

Universal Functional Coherence and Physical Unification under the Modal Scrutiny of the Theory of Objectivity

A Critical–Propositive, Modal–Ontological and Epistemological Analysis of UFCT via the Seven Axioms, the Inducer Effects, and the Cosmology of TO

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Abstract

This paper offers a formal, scientific, critical–propositive assessment of the *Universal Functional Coherence Theory* (UFCT) as presented in the Zenodo record by Mário César Garms Thimoteo, focusing on the constant Ξ_0 described as the “minimum quantum of functional execution” and claimed to be derived from first principles via topological tools (Chern classes), embedded in a functional-coherence master equation, and validated across independent empirical domains (CMB/Planck, high-energy neutrinos/IceCube, and neutrino-mass measurements/KATRIN) with no free parameters and high reported accuracy. ([Thimoteo 2025](#))

UFCT is examined under the *modal* framework of the *Theory of Objectivity* (TO), which is formulated as a logically and ontologically necessary basis for any coherent *possible universe* through seven modally necessary axioms and a complete theorem expressed in a proprietary mathematical language (graphical theorem), wherein cosmic emergence is deduced from an eternally static Perfect Logical Sphere prior to time, space, and matter. ([Cabannas and Silva 2018, 2016, 2020, 2025](#))

The paper articulates (i) points of compatibility and (ii) structural tensions between UFCT and TO, operationalizes TO’s *Expansive Inducer Effect* (Axioms 4 and 5) and *Reductive Inducer Effect* (Axioms 4, 5, and 6) as an analytic grid, and develops a dedicated section on whether neutrinos can plausibly function as phenomenic manifestations of TO’s plasmatic regimes. The argument is additionally grounded through a structured dialogue with foundational literature in quantum philosophy (Heisenberg), spacetime

ontology (Einstein), holism (Bohm), nonequilibrium emergence (Prigogine and Stengers), cosmological framing (Weinberg, Hawking, Penrose), and paradigm analysis (Kuhn).

Keywords: Theory of Objectivity; UFCT; functional coherence; Ξ_0 ; modal axioms; expansive and reductive inducer effects; cosmology; neutrinos; Chern classes; philosophy of science; testability.

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1 Introduction: Why Unification Programs Require Modal–Ontological Scrutiny

Contemporary theoretical physics is shaped by two intertwined trends: (i) increasingly sophisticated mathematical formalism and (ii) a growing number of “unification” proposals aiming to stabilize constants, explain dark sectors, derive effective laws, and reduce parametric arbitrariness. These trends can foster genuine advances; however, they also introduce an epistemic risk: models may become *internally elegant* and *empirically persuasive* without establishing whether their foundational commitments are *necessary* for a *possible universe*—that is, without providing a minimal ontology explaining *why* there are elements, boundaries, compositional chains, and conditions of full reality.

It is precisely at this foundational level that the *Theory of Objectivity* (TO) claims priority: not as one more physical model competing with modern physics, but as a *modally necessary* logical–ontological basis for any coherent universe, articulated through seven Absolute Truths (modal axioms) and a complete theorem expressed in a proper mathematical language (graphical theorem). (Cabannas and Silva 2018, 2016) TO explicitly states that it does not aim to replace contemporary physical theories or cosmological models; rather, TO positions itself as the level of necessity at which any coherent model must be interpretable, auditable, and connected to minimal criteria of existence: individuation, boundary, relational witnessing, composition, and transcendence beyond the quantum.

This paper subjects UFCT—insofar as it proposes a cross-domain unifying invariant Ξ_0 —to this modal scrutiny. The guiding question is not merely whether UFCT can fit data, but what it presupposes about reality and whether its “universal constant” can be aligned with (or structurally tensions) the conditions TO regards as modally necessary.

2 Methodology: Separating Operational Modeling from the Modal Grammar of Possibility

The analysis separates two layers:

2.1 Operational layer (physics, measurement, data)

This includes formal derivations, inferential pipelines, predictions, experimental protocols, computational reproducibility, and quantitative comparisons. UFCT emphasizes strong operational claims: Ξ_0 is allegedly derived from first principles using topological methods (Chern classes), embedded in a master equation, and validated across multiple independent

observational domains with high reported accuracy and without free parameters. (Thimoteo 2025)

2.2 Modal–ontological layer (conditions of possibility)

This includes minimal conditions for there to be *elements, differences, boundaries, full existence by relational witnessing, compositional anteriority, and transcendence beyond the quantum*. TO locates its Seven Absolute Truths here, together with derived *inducer effects* that function as an ontological dynamics of constraint.

