



The Dead Universe Theory (DUT): The Asymmetric Thermodynamic Retraction of the Universe and the Foundations of Cosmic Infertility

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Abstract

This article presents an extension of the Dead Universe Theory (DUT), introducing two original conceptual frameworks: *asymmetric thermodynamic retraction* and the *foundations of cosmic infertility*. The central hypothesis is based on the growing imbalance between the declining rate of galaxy formation and the increasing prevalence of structurally exhausted galaxies. It is proposed that the universe is undergoing a non-explosive thermodynamic regression, governed by entropy rather than by expansion or collapse. In this scenario, cosmic structures progressively lose their reproductive capacity, resulting in a slow but irreversible reduction in structural complexity. The theoretical model defines the net galactic function as $dN/dt = \dot{N}_f - \dot{N}_d$, where the extinction rate surpasses the formation rate. Simultaneously, matter availability follows $d\rho_m/dt = -\alpha\rho_m$ ($\alpha > 0$), indicating an entropic depletion of structural resources. Despite the absence of a final gravitational collapse, entropy continues to grow, as expressed by $dS/dt > 0$, leading the universe toward a state of irreversible thermodynamic dormancy. This hypothesis can be empirically tested using deep-field data from the James Webb Space Telescope by analyzing the ratio of extinct to active galaxies, identifying regions of gravitational mass without star formation, and mapping voids that exhibit structural infertility. As a novel contribution, a Structural Natalivity Index (SNI) is proposed to quantify the universe's remaining capacity for structural reproduction. The DUT framework, when combined with a time-variable Friedmann equation, suggests that the final stage of the universe may not be collapse or infinite dispersion, but rather functional exhaustion marked by a loss of cosmogenic fertility.

Subject Areas

Cosmology

Keywords

Dead Universe Theory, Structural Black Hole, Thermodynamic Retraction, Asymmetric Entropy, Galactic Formation Rate, Galactic Extinction Rate, Structural Natality Index (SNI), Cosmic Star Formation Decline, Reproductive Capacity of Galaxies, Functional Galactic Regression, Entropy-to-Formation Ratio, Dark Starved Structures, Declining Galactic Complexity, Thermodynamic Galaxy Suppression, Galactic Fertility Threshold, Astroentropic Reproduction Barrier, Photonic Anomaly, Metric Topology Degeneration, Observable Anomaly, Buraco Negro Estrutural, Retração Termodinâmica Assimétrica

1. Introduction: The Universe That was not Born—An Anomaly Residing on the Surface of the Primordial Cosmos

Before any cosmological model can be regarded as scientifically, philosophically, and mathematically viable, it must fulfill stringent standards of logical consistency, conceptual coherence, empirical testability, and formal predictability. Among these, falsifiability—the real possibility of being refuted by observation—remains the cornerstone of modern scientific methodology. [1]-[3]

Models that rely on inaccessible domains, such as unobservable multiverses or hypothetical universes spawned within black holes, often elude empirical scrutiny and reside within the realm of metaphysical abstraction rather than scientific verification. While mathematically imaginative, these proposals frequently lack predictive rigor or observable consequences, and thus fail to satisfy the basic criteria of a testable physical theory. [1]-[5]

In contrast, the Dead Universe Theory (DUT) introduces a falsifiable framework grounded in observational reality, thermodynamic logic, and gravitational structure. It does not invoke parallel dimensions, speculative bounces, or unknown physical constants. Rather, it formulates mathematically consistent predictions—such as asymmetric entropy gradients, localized zones of thermodynamic retraction, and non-luminous gravitational compartments—all embedded within the known universe.

As instruments like the James Webb Space Telescope (JWST) continue to explore deep-field cosmic layers, it is expected that empirical signatures of the DUT will begin to emerge. These include dwarf galaxies trapped in high-entropy environments, cold galactic halos, and entropy-saturated voids devoid of light. Such structures would serve not as remnants of a creative expansion, but as thermodynamic fossils of a degenerating universe encapsulated within a structural black hole. [1]-[5]

Furthermore, DUT challenges the conventional approach of dating the universe by tracing the light from luminous active galaxies. The theory asserts that the true chronological record lies in the gravitational and entropic remains of cosmic death—not in the surviving zones of stellar activity. Thus, DUT proposes a shift in cosmological investigation: to reconstruct the deeper strata of universal history, one must

examine dead matter, cold fields, and the silent geometry of collapse. This methodology is not only scientifically robust, but also mathematically sound and empirically reachable—positioning DUT as a rigorously testable alternative to speculative cosmologies.

“Unlike traditional models where light and stellar activity define cosmic vitality, this theory presents a universe born from the ashes of a vast and dark predecessor, where light appears not as a constant, but as a rare anomaly. It challenges prevailing paradigms by proposing that the observable universe, with its stars and galaxies, resides in the core of a colossal black hole—the heart of the dead universe. Here, the conventional laws of physics intertwine with the arcane rules of a universe that no longer exists but still profoundly influences the cosmic landscape we observe.”

[1] [2]

“Black holes, often envisioned as catacombs of nascent galaxies, exemplify the inexorable decline of our cosmos toward the vast void of a colossal black hole—a remnant of the former universe. This perspective offers a clarifying interpretation of the enigmatic proliferation of dark matter that permeates the visible universe. Thus, we dwell within the cradle of a cosmic stellar tomb; and when the time comes for our universe to succumb, its epitaph will have long been foretold by the madness long consumed in the decaying memory of the ancient, deceased universe.”

([2]: 1.2 The Continuous Structure and Gravitational Collapse: Foundations of the Dead Universe Theory (DUT))

The Dead Universe Theory (DUT) breaks with the dominant cosmological paradigms by rejecting the notion that the observable universe emerged from an isolated initial event—such as the Big Bang, cyclic bounces, or quantum phase transitions. Instead, since its first publication, DUT has maintained that the visible universe constitutes only a minimal, degraded, and surviving fraction of a larger continuous structure that has already undergone total gravitational collapse. [1]-[6]

Unlike theories that suggest the cosmos was born from a prior universe, or that posit a thermal rebirth following a singularity, DUT proposes that the universe did not begin again—it continues in a state of ruin. The visible universe does not represent a beginning, but rather the last remaining signs of organization before the complete thermal and metric extinction of observable reality. [1]-[5]

2. Two Foundational Structural Hypotheses

The theory presents two fundamental hypotheses, each distinct from any previous formulation.

2.1. The Collapsed Core Hypothesis

The observable universe is interpreted as the last fine, stable, and luminous particles (photons, atomic nuclei, forms of life) that survived the total gravitational collapse of a former cosmic structure. This structure—immeasurable in scale—was predominantly composed of dark matter, high-density gravitational fields, and a complex

metric fabric. Its collapse gave rise to a structural black hole, within which the observable universe remains encapsulated—not generated, but residing as an internal residue. What is perceived as “cosmic expansion” is reinterpreted in this model as an illusory effect caused by localized asymmetric thermodynamic retraction within a dissolving metric field. [1]-[5]

2.2. The Primordially Dark Structure Hypothesis

Alternatively, DUT proposes that the universe has always been dark and continuous, composed of dark matter, dark energy, and hypothetical particles (such as axions and UNO). Within this vast silence, an entropic instability triggered the anomalous formation of photons and biogenic particles, thus giving rise to the visible universe as a luminous autonomous bubble—a photonic oasis emerging within a gravitational-entropic ocean. This visible cosmos, though structured and measurable, resides within a cosmic-scale black hole, enveloped by an almost infinite and dark metric layer that confines and delimits it. [1]-[5]

Anomalous and highly localized instabilities within the decaying structure of the dead universe were sufficient to generate transient regions of gravitational disequilibrium—bubbles of constrained existence. Our observable universe constitutes one such anomaly: a coherent, thermodynamically active region encapsulated within a structural black hole, itself embedded in the terminal fabric of the primordial dead universe. [1]-[5]

