same geometric trunk.

4. **Cosmological Parameters:** Static universe metrics and CMB temperature $T_{\text{CMB}} = f_{\text{CMB}}(\xi)$, with redshift mechanisms derived from time-field variations (see CMB document for detailed non-expansion explanation).

4 Experimental Predictions

T0-Theory makes precise, testable predictions:

Concrete Predictions

- **Anomalous Magnetic Moment:** $(g-2)_\mu$ calculation from ξ alone – a quirky electron-like wobble explained without extras.
- **Koide Formula:** Exact mass relationship of leptons via ξ -scaling – the math that ties three particles' weights in a neat bow.
- **Redshift:** Modified interpretation without expansion, governed by ξ – why distant stars look "stretched" without the universe ballooning.
- **CMB Anisotropies:** Explanation through time-field variations rooted in ξ – the microwave "echo" of the cosmos as geometric echoes.

These aren't wild guesses; they're checkable with today's labs, inviting everyone – physicists or curious minds – to test the theory's mettle.

5 Structure of the Document Collection

This collection comprises:

- **Foundations:** Mathematical formulation of time-mass duality under ξ -geometry – the bedrock basics, explained step by step.
- **Quantum Mechanics:** Deterministic interpretation, Bell inequalities – quantum weirdness made predictable and local.
- **Quantum Field Theory:** Lagrangian formalism in the T0 framework – fields dancing to a unified tune.
- **Cosmology:** Static universe, redshift, CMB – a steady cosmos that still surprises, without expansion, dark matter, or dark energy.
- **Particle Physics:** Mass spectrum, anomalous moments, Koide formula – the particle zoo, tamed.
- **Technical Applications:** Photon chip, RSA cryptography – real-world tricks from theory.
- **Experimental Tests:** Verifiable predictions – hands-on ways to probe the ideas.

Note: The documents consistently follow the geometric ξ -pathway, deriving all physics from 3D space principles, with α and other constants as emergent features. We've woven in plain talk throughout, so non-experts can dip in without drowning in jargon.

6 Conclusion

T0-Theory offers a radically new perspective on fundamental physics. Its central strength lies in the **reduction of all physical parameters to a single number** – ξ – a goal pursued by physicists for centuries. The geometric origin of ξ in 3D space provides the ultimate unification, rendering the universe a pure manifestation of spatial structure. In plain sight, it's like discovering the universe runs on one elegant equation, hidden in plain view in the shape of space itself.

If this theory is correct, it means:

- The universe is mathematically completely determined by ξ – no more "just because."
- All seemingly arbitrary constants, including α , have a common geometric origin in ξ – everything connected, like threads in a tapestry.
- A true "Theory of Everything" is possible – the holy grail, within reach.

"Nature uses only the longest threads to weave her patterns, so that each small piece of her fabric reveals the organization of the entire tapestry." – Richard Feynman