Accordingly, the procedure is *critical–propositive*: it identifies compatibilities and tensions, clarifies where UFCT’s claims (as publicly described) are ontologically underdetermined, and proposes criteria for conceptual and empirical auditability. The aim is neither institutional nor invitational; it is a scientific–philosophical assessment structured by the requested bibliographic framework.

3 UFCT in Synopsis: The Ξ_0 Constant and Cross-Domain Validation Claims

The Zenodo record presents UFCT as the most complete and rigorous formulation of the program, centered on the discovery and validation of a universal constant Ξ_0 , characterized as a “minimum quantum of functional execution” in the universe. (Thimoteo 2025) The public description attributes to UFCT four main axes:

1. **First-principles derivation** of Ξ_0 via **Chern classes** and topological foundations.
2. **Insertion into a master equation** for functional coherence.
3. **Empirical invariance** across independent domains: CMB/Planck, high-energy neutrinos (IceCube), and neutrino-mass measurement (KATRIN).
4. **Parameter-free predictive performance** (reported relative errors below $\sim 0.03\%$ and $R^2 \geq 0.998$), coupled to an emphasis on falsifiability, test protocols, and computational reproducibility.

At the same time, the record indicates that the **files are restricted**, limiting access to full derivations, data, code, and methodological detail. (Thimoteo 2025) This constraint matters directly for any rigorous audit of the operational layer and will be addressed explicitly in Section 11.

4 The Theory of Objectivity: Modal Axioms, Graphical Theorem, and Cosmology by Eras

TO is structured not around a single physical equation, but around a modal axiomatic system and a theorem expressed through a proprietary mathematical language (graphical theorem). (Cabannas and Silva 2018, 2016) In TO, the universe emerges from *Nothingness* construed as a primitive and eternal mathematical essence, with the genesis of time, space, matter, and phenomenic elements deduced from the Seven Absolute Truths.

In addition, TO’s development explicitly engages the question of *empirical contact* and *testability* through new methods and reinterpretations of data, including the articulation of operational bridges and minimal constraints for predictability and falsification. (Cabannas and Silva 2025; Vidamor and Silva 2026) This is essential for the present study because it enables a structured comparison: UFCT may function as an operational candidate while TO supplies modal criteria for what any operational candidate must satisfy to claim universality in the strong sense.

5 The Perfect Logical Sphere: Modal Necessity, 64 Straight Parts, and 2048 Surface Parts

A central piece of TO’s cosmology is the *Perfect Logical Sphere* that is eternally static prior to time, space, and matter. TO maintains that this sphere is not an aesthetic choice but follows from modal necessity: it possesses **64 straight logical parts** on the maximal circumference and **2048 straight logical parts** across the total surface, each capable of individually tangentially contacting a plane, given the sphere’s primordial static configuration. (Cabannas and Silva 2018, 2016, 2020)

This matters for UFCT because UFCT frames its “first principles” via topological invariants. TO’s position implies a strict question of hierarchy: Is the relevant topological foundation *modally necessary* for any possible universe, or is it a contingent but useful formal substrate for our universe? UFCT’s public description does not settle this hierarchy, yet any claim of universality in the strongest sense requires such a clarification.

6 UFCT and TO under the Seven Modal Axioms (A1–A7)

In what follows, TO’s axioms are treated as *conditions of possibility*. UFCT is treated as a candidate operational program whose commitments may partially align with, remain silent

about, or tension these conditions.

6.1 A1: Nothingness as a primitive, eternal mathematical essence

UFCT’s pursuit of a universal minimal constant Ξ_0 and its stated first-principles derivation resonates with TO’s A1 insofar as both privilege primitive mathematical structure over ad hoc phenomenology. (Thimoteo 2025; Cabannas and Silva 2018) A tension remains if Ξ_0 is proposed as an ultimate foundation without addressing the *modal why*: why must any possible universe contain such an invariant?

6.2 A2: Individuation by field (“aura”)

TO asserts that every element has a field that individuates it. UFCT foregrounds a universal invariant; compatibility becomes plausible if Ξ_0 is treated as a universal execution constraint while individuation emerges through local coherence signatures (e.g., field patterns, coupling regimes, spectral fingerprints). The tension arises if universality collapses into ontological homogeneity without an individuation mechanism.

6.3 A3: Infinity as a necessary non-element delimiting the universe

UFCT’s aspiration to eliminate free parameters and enforce invariance aligns methodologically with TO’s discipline of delimitation and necessity. Yet A3 functions as a logical condition, not as an empirical regularity; UFCT would need to clarify whether its topological foundation has such modal status.

6.4 A4: Distinct elements require at least one boundary

UFCT’s cross-domain framing presupposes boundaries (between regimes, datasets, and interpretive domains). TO demands that boundary be constitutive of difference, not merely a pragmatic partition. This invites UFCT to specify what counts as a boundary in its master equation: phase transitions, topological class changes, or functional domain separations.