Within the framework of the Dead Universe Theory (DUT), what was previously denoted as UNO is redefined as Layer-2 Heavy Dark Matter—an ultra-dense, non-baryonic substance that permeates the gravitational cores of stellar black holes. This substance forms the opaque and impenetrable core of the collapsed cosmological structure, a domain where conventional particles and forces can no longer persist. [1]-[5]

Critically, this heavy dark matter is not a byproduct of stellar collapse. Rather, during extreme gravitational implosions, the curvature of spacetime intensifies to a degree that, as predicted by general relativity, causes a breakdown in the local causal structure—a phenomenon often modeled as a spacetime singularity. In DUT, however, such singularities are not interpreted as terminal points of physical reality, but as structural apertures through which the deeper, concealed strata of Layer-2 matter are momentarily revealed. These regions expose the primordial content of the dead universe, not by creating it, but by allowing its observational effects to emerge. [1]-[5]

Thus, stellar black holes do not generate universes; any framework that assumes so implies the existence of an unbounded multiverse—a claim that diverges from established cosmological constraints. In contrast, DUT proposes a single cosmological lineage, wherein the observable universe emerged from the gravitational reconfiguration of a preexisting thermodynamic field composed of heavy dark matter and dark energy. These entities become detectable only as the curvature of space reveals them under black hole formation, which acts not as a cause, but as a lens—

a gravitational amplifier—through which the hidden architecture of the dead universe can be inferred. [1]-[5]

The structural black hole in which our universe resides is not equivalent to a classical Schwarzschild or Kerr-type black hole. Instead, it is conceptualized as a third category of cosmological entity—a topologically stable, thermodynamically persistent cavity where gravity is locally modulated in such a way that allows a continuous and coherent sub-existence. This sub-existence unfolds not in an alternate or parallel universe, but as a luminous anomaly nested within the ontological substrate of the original and singular cosmological entity: the Dead Universe. [1]-[5]

Following acute thermodynamic instabilities—quantum-level fluctuations embedded in the geometric tension of spacetime—portions of the heavy dark substrate underwent phase transitions. These transitions, governed by quantum-gravitational perturbations, led to the emergence of lower-energy, stable particles. This process effectively gave rise to the observable universe as a thin energetic membrane, formed from the destabilization and dissipation of energy stored in the deeper, pre-luminous strata of matter. [1]-[5]

Detecting this hidden structure remains one of the frontier objectives in theoretical cosmology. Experimental access may be achieved through careful study of gravitational lensing anomalies, non-thermal entropy gradients in black hole environments, or deviations in galactic rotational profiles in ultra-cold dark matter regions. These signatures, while subtle, could provide indirect confirmation of the DUT framework and the presence of a deeper cosmological architecture preceding conventional time. [1]-[5]

Following localized thermodynamic instabilities—anomalies in spacetime structure—this heavy matter underwent quantum-gravitational perturbations, giving rise to lighter, stable particles that now compose the observable universe. Thus, the observable universe emerges as a thin luminous shell formed from the disruption and release of energy stored in this dense substrate. [1]-[5]

Detecting this material remains a frontier goal, potentially achievable through analysis of gravitational lensing anomalies, ultra-cold galactic structures, or entropy gradients in stellar collapse scenarios.

Let:

- ρ_{D2} = density of Layer-2 heavy dark matter (former UNO)
- ΔT = localized thermodynamic perturbation
- Φ_g = gravitational potential generated by the dark core
- m_f = resulting fine-particle mass (luminous matter)
- E_{res} = residual energy released as radiation

When:

$$m_f + E_{res} \approx \int_V [\rho_{D2}(r) \cdot \Phi_g(r) \cdot \Delta T(r)] dV \quad (1)$$

Interpretation: The observable universe's luminous matter and radiation emerge as a result of localized energy release due to gravitational and thermal instabilities within the dense dark core substrate.

Hypothetical dark matter candidates, particularly those with ultra-light or high-mass properties, are predicted to arise in extreme gravitational environments, such as the interiors of collapsed stellar remnants. While not directly observed, their transient interactions with magnetic fields could induce photon conversion—offering a thermodynamic pathway for luminous anomalies. [1]-[5]

3. Originality of the Model and Epistemological Revision

DUT does not merely propose a new cosmological model—it redefines the fundamental concepts of origin, expansion, gravity, and entropy. While traditional theories require an extremely dense primordial state prior to the Big Bang to justify the formation of structure, DUT asserts that any real singularity would eliminate such matter entirely, rendering impossible the thermal emergence of a new universe from remnants of a former one. Thus, DUT dispenses with the necessity of a “parent universe” as a source of recycled matter. [1]-[5]

What is observed is not a new beginning, but the lingering remainder of a collapsed system that was never fully extinguished. In this context, light is not treated as a generative event, but as an aberration resulting from internal entropic instabilities. Gravity is reinterpreted as a residual force—the shadow of entropy, rather than the fundamental generator of structure.

Redshift is no longer considered evidence of expansion, but rather an optical symptom of asymmetric thermodynamic retraction. The gradual disappearance of galaxies does not prove cosmic acceleration—it signals their progressive gravitational reintegration into the collapsed metric field of the dead universe. [1]-[5]

4. Postmodern Cosmology: The Ontology of Ruin

DUT offers not a cosmogony, but an ontology of cosmic ruin. The universe is neither young nor cyclic; it is an ancient corpse, where the glow of galaxies represents only the final vital signs of a cosmic organism that has already died. Light is the terminal fever of a collapsing system. Matter, atoms, and life are rare remnants, temporarily stable, floating in a sea of entropic darkness. [1]-[5]

By proposing a new mechanism for analyzing the birth and death of galaxies, DUT redefines the foundations by which contemporary astrophysical data should be interpreted. In this view, the visible universe is in retraction and disappearance, not expansion—and any attempt to understand it as young, generated, or inflating is a misreading of a terminal process masked by metric illusion. [1]-[5]

While the Dead Universe Theory (DUT) was initially published in early 2024 through lower-impact scientific outlets, its growing alignment with observational data—including recent findings from the James Webb Space Telescope—underscores its increasing relevance. The scientific merit of a theory resides not in its first publication platform, but in its falsifiability, predictive capacity, and ability to withstand empirical scrutiny. In this regard, DUT continues to assert itself as a meaningful and testable cosmological paradigm. [1]-[5]

This review article is the culmination of over two decades of interdisciplinary

investigation into the origin of the universe through the lens of the Dead Universe Theory (DUT), integrating principles from theoretical physics, structural cosmology, and epistemological analysis. Although grounded in rigorous mathematical models and formal equations, it also recognizes that cosmology—before becoming a mathematical science—has deep historical roots in philosophical, ontological, and conceptual traditions. These foundations have long shaped humanity’s understanding of the cosmos and continue to inform the development of contemporary cosmological frameworks. [1]-[5]

The Dead Universe Theory (DUT) introduces a radical cosmological framework in which the observable universe is not an autonomous product of a primordial singularity, nor an offshoot of multiverse dynamics. Instead, it is defined as a negligible photonic anomaly—mathematically minimal—emerging from the surface of a structural black hole embedded within a cohesive and inertial continuum known as the dead universe. This model rejects the notion of distinct cosmological domains, proposing instead that both the observable and dead universes are co-extensive manifestations of a singular ontological system. This is visually illustrated in **Figure 1**, where the observable universe is not depicted as a separate structure, but rather as a temporary luminous region immersed in a vast, inertial field of gravitational remnants. [1]-[5]



Figure 1. Cosmological Cemetery of the Dead Universe. The observable universe (highlighted) is embedded within the dead universe—not as a separate structure, but as part of a continuous cosmic fabric. The observable universe was not created by black holes, nor did it emerge from another universe; it is an anomalous region within the dead universe itself. Surrounding it, black holes serve as gravitational tombs of extinct galaxies, each marked with the name of a galaxy that has lost its generative function. This image is a visual metaphor for the terminal thermodynamic state proposed by the Dead Universe Theory (Almeida, 2024). Formal citation for figure credits: Rodrigues, E. & Almeida, J. (2025). Visual image produced using DarkStructSim™, ExtractoDAO S/A. All rights reserve.

The Dead Universe Theory (DUT) proposes that the observable universe is not an isolated system born from a singularity, but rather an anomalous region embedded in a greater cosmological entity—a structural black hole. [1]-[6]

Instead of assuming the observable universe originated from a hot, dense singularity or from other universes, DUT proposes that our visible cosmos is a thermodynamic anomaly—a gravitational blister—on the surface of a much larger, older, and inertial structure known as the dead universe.

According to DUT, the observable universe is not a separate entity but a small instability on the surface of a structural black hole, a third category of black holes distinct from stellar and supermassive ones. This structural black hole is embedded within the dead universe—a vast, cold, and silent continuum composed of exotic dark matter and governed by topological gravitational laws. [4]-[6]

In this framework, light is not a constant, but a localized thermodynamic perturbation that emerges briefly in zones of entropic instability. DUT reinterprets cosmic redshift as a result of asymmetric thermodynamic retraction, not expansion. The apparent disappearance of galaxies is seen as a natural return to gravitational equilibrium, not as evidence of accelerating expansion. [5] [6]

Contrary to cyclic or multiverse theories, DUT asserts that the visible cosmos did not emerge from another universe, but from a collapse and spatial distortion within the dead universe itself. Black holes are not creators of new universes—they are residual remnants of decay, not portals of birth.

DUT remains consistent with general relativity, quantum mechanics, and Newtonian gravity, while offering an original interpretation of cosmic structure. By merging gravitational geometry with axionic quantum behavior, it proposes that the engine of the universe is not explosion—but exhaustion. [1]-[6]

In this model, the origin of the universe is not creation, but deviation—a residual fluctuation on the inertial surface of a dead, ancestral cosmos.

This scientific illustration represents the observable universe as a thermodynamic anomaly—a luminous “bubble” emerging from the surface of the primordial dark cosmos, defined as the dead universe. The image captures the asymmetric retraction of this bubble as it inverts inward, illustrating the gravitational collapse not as expansion, but as metric reintegration. Matter and light are shown curving back toward the gravitational field of the structural black hole, whose formation is not due to stellar collapse, but rather to the entropic deformation of the dead universe’s inertial fabric. The outer dark layers represent the exotic matter of the primordial universe, while the central luminous region symbolizes the temporary anomaly we perceive as the observable universe. [1]-[6]

In the context of thermodynamic degeneration, the observable universe can be visualized as a structural anomaly—a luminous perturbation emerging from a larger, inertial field composed of dark, exotic matter. This concept is illustrated in **Figure 2**, where the observable cosmos is shown not as a product of expansion, but as a bubble of entropy inversion retracting into a deeper gravitational structure. [1]-[6]

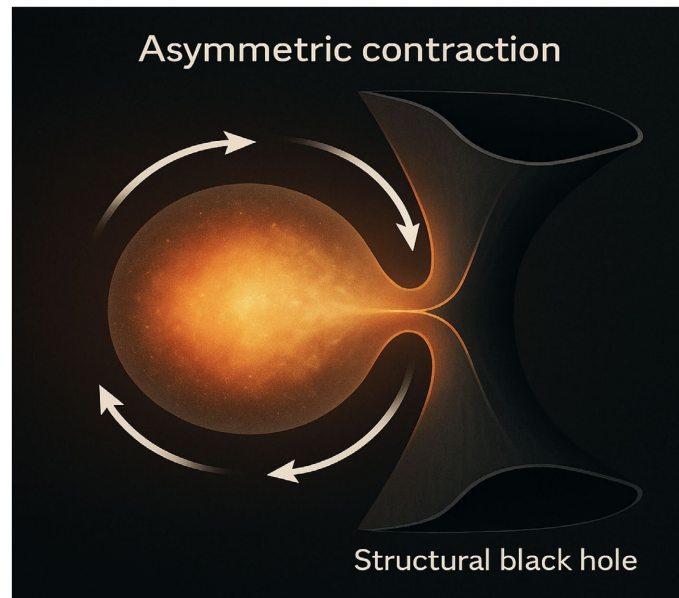


Figure 2. Thermodynamic Retraction and the Formation of a Structural Black Hole in the Dead Universe Framework. Formal citation for figure credits: Rodrigues, E. & Almeida, J. (2025). Visual image produced using DarkStructSim™, ExtractoDAO S/A. All rights reserved.

According to the Dead Universe Theory (DUT), the luminous bubble we call the observable universe is not the result of an expanding explosion, but rather a localized thermodynamic instability that emerged on the surface of a previously collapsed structure—the dead universe. This bubble, much like a burn blister on the skin, arose from extreme surface tension driven by entropic saturation and localized metric imbalance. However, unlike a typical blister that inflates until rupture, this cosmological structure does not expand: it inverts inward. [1]-[6]

This inversion signifies that the thermodynamic membrane sustaining this luminous bubble—the so-called “cosmic skin”—is gradually collapsing inward, being reabsorbed by the gravitational field of the dead universe. What appears observationally as the accelerated expansion of galaxies is, in this framework, the asymmetric stretching of a spacetime fabric being pulled back inward. It is a metric inversion—a bubble turning inside out—as the universe’s matter regresses toward the primordial field from which it emerged. [1]-[6]

This process culminates in the formation of the Structural Black Hole—not a product of stellar death or chaotic matter aggregation, but rather the entropic end-state of the primordial universe. Its outer membrane temporarily deformed, generating the cosmic anomaly we perceive as the observable universe. Now, this anomaly is gravitationally reintegrated into its source, governed by internal laws of decayed entropy and exotic gravitational topology. [1]-[6]

In this context, Hubble’s interpretation of redshift as evidence for expansion is recast: it may instead signify an entropic thermodynamic retraction, wherein the dead universe’s gravity is drawing matter inward—not from another universe or multiverse, but from the inherent curvature of the dead primordial body itself.

This mechanism was first proposed in the initial 2024 publication of DUT, under the premise of the natural separation of galaxies, not their explosive scattering. [7]

The redshift then becomes a metric artifact of regression, not divergence. The so-called structural black hole is not formed from stellar collapse, nor from accreting gas clouds, but possibly arose after the formation of supermassive black holes, which relocated matter within this exotic structure. This perturbation enabled the emergence of the cosmological anomaly we observe, simultaneously giving rise to gravitational fields and temporal curvature sufficient to trap light and form a confined universe, without relying on stellar-scale black hole models. [1]-[7]

Thus, the observable universe is not an outward expansion from a hot singularity, but an inward contraction of a luminous membrane, a thermodynamic regression mechanism. There was no “Big Bang”—only a gravitational return curve, a scar rather than a spark. It is the cosmos healing itself. [1]-[7]

Perhaps gravity, like dark matter and dark energy, does not primarily reside in the observable universe, but rather within the interior of the dead universe, whose extreme gravitational density may have pulled the fabric of spacetime inward, forming what we refer to as the structural black hole. In this model, the observable universe did not arise from an explosion (as proposed by the Big Bang), but instead emerged as a thermal and photonic anomaly contained within the inner layers of a pre-existing gravitational cavity. This structure does not correspond to a singular point, but to a continuous and stable curvature region, where the gravity of the dead universe governs the motion of galaxies and defines the boundaries of the observable field—the so-called event horizon. [1]-[6]

The anomalies detected beyond the cosmic horizon—such as isolated supermassive black holes and the apparent acceleration of expansion—can be reinterpreted as effects of the deep curvature of the dead universe upon the observable universe. This curvature does not follow the traditional geometric symmetry predicted by homogeneous expansion models, but reflects an asymmetric distortion of spacetime, influenced by layers of dark matter (especially axions) and by residual gravitational fields from a prior universe. [1]-[6]