6.5 A5: Full existence requires relational witnessing by at least two others

UFCT’s emphasis on validation across independent domains can be reinterpreted as a form of multi-witness operational stabilization. (Thimoteo 2025) TO, however, makes a stronger ontological claim: relational witnessing is constitutive of full existence, and it is not

anthropomorphic. Here, foundational discussions of observation and description in modern physics (e.g., Heisenberg) become relevant. (Heisenberg 1958)

6.6 A6: Every element is composed of elements prior to it

UFCT’s topological derivation points toward structural anteriority: Ξ_0 may be composed of more primitive invariants and constraints. (Thimoteo 2025) This aligns with A6 and also resonates with holistic ontologies (e.g., Bohm), provided the compositional chain is explicit and auditable. (Bohm 1980)

6.7 A7: No existential universe without substance transcendent to its quantum

If Ξ_0 is a minimum quantum, TO’s A7 demands an account of what transcends the quantum and makes it possible. TO locates this in the pre-temporal Perfect Logical Sphere and the modal necessity of the axioms. (Cabannas and Silva 2018, 2020) UFCT’s public description does not explicitly articulate a “trans-quantum” substrate; thus, it remains ambiguous whether UFCT aims at a complete ontology or a strong operational unification principle.

7 Inducer Effects: Reading UFCT through Expansive and Reductive Induction

TO develops inducer effects as a derived ontological dynamics of constraint.

7.1 Expansive Inducer Effect (A4 + A5)

Boundary (A4) plus relational witnessing (A5) yields expansion/complexification: structures fully exist as they become delimited and stabilized by multiple relations. UFCT’s cross-domain invariance claim can be read as an operational analogue: Ξ_0 is treated as “real” insofar as it remains stable across domain boundaries and under independent empirical witnessing (CMB, neutrinos, laboratory neutrino mass). (Thimoteo 2025)

The key issue is whether UFCT treats this as merely evidential or as ontologically constitutive in a TO-consistent sense.

7.2 Reductive Inducer Effect (A4 + A5 + A6)

Adding compositional anteriority (A6) yields a reductive discipline: only what can be reconstructed from prior constituents and stabilized relationally persists. UFCT’s “no free parameters” ethos fits this discipline in spirit; nevertheless, the reductive inducer effect requires explicit, reconstructible compositional chains. With restricted files, that requirement cannot be publicly audited. (Thimoteo 2025)

8 Neutrinos and TO Plasmas: Phenomenic Hypotheses and Operational Bridge Criteria

UFCT explicitly points to neutrino domains (IceCube and KATRIN) as part of the validation architecture for Ξ_0 . (Thimoteo 2025) This makes neutrinos a natural locus for exploring whether they could function as phenomenic manifestations of TO’s plasmatic regimes.

8.1 Why neutrinos are plausible messengers of primordial regimes

In standard cosmological reasoning, neutrinos are weakly interacting and carry information across large scales, making them privileged messengers of early-universe conditions. In TO’s language, this motivates considering neutrinos as candidates for phenomenic signatures of transitional eras where collective plasma-like regimes dominate prior to stable baryonic organization.

8.2 A TO-compatible hypothesis space

A minimal bridge can be formulated as:

- **Weak hypothesis ($H\nu$ –TO):** neutrinos encode persistent correlations functioning as operational “memory” of earlier plasmatic regimes.
- **Strong hypothesis ($H\nu$ –TO):** specific neutrino ensembles or propagation channels are direct phenomenic manifestations of TO plasmas, producing testable spectral and correlational signatures.

8.3 Bridge requirements: from narrative to falsifiable criteria

To avoid metaphor, the bridge must specify: (i) differential predictions (what changes relative to standard expectations), (ii) cross-correlations (e.g., with CMB anisotropies), and (iii)

explicit failure criteria. TO’s recent work emphasizes precisely this discipline of operational bridges and logical minimality in empirical contact. (Cabannas and Silva 2025; Vidamor and Silva 2026)

9 Dialogue with the Requested Bibliographic Framework

This section integrates the requested works as conceptual supports and critical interlocutors.

9.1 Heisenberg: indeterminacy, description, and observation

Heisenberg’s analysis of the quantum revolution clarifies that “observation” and language are not neutral add-ons to physical description. (Heisenberg 1958) This supports TO’s non-anthropomorphic A5 as a relational condition of full existence and frames UFCT’s multi-domain validation as a candidate operational analogue.

9.2 Einstein: spacetime plasticity and the ontology of geometry

Einstein’s treatment of relativity invites a hierarchy question: what precedes what—geometry, physical law, or deeper constraint? (Einstein 1920) This provides a rigorous arena for comparing UFCT’s topological-first principles with TO’s modal-first principles.

9.3 Bohm: implicate order and compositional anteriority

Bohm’s holism and implicate order resonate with A6: elements are composed of prior structure, not isolated primitives. (Bohm 1980) UFCT’s invariant Ξ_0 could be read as a marker of deep order if and only if its compositional derivation is explicit and auditable.

9.4 Prigogine and Stengers: order out of chaos and irreversibility

TO’s cosmological eras and transition narratives require a disciplined account of emergence and irreversibility. Prigogine and Stengers supply a conceptual vocabulary for nonequilibrium order formation that can bridge TO’s process claims with operational modeling. (Prigogine and Stengers 1984)

9.5 Weinberg, Hawking, and Penrose: standard chronology, constraints, and mathematical realism

Weinberg and Hawking provide the canonical operational chronology and observational scaffolding of modern cosmology, enabling structured contrasts with TO’s eras and UFCT’s CMB-based claims. (Weinberg 1993; Hawking 1988) Penrose provides a comprehensive account of mathematical structure and a philosophically sophisticated realism about laws, supporting serious debate about whether topological or modal foundations are primary. (Penrose 2004)

9.6 Kuhn: paradigms, criteria, and the discipline of comparison

Kuhn distinguishes rhetorical declarations of revolution from actual paradigm shifts, which require anomaly resolution, puzzle-solving capacity, predictive fertility, and a stable disciplinary matrix. (Kuhn 1962) This framework disciplines both UFCT (as a proposed unifier) and TO (as a proposed modal foundation): each must specify criteria, predictions, and auditability rather than rely on programmatic claims.

10 Testability and Predictability: Operational Bridges, Gödelian Discipline, and the Law of Logical Minimum

TO’s recent articulations emphasize a disciplined route from modal axioms to empirical contact: specify what is demonstrable, what is assumed, what is testable, and what would count as failure. (Vidamor and Silva 2026; Cabannas and Silva 2025) Under this standard, UFCT’s declared emphasis on computational reproducibility and falsifiability is methodologically promising. (Thimoteo 2025)

Nevertheless, a TO-grade audit demands:

1. a clarified ontological status of Ξ_0 (operational invariant vs. modal necessity),
2. a public, reconstructible derivation chain (A6),
3. explicit boundary criteria between regimes (A4),
4. a non-anthropomorphic account of multi-witness stabilization (A5).

These conditions do not “replace” UFCT; they specify what UFCT must make explicit to justify strong universality claims in the modal sense.

11 Limitations and Minimal Conditions for Scientific Auditability

The UFCT Zenodo record indicates that the associated files are restricted. (Thimoteo 2025) This constraint prevents independent audit of:

- the Chern-class derivation steps,
- the explicit form and assumptions of the master equation,
- the data pipeline and statistical procedures supporting R^2 and reported error bounds,
- the “no free parameters” claim in an inspectable modeling workflow.

Therefore, the present paper is necessarily a *modal-ontological and programmatic* assessment based on the public description, not a full verification of results. In Kuhnian terms, it evaluates the structure of commitments and the requirements for paradigm-level stability, not the final empirical adjudication.

12 Conclusion

UFCT, as publicly described, articulates a strong unification aspiration: a cross-domain invariant Ξ_0 derived from topological first principles and validated across distinct empirical regimes. (Thimoteo 2025) Under TO’s modal framework, this aspiration yields four central conclusions:

1. **Plausible structural compatibility:** UFCT’s invariance and “first principles” posture can be read as operationally consonant with TO’s emphasis on primitive mathematical structure and the reduction of arbitrariness. (Cabannas and Silva 2018, 2025)
2. **Decisive ontological tension (A7):** if Ξ_0 is a minimum quantum, UFCT must clarify what grounds the quantum regime beyond itself or explicitly restrict its ambition to operational unification rather than complete ontology.
3. **Compositional chain requirement (A6 + Reductive Induction):** topological derivation must be reconstructible and auditable; otherwise, “parameter-free” remains programmatic rather than demonstrative.
4. **Neutrinos as a bridge locus:** UFCT’s own emphasis on neutrino domains makes neutrinos a natural site for operational bridges to TO’s plasmatic regimes—but only

if formulated as differential predictions, cross-correlations, and explicit failure criteria under TO’s discipline of empirical contact. ([Vidamor and Silva 2026](#); [Cabannas and Silva 2025](#))

In sum, UFCT may represent a promising operational unification attempt; TO provides a modal grammar specifying what must be explicit for any claim to universality across possible universes. Where UFCT offers invariance across domains, TO demands necessity across possibility—a shift from empirical breadth to modal grounding.

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