As galaxies move away from the gravitational center of the observable universe, they are not accelerating by internal impulse, but are instead being gravitationally drawn back toward the dead universe, losing kinetic energy, functional mass, and structural stability—a process of thermodynamic regression to the primordial state. In parallel, new galaxies continue to emerge, but on increasingly smaller scales, often as short-lived dwarf galaxies, as predicted by the Structural Infertility Theory proposed within the framework of DUT. [1]-[6]

Figure 3 precisely illustrates this distinction between two layers of curvature: a deep, gravitationally static curvature corresponding to the dead universe, and a local, transient curvature associated with the observable universe. The latter arises as a secondary deformation caused by internal gravitational ruptures, while the greater curvature—originating from the dead universe—outlines the structural

architecture that confines the observable universe and silently guides it back toward its thermodynamic origin. [1]-[6]

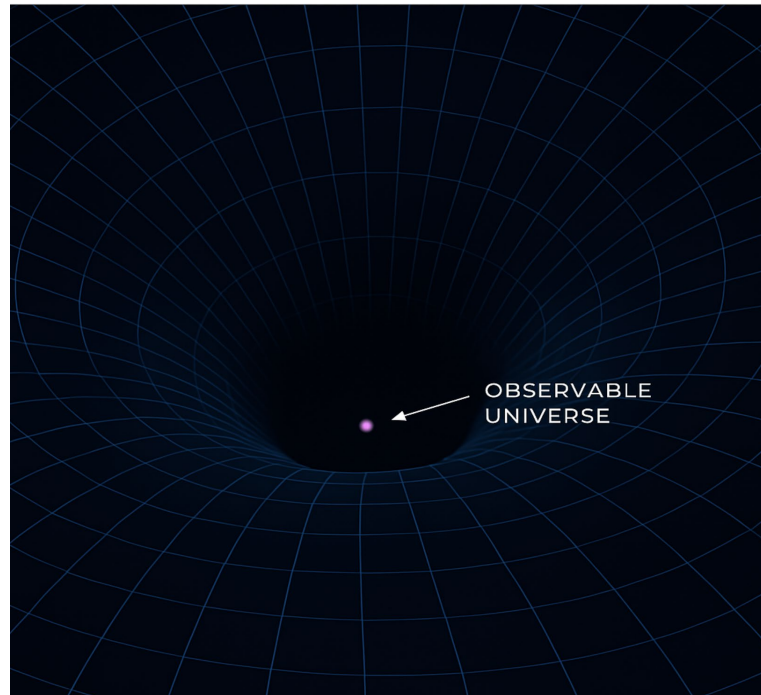


Figure 3. From within the scar.

This is not a birth. This is the view from within a cosmic wound—a localized collapse where light, entropy, and particles emerged as an anomaly inside an eternal, dense, and silent universe. The gridlines do not depict expansion; they represent tension—the surrounding fabric pulling inward. What we call the observable universe is only the illuminated center of a deeper gravitational trauma. This is not the beginning of everything. It is the last flicker inside what has always existed—The Dead Universe Theory. Formal citation for figure credits: Rodrigues, E. & Almeida, J. (2025). Visual image produced using DarkStructSim™, ExtractoDAO S/A. All rights reserve

5. Thermogravitational Collapse and Structural Origins

In 2024, Joel Almeida introduced the Dead Universe Theory (DUT) in a series of five peer-reviewed scientific articles, including the paper *Astrophysics of Shadows: The Dead Universe Theory—An Alternative Perspective on the Genesis of the Universe*, published in the *Global Journal of Science Frontier Research*. In this framework, the observable universe is not an isolated expansion from a singularity, but a photonic thermodynamic anomaly generated inside the core of a structural black hole, itself nested within a larger, preexisting cosmological system—a “Dead Universe” composed of non-baryonic fine particles such as axions and exotic dark matter. [1]-[6]

This cosmological model postulates that the gravitational collapse of a previous

universe did not lead to a singularity, but rather to a stable internal architecture, in which light emerges from localized instabilities in a high-density thermodynamic field. Light, in this model, is not a universal constant but an emergent and anomalous phenomenon, occurring only within specific regions of entropic resonance inside the black hole. This hypothesis eliminates the need for a multiverse or inflationary phase transitions and redefines the origin of the universe within a closed yet structurally scalable gravitational continuum.

The Dead Universe Theory (DUT) differs fundamentally from prior works such as those proposed by Pathria], the singularity theorems of Penrose, and developments in Loop Quantum Cosmology. None of these frameworks articulated a fully scalable cosmological structure governed by gravitational hierarchy, nor did they define light as a product of entropic gravitational tension within a black hole core. These earlier models either relied on singularities or invoked disconnected multiverse scenarios. [8] [9]

Pathria [8] was among the first to suggest that a closed universe could be interpreted as the interior of a Schwarzschild black hole, derived from a closed Friedmann-Robertson-Walker (FRW) geometry. However, this remained a purely geometrical extrapolation, lacking any accompanying gravitational, thermodynamic, or structural mechanism for long-term cosmological evolution. In contrast, the Dead Universe Theory introduces a structured and testable model that incorporates gravitational compartmentalization, entropy gradients, and layered dark matter densities. [8] [9]

Penrose's Conformal Cyclic Cosmology (CCC) proposes a succession of universes across aeons [9], yet it does not offer gravitational structural modeling between cycles, limiting its predictive utility when compared to the DUT's thermodynamically grounded framework. [9]

The CCC model posits that the universe undergoes infinite cycles, each beginning from a low-entropy state following the decay of a previous aeon. Although conceptually elegant, CCC faces significant challenges in observational verification, particularly in aligning conformal invariance with empirical cosmic data. [9]

In contrast, the Dead Universe Theory (DUT) asserts a unique thermodynamic retraction process, culminating in the structural collapse of a previous cosmic matrix. This collapse forms a black hole whose interior gravitational compartments and entropy gradients give rise to the observable luminous matter. [1]-[6]

As Penrose acknowledged, "the succession of aeons lacks direct structural connections" [9], which makes CCC more philosophical than testable. DUT, by contrast, presents a physically grounded and structurally complete cosmology.

By contrast, DUT was the first published cosmological theory to formally define the observable universe as residing within a structural black hole, embedded in a larger and coherent gravitational system, where the collapse of exotic matter fields triggered a photonic anomaly without invoking inflation, quantum tunneling, or pre-Big Bang metaphysics. [1]-[6]

In June 2025, an article by Enrique Gaztañaga et al., published in *Physical Review*

D (DOI: 10.1103/PhysRevD.111.103537), proposed that quantum exclusion principles could prevent singularities and trigger a gravitational bounce. Although their conclusion mathematically converges with DUT's prediction—namely, that the universe could emerge from within a black hole without a singularity—the theoretical path and publication timeline are distinct. Gaztañaga's paper, while valuable, does not cite Almeida's prior work and was published after DUT was fully established through multiple peer-reviewed outlets. [1]-[6] [10]

Additionally, in a follow-up article from July 2025, Gaztañaga and his research team further reinforced the possibility that gravitational dynamics governed by quantum exclusion laws might lead to black hole-based universe formation. This lends indirect support to DUT, even though the DUT framework had already formalized these ideas a year earlier using different mathematical foundations and cosmological premises. [10]

DUT thus remains the first and original scientific framework to:

- Propose a larger, continuous gravitational universe housing the observable one;
- Define the emergence of light as an entropic anomaly, not as an inherent universal property;
- Integrate axionic and exotic particles into the genesis model of the observable universe;
- Reject singularities in favor of stable high-density compartments within structural black holes;
- Unify the concepts of a “dead” and an “observable” universe as phases of a single gravitational entity.

The chronological and conceptual precedence of DUT is therefore scientifically established, and any subsequent work that arrives at similar conclusions—regardless of the route taken—must recognize and cite the foundational publications that first articulated this paradigm.

6. According to Almeida's Work

“The theory of the dead universe presents a new perspective on the origin and evolution of the cosmos. It proposes that our universe may have emerged from the remnants of a previous universe, vastly larger than the observable one, which collapsed and perished, transforming into a defunct entity whose laws still influence our cosmos. Furthermore, the theory suggests a second hypothesis, in which this universe, from its very inception, has always been immersed in a state of death—not in the traditional sense of stellar death, but as a primordial existence characterized by the total absence of light. In this chaotic context, light, which was not an intrinsic property of this universe, emerged as a cosmic anomaly, culminating in the formation of the observable universe, which now resides at the center of a black hole belonging to the dead universe.” [1]-[6]

The Dead Universe Theory (DUT), as presented in this article, represents a novel and integrated cosmological model for the origin, structure, and evolution of the universe. Unlike earlier speculative or metaphorical approaches, DUT formally

posits—on thermodynamic and gravitational grounds—that the observable universe is located at the core of a supermassive structural black hole, which itself belongs to a prior, extinct, and dark universe, herein referred to as the dead universe. [1]-[6]

To date, no existing work has proposed or articulated a theoretical framework combining the following foundational elements:

- The placement of the observable universe within a structural black hole, not merely as a byproduct of a generic gravitational collapse;
- The existence of a predecessor universe composed of exotic matter, including axion-like particles and dark matter, whose physical laws still influence the present cosmos; [1]-[6]
- The assertion that light is not an intrinsic or universal constant, but rather an emergent anomaly arising from a dark, entropic context;
- A redefinition of cosmological “expansion” as a thermodynamic asymmetric retraction, distinct from inflationary or metric-based interpretations;
- A model in which the current universe is a localized anomaly within a much denser and colder field, not a self-contained or isolated system born from a singularity. [1]-[6]

Several prior authors have touched on related concepts, but none have proposed an integrated cosmological theory equivalent to DUT. For instance:

Karl Schwarzschild (1916):

“Ich habe die Aufgabe gelöst, das Gravitationsfeld eines Massenpunktes nach der Einsteinschen Theorie zu bestimmen.” [11]

“I have solved the task of determining the gravitational field of a point mass according to Einstein’s theory.” [11]

(Source: Schwarzschild, *Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften*, 1916) [11]

It is scientifically inaccurate to refer to Karl Schwarzschild’s contribution as a “black hole cosmology.” [11]

At the time, the term “black hole” did not exist, and Schwarzschild’s work focused solely on the local gravitational solution for a static, spherically symmetric mass in the context of Einstein’s newly formulated field equations. [11]

Although Karl Schwarzschild’s 1916 solution laid the foundation for black hole physics, he did not propose any global cosmological model, nor did his equations imply a topological or existential interpretation of the universe as a whole. The expression “black hole” itself was only coined by John Archibald Wheeler in 1967, over 50 years later.

Penrose’s Conformal Cyclic Cosmology (CCC) suggests a continuous succession of universes across aeons, yet the absence of gravitational structural modeling between cycles renders it speculative when compared to DUT’s thermodynamic metrics and inner-compartment models. CCC posits entropy resets but lacks a defined structure for inter-universal transitions. [9]

Nikodem Popławski, expanding on Einstein-Cartan theory, proposed that black holes might generate new universes via spacetime torsion. He introduced the idea of a “black hole bounce” and stated: “Each black hole produces a new, nonsingular, closed universe inside it”. In another work, he added: “Our universe may exist inside a black hole that lies within another universe.” [12] However, Popławski did not locate the observable universe within a preexisting cosmological structure, nor did he engage with entropy modeling, the genesis of light, or any thermodynamic dead universe scenario. [12]

While Popławski introduced the “universe within a black hole” scenario with more physical detail than Pathria, he still treated it as a speculative hypothesis. His work lacks a scalable cosmological framework, gravitational compartmentalization, and empirical testing protocols. In contrast, DUT integrates these elements as part of a cohesive structural model. [12]

Popławski introduced the idea of a “universe inside a black hole” based on Einstein-Cartan theory, involving torsion and matter bounce cosmologies. While innovative, Popławski’s model depends heavily on spin-torsion interactions, which remain speculative and lack direct observational support. In contrast, DUT does not rely on torsion or hypothetical spin interactions. Instead, it focuses on the empirical consequences of gravitational stability and the thermodynamic decay of a parent structure. [12]

- Raj Pathria proposed a geometrical equivalence between a closed universe and the interior of a Schwarzschild black hole, without any associated physical model of structure, entropy, or dark matter. His work lacked a thermodynamic or structural basis. As he stated: “...a closed universe could be interpreted as the interior of a black hole.” [8]

Conceptual Innovation Introduced by the Dead Universe Theory (DUT)

Joel Almeida, 2024—Dead Universe Theory

Key Scientific Innovations:

1) Cosmological Framework

The DUT presents the first cohesive cosmological model in which the observable universe is a collapsing core inside a supermassive black hole, structurally embedded in a much larger dead universe. [1]-[6]

2) Observable Consequences

It uses galactic entropy, asymmetry in galaxy distribution, and the light decay pattern to predict cosmic death, not as a heat death but as structural mummification—a decaying core of light inside a dark, frozen shell. [1]-[6]

3) Unique Definitions

DUT redefines light as a cosmic anomaly, not a constant—an emergent phenomenon localized in photonic compartments. No prior theory made this claim. [1]-[6]

4) Particle Structure

The theory introduces Axions and the invisible particle UNO as core remnants of the decayed universe, now giving birth to our observable cosmos.

In this context, “UNO particles” serve as a heuristic representation of non-

baryonic dense matter layers postulated to exist within black hole interiors.

The Dead Universe Theory (DUT), by contrast, is the first peer-reviewed scientific theory to explicitly define and utilize the concept of a “greater universe” in its full structural, dimensional, gravitational, and evolutionary sense, grounded in both empirical observations and theoretical consistency. **Figure 4** exemplifies this contrast by comparing DUT to standard inflationary and multiverse models. [1]-[6]

Let ρ_{D2} represent the density of Layer 2 dark matter in the dead universe:

$$\rho_{D2} = M_{UNO} / V_{SB}$$

where:

ρ_{D2} = Density of heavy dark matter in Layer 2

M_{UNO} = Total mass of non-photonic, exotic matter (UNO particles)

V_{SB} = Effective volume enclosed by the gravitational boundaries of a structural black hole

Almeida proposes that the observable universe is encapsulated within a structural black hole belonging to a previous cosmic matrix—a remnant of a dead universe. Unlike earlier proposals based on partial conjectures by Pathria, Popławski, and Penrose, the Dead Universe Theory formalizes a testable model grounded in internal gravitational structures and high-density dark matter located within black hole interiors. [1]-[6] [8] [9] [12]

This model predicts observable consequences: distorted metrics in galactic outskirts, anomalously cold galaxies, and residual effects in cosmic voids—all stemming from the presence of layered dark matter (UNO particles). These anomalies can be tested via weak lensing studies and thermal surveys of regions adjacent to black hole event horizons. [1]-[6]

Thus, the Dead Universe Theory (DUT) proposes a complete cosmology grounded in structural black holes, reconciling thermodynamic collapse with the luminous anomaly of the observable cosmos. Rather than replacing previous efforts, DUT positions itself as an evolutionary complement—advancing the literature while honoring the foundational pillars that first began building this conceptual bridge. [1] [2]

7. Priority of Structural Black Hole Cosmology

While Pathria and Popławski explored speculative concepts of universes as black holes, only the DUT formalized this idea into a structured scientific cosmology, incorporating mechanisms such as gravitational compartmentalization, entropy gradients, and observational testability. Popławski’s model, for instance, proposed radial motion into an Einstein-Rosen bridge, but lacked a framework for layered gravitational thermodynamics. [8] [12]

In astrophysics, quantitative formulation is one of the core foundations of scientific validation. Therefore, the occasional metaphorical or speculative use of terms such as “parent universe” or “baby universe” in prior theories does not constitute a definition of a quantitatively larger cosmological structure—neither in terms of

scale, mass, density, nor physical continuity. [1]-[6] [12]

The present theoretical model—originally proposed by Almeida (2024) as the *Dead Universe Theory* (DUT)—defines for the first time that the observable universe is not an isolated system, but rather the consequence of a catastrophic gravitational collapse of a far older and vastly larger ancestral universe, herein referred to as the *dead universe*. This collapse converted billions of galaxies, stars, and cosmic structures into an entity of extreme density and absolute absence of light, resulting in the formation of a hypercosmic structural black hole. [1] [2]

It is within this black hole—not outside it—that the observable universe emerged as a thermal and quantum by-product, composed of the final residual particles of the dead universe: cosmic dust, ashes of extinguished galaxies, and reorganized dark matter under the new local laws of space-time.

This theory establishes, with unprecedented clarity, that light is a late thermal anomaly in a universe that arose from a state of absolute darkness—not from a hot origin point. The DUT thus replaces the Big Bang model, asserting that the origin of the observable universe is conditioned by a prior universe whose death was marked not only by the exhaustion of nuclear energy but by the complete gravitational implosion of its contents. [1] [2]

“The observable universe, which consists only of the final particles of the dead cosmos, is located inside a massive black hole formed from the death of the dead universe, which became an entity without light. It is possible that, upon entering a black hole, the fate of our universe is a transition into the ‘dead universe’—an ancestral cosmic structure that interacts with the remaining memories of the cosmos, activated by the death of stars and galaxies under its fundamental laws.” [2]

“According to this hypothesis, the observable universe would be encapsulated within the core of a large black hole formed after the collapse and collision of this previous universe, which is now completely dead. The ‘Dead Universe’ theory offers the only plausible explanation for the existence of unexplained supermassive black holes, as well as dark matter and dark energy in large quantities, proposing that the origin of these phenomena arose after the death of the universe. We are described as the last living particles of this cosmos, which still exerts a strong influence over the observable universe, through phenomena such as the expansion of the universe and the bending of spacetime, along with other unexplained quantum mechanical effects caused by the influence of the laws of the dead universe upon the laws of the observable universe.” [2]

“These ruptures, although anomalous and limited in scope, were powerful enough to create bubbles of existence. Our observable universe is one of these bubbles, encapsulated within a black hole of this dead universe.” [2]

Stars and planets within this dead universe are formed of dark matter and axion particles, emitting no luminous radiation, making it entirely opaque and dark. The idea is that, by entering a black hole, we might end up in the dead universe—the primordial space from which our observable universe emerged.” [2]

Thus, this theory not only elucidates the origin of the Dead Universe but also

defines the boundary between the observable universe and the Dead Universe—a realm immersed in darkness and rich in dark energy and dark matter. These elements, although unexpected within the observable cosmos, are essential to its very existence. The predictions of this theory include the discovery of billions of super-massive black holes and vast amounts of dark matter and dark energy, coherently aligning with the proposals presented herein. The hypothesis that we inhabit a black hole suggests that we are immersed in the essence of dark matter and dark energy, both originating from those early light particles. These fluctuations led to the fusions that gave rise to the light we now observe. [2]

The Dead Universe Theory (DUT) diverges fundamentally from other cosmological paradigms by proposing a thermodynamically decaying structural framework in which the observable universe is encapsulated within a gravitational remnant of a prior cosmic matrix. This structural coherence, grounded in empirical viability, contrasts with the speculative or fragmented nature of inflationary and multiverse-based models, as illustrated in Figure 4, DUT scores prominently in areas such as the origin of the universe, cosmic structure, black hole dynamics, and dark matter interpretation, while presenting lower compatibility with multiverse-based assumptions. This contrast highlights the theory’s focus on empirical coherence and structural determinacy. Rather than offering speculative extensions, DUT consolidates multiple cosmological phenomena within a unified and falsifiable framework. [1]-[6]

The unprecedented scientific priority of DUT is based on the following original foundations:

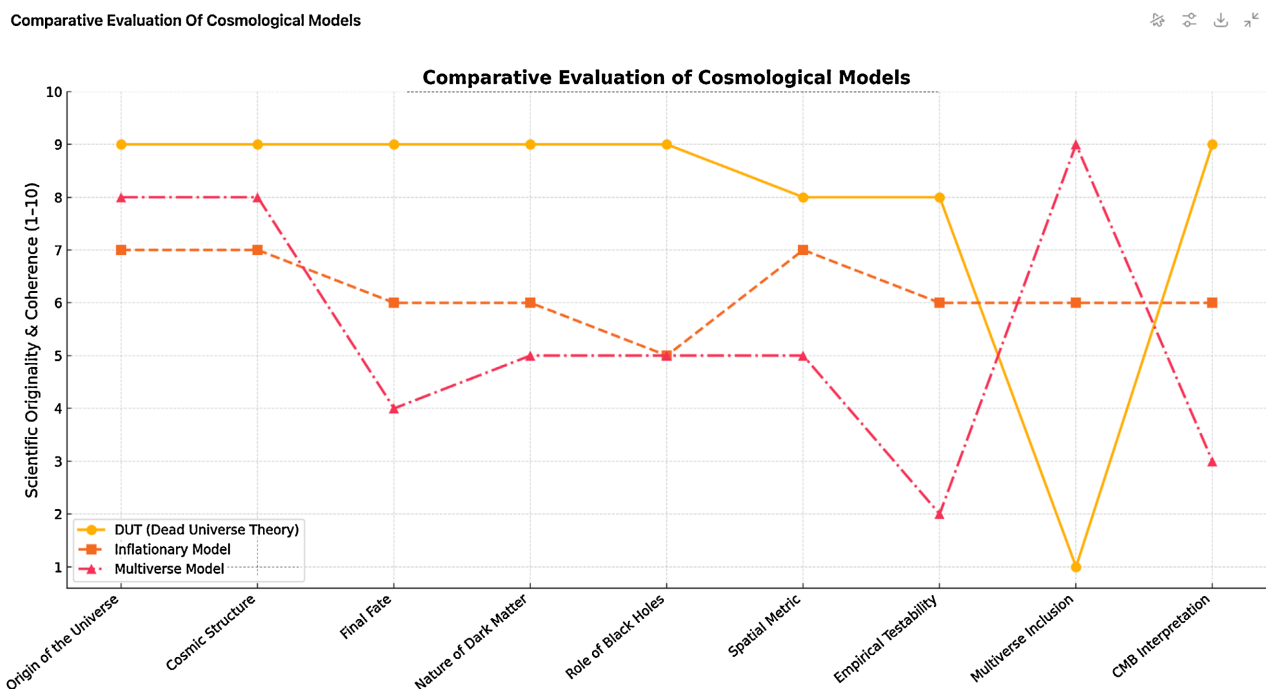


Figure 4. Comparative Evaluation of Cosmological Models. Formal citation for figure credits: Rodrigues, E. & Almeida, J. (2025). Visual image produced using DarkStructSim™, ExtractoDAO S/A. All rights reserve.

- True physical scalability:
DUT does not merely refer to a prior universe but asserts that it was billions or trillions of times larger than the observable universe—establishing a clear quantitative distinction, which is absent from all earlier theories, including speculative ones. [1]-[6]
- Non-separation of structures:
DUT uniquely affirms that the observable universe and the dead universe are not separate entities, but rather one continuous structure, where the universe of light (the observable) is a cosmic anomaly nested within the core of a black hole from the larger dead universe. [1]-[6]
- ejection of the singularity:
Unlike Big Bang-based models, which rely on a singularity where the laws of physics break down, DUT proposes that the gravitational laws of the dead universe created the conditions for the emergence of the light anomaly—without requiring a singularity. This represents a paradigm shift in the understanding of cosmic origins. [1]-[6]
- Gravitational origin of light as an anomaly:
DUT defines light not as a universal constant, but as a cosmic anomaly, born within the gravitational field of a structural black hole. No other theory has described the emergence of light from gravitational collapse in this form or with such coherence. [1]-[6]
- Unprecedented semantic and structural originality:
Given its internal rigor and scientific coherence, DUT is the first theory in the literature to define:
 - a structurally greater ancestral universe,
 - hosting a light-based anomaly,
 - inside a black hole,
 - without invoking a singularity, and,
 - within a unified gravitational system where both universes are part of the same structure, not causally or spatially disconnected. [1]-[6]

Therefore, the DUT must be recognized as an original and foundational proposal—a new cosmological architecture that does not merely reinterpret known phenomena, but redefines the fundamental nature of light, structure, and time. It stands as a comprehensive paradigm distinct from all previous models. [1]-[6]

Within DUT, gravitational collapse is treated as asymptotic, and thermodynamic friction combined with entropy gradients gives rise to a photonic anomaly—what we currently perceive as the visible universe. Thus, DUT offers a model that replaces explosion with retraction, creation with instability, and the Big Bang with a thermodynamic scar emerging from a dead cosmos. [1]-[6]

The proposition that the observable universe may reside within a black hole is not new. It has been the subject of scientific debate for decades, reemerging with increasing vigor in light of recent observations. Studies based on data from the James Webb Space Telescope, for instance, have provided unexpected evidence

that aligns with this hypothesis. Among such findings is the discovery that approximately two-thirds of the observed galaxies rotate clockwise, suggesting a preferred direction of cosmic rotation—a feature incompatible with conventional isotropic models and potentially indicative of large-scale structural asymmetry. [1]-[7] [12]

This line of thought echoes and expands upon theories advanced by physicists such as Nikodem Popławski, who proposed that black holes might serve as birthing grounds for new, expanding universes—functioning as so-called “baby universes.” Additionally, some recent models challenge the Big Bang paradigm altogether, positing that the universe may have originated from a gravitational collapse culminating in the formation of a supermassive black hole, within which the observable universe subsequently emerged. [12]

While such hypotheses are increasingly compelling and attract growing scientific attention, they remain fragmented interpretations within a broader constellation of alternative cosmologies. In contrast, the Dead Universe Theory (DUT) offers a comprehensive cosmological framework that systematically elaborates the possibility of the observable universe being embedded within a supermassive black hole. Importantly, this framework was formulated prior to the emergence of these recent publications and is grounded in a mathematically articulated structure across multiple peer-reviewed articles [1]-[6].

DUT postulates the existence of a structural black hole—not a gravitational collapse within our observable cosmos, nor a construct originating from a multiversal hierarchy, but a primordial, inertial, and pre-energetic configuration embedded within what is termed the *dead universe*. This domain is not a parallel universe nor a spatially larger cosmos; rather, it represents the original ontological substrate of reality—a condition of perfect darkness, gravitational stillness, and latent entropy, in which light had not yet emerged as a physical phenomenon. [1]-[6]

Within this framework, the observable universe does not define the whole, but instead emerges as a localized thermodynamic disturbance, a photonic anomaly unfolding near the surface strata of this inertial field. From this perspective, what we call “the universe” is merely an internal fluctuation—not a birth, but a rupture. The configuration and topology of this structural black hole are conceptually illustrated in **Figure 5**, where the observable universe is shown as a luminous pocket embedded in a gravitational cavity formed by dense axionic matter and surrounded by insulating UNO particle fields. This model challenges standard cosmogenesis by reinterpreting origin not as an explosion, but as a structural breach. [1]-[6]

In this model, the dead universe and the observable universe are not two separate realms, but coexistent domains of a singular existential continuum. The emergence of the observable universe is treated not as a genesis, but as a thermodynamic deviation—akin to a blister forming on decaying tissue—produced by localized gravitational instabilities in the saturated fabric of exotic dark matter. [1]-[6]



Figure 5. DUT postulates the existence of a structural black hole—not formed within our observable cosmos, nor originating from any multiversal domain, but conceived as a primordial, cold, and pre-energetic entity that resides within what is termed the dead universe. This dead universe is not a parallel or external system, nor a spatially “larger” cosmos, but the original ontological substrate of existence—a domain defined by darkness, inertia, and structural entropy, where light had not yet emerged. In this model, the observable universe is not the cosmos itself, but a localized thermodynamic anomaly—a photonic perturbation embedded within the upper layers of a gravitational field composed of axionic matter and UNO particles. This figure conceptually illustrates the topology of this structure, situating the luminous region as a rupture within a dense, recursive continuum of cosmological stillness. Formal citation for figure credits: Rodrigues, E. & Almeida, J. (2025). Visual image produced using DarkStructSim™, ExtractoDAO S/A. All rights reserve [1]-[6].

The Dead Universe Theory articulates this paradigm in opposition to models such as those of Pathria, who mathematically equated a closed universe with the interior of a Schwarzschild black hole, or Popławski, who invoked quantum torsion to explain universe generation. Whereas these models retain creative or reproductive functions for black holes, DUT posits them instead as remnants—gravitational tombs—whose structural collapse gives rise to metric disturbances, not new universes. [1]-[6] [8] [11] [12]

Renowned thinkers such as Penrose, Smolin, Hawking, Barrow, Mukhanov, and Turok have contributed vital insights into gravitational entropy, black holes, and multiverse theories. However, none of them have developed a thermodynamically grounded theory of asymmetric cosmic retraction embedded in a dark prior universe,

as DUT does. [9] [13]-[17]

Jacob D. Bekenstein pioneered the concept of black hole entropy, establishing a relationship between thermodynamics and gravitation. His proposal that black holes have entropy proportional to the area of their event horizon not only revolutionized theoretical physics, but also supported the Dynamics of Universal Transitions (DUT) perspective on the existence and evolution of residual information in extreme gravitational systems. [18]

In this context, gravity is not the generator of structure, but a residual force—the shadow of entropy. The emergence of light is treated not as an originating event, but as an aberrational outcome of entropic instability. Redshift is reinterpreted as the optical symptom of asymmetric thermodynamic retraction, not the result of cosmic expansion. The apparent disappearance of galaxies is reframed as a gravitational reintegration into the collapsed metric field of the dead universe, not as evidence of acceleration. [18]-[26]

DUT merges the concept of topological gravity, which describes gravity's effect on the shape of space, with the study of axions' quantum vibrations. This integration marks a significant departure from traditional cosmological theories:

- Explosion is replaced by exhaustion
- Expansion by reversion
- Creation by collapse
- Light by darkness
- Genesis by decay

In the DUT model, cosmogenesis is not a spark but a scar—not the origin of all things, but the echo of something that once was whole, now reduced to luminous residue clinging to the membrane of a dying giant. [1]-[6] [23]-[26]

“These fusions are not trivial events, but rather intricate processes that defy conventional laws of physics. They occur in scenarios where the collapse of spacetime enables exotic particles to merge in ways that would normally be unfeasible. The resulting light and matter are regarded as ephemeral byproducts of a predominantly dark and stagnant cosmic structure. In essence, such fusions function as re-surgence mechanisms within a dead system, in which life and light are but transient flashes in a vast ocean of darkness.” [27]

Thus, we inhabit an immense black hole, while countless supermassive bodies are situated on the margins of this Dead Universe. Possibly, supermassive black holes exist—some of which, in a single unit, may be larger than the observable universe. Behind the primary conception of the Dead Universe, in the sense of stellar death, numerous galaxies are inert. The dating of the Big Bang, estimated at 13.8 billion years, may be reconsidered to understand that the universe's structure may have had much more time. Studying these dead galaxies, just as we study dinosaur fossils, and with the help of technology and quantum computing, we may conclude that we have been wrong for more than 100 years. [27]

Stars and planets in the dead universe are formed by dark matter and Axion particles, without emitting any luminous radiation, rendering this environment

completely opaque and dark. The idea is that, upon entering a black hole, we may find ourselves in the dead universe, which represents the primordial space from which our observable universe emerged. [27]

Almeida proposes that the observable universe is encapsulated within a structural black hole belonging to a prior cosmic matrix, conceived as an extension of spacetime. [1]-[6] [27]

Unlike earlier proposals grounded in partial conjectures—such as those by Pathria, Popławski, and Penrose—the Dead Universe Theory formalizes a testable model based on internal gravitational structures and heavy dark matter, present at extreme densities within stellar black holes [8] [9] [12].

The heavy dark matter composing the dead universe can plausibly be located within the interior of a black hole. Although not yet directly observed, it is treated not as a defined particle, but rather as a measurable physical component—detectable through its gravitational and thermal effects, allowing for simulations and empirical validation based on the metric behavior and dynamics of distant galaxies and cold cosmic structures. [1]-[6] [27]

8. Axion Stars and the Dark Continuum

Some theoretical frameworks describe compact dark matter objects with atomic-like behavior, which aligns with the structural assumptions of the Dead Universe Theory (DUT). Within this context, axionic matter is conceived as forming the invisible scaffolding of spacetime—a dark continuum from which local entropic ruptures may give rise to photonic emissions and gravitational irregularities. This structural axion lattice provides the inertial foundation of the DUT model, reinforcing the hypothesis of a decaying universe embedded in a thermodynamic fabric without expansion. [1]-[6] [19]-[21]

This structural model is conceptually illustrated in **Figure 6**. The visualization



Figure 6. Topological simulation of the Dead Universe cavity and the observable core. Visual rendering: Rodrigues, E. & Almeida, J. (2025). DarkStructSim™, ExtractoDAO S/A.

shows a hypothetical gravitational cavity within the larger dead universe, where the observable universe is confined as an energetic anomaly. Surrounding this localized bubble are dense axionic fields, forming stratified gravitational layers insulated by exotic UNO particles. These dark zones are not uniform, but recursive in topology, sustaining gravitational memory without active energy production. The observable region appears internally illuminated, not because it generates light, but because it contains entropic ruptures from the decayed dead universe—a structural echo, not a genesis. The visualization does not attempt to represent known astronomic [1]-[6] [19]-[21] structures, but a theoretical model within DUT's speculative cosmology.

9. Metric Perturbation and Photon Genesis

To account for photon genesis within the gravitational structure of the Dead Universe Theory (DUT), an oscillatory anomalous potential is introduced. This potential defines regions of localized gravitational resonance—zones where photons may be generated without violating energy conservation principles or requiring inflationary mechanisms. These regions act as metric cavities that evolve through internal instabilities rather than global expansion. The anomalous potential is expressed as:

$$\Phi_{anom}(r) = \beta \cdot e^{-\alpha r} \cdot \cos(\kappa r) \quad (2)$$

Here, β defines the amplitude of the fluctuation, α is a decay coefficient related to entropic dissipation, and κ represents a spatial frequency tied to topological anisotropy. This framework allows for non-homogeneous emergence of light within a structurally complex, collapsing universe.

10. Structural Field Equation

In the context of the Dead Universe Theory (DUT), gravitational behavior deviates from the traditional Newtonian form by incorporating density-specific constraints embedded within the fabric of structural black holes. Instead of treating gravity as a purely radial and isotropic field, DUT introduces a localized divergence relation that governs the emergence of gravitational compartments—stable zones within the broader curvature field that resist immediate collapse.

This divergence is mathematically expressed as:

$$\nabla \cdot \vec{g}(r) = -4\pi G \rho_{estr}(r) \quad (3)$$

where:

$\vec{g}(r)$ is the gravitational field vector at position r ;

G is the gravitational constant;

$\rho_{estr}(r)$ represents the *structural density*, a modified density term accounting for exotic matter, gravitational tension, and anisotropic collapse resistance.

This equation generalizes Gauss's law for gravity by replacing the ordinary mass density with ρ_{estr} , which encapsulates not just baryonic matter but also gravitational

effects arising from the anomalous metric defined in DUT. In this framework, gravitational divergence is not uniformly distributed but modulated by internal structural parameters—including entropic stress, curvature gradients, and the non-homogeneous topology of the dead universe.

As a result, structural black holes in DUT do not lead to instantaneous singularity formation. Instead, they exhibit compartmentalized zones of gravitational tension that evolve quasi-statically, allowing for stable regions where photons may emerge, galaxies may organize, and entropy may localize—without requiring a global time arrow or continuous expansion.

This gravitational divergence model reinforces the DUT’s departure from classical singularity-based cosmology, emphasizing structure, stability, and anisotropy as the foundational mechanisms of universal evolution.

11. Curvature-Rupture Photon Emission

Within the DUT framework, photon emission is interpreted not as a byproduct of thermal equilibrium, but as a consequence of structural ruptures in the gravitational potential field. Specifically, the emission process is governed by the local curvature fluctuations of the anomalous potential. These fluctuations, when reaching critical thresholds, induce energetic instabilities that lead to the emergence of light. This behavior is formalized through a rupture-based emission function:

$$\Gamma_{\gamma}(r, t) = \eta \cdot \left| \nabla^2 \Phi_{anom}(r, t) \right| \quad (4)$$

where:

- $\Gamma_{\gamma}(r, t)$ — *local photon emission rate*,
- η — *coupling coefficient* that links the intensity of the curvature to the likelihood of photon emission;
- $\nabla^2 \Phi_{anom}$ — *Laplacian of the anomalous gravitational potential*, indicating local curvature instabilities in the field.

This formulation implies that light is not a fundamental constituent of the universe, but an emergent anomaly resulting from oscillatory instabilities in the gravitational field—reinforcing the DUT’s central postulate that light arose *after* structure, not before.

12. Structural Entropy and Systemic Evolution

To characterize the entropy of the cosmos under the Dead Universe Theory (DUT), one must move beyond traditional isotropic models derived solely from statistical mechanics. In the DUT framework, entropy is not merely a macroscopic thermodynamic quantity but also a gravitationally structured phenomenon. It evolves anisotropically due to internal instabilities caused by variations in the anomalous gravitational potential field. Therefore, entropy must be treated as a mixed scalar functional, integrating both thermodynamic state density and the spatial distribution of gravitational tension. This results in the

following hybrid formulation:

$$S_g = k \cdot \ln(\Omega) + \sigma \cdot \int |\nabla \Phi_{anom}|^2 dV \quad (5)$$

where:

- S_g is the generalized cosmic entropy;
- $k \cdot \ln(\Omega)$ represents the classical Boltzmann entropy for a system with Ω accessible microstates;
- Φ_{anom} is the anomalous gravitational potential, as previously defined in the DUT framework;
- σ is a dimensional coupling constant relating gravitational curvature to entropy generation;
- The integral term captures **localized gravitational instabilities**, treated as internal entropy sources independent of cosmic expansion.

This formulation implies that entropy in the universe is not a passive consequence of time, but a direct manifestation of structural gradients and decaying gravitational compartments within the dead universe background.

13. Reorganization over Cyclicity

Unlike cyclical models that imply a universal reset through successive expansions and contractions, the Dead Universe Theory (DUT) proposes a model of local reorganization driven by thermodynamic imbalance and entropy gradients. In this framework, matter density evolves according to a differential relation between internal mass distribution and spatial volume contraction. This evolution is governed by the equation:

$$d\rho(t)/dt = \kappa \cdot [M/R(t)^3 - \rho(t)] \quad (6)$$

where:

- $\rho(t)$ denotes the local matter density at time t ;
- M represents the total mass enclosed within the radial boundary (t);
- $R(t)$ is the time-dependent radial extent of the gravitational compartment;
- κ is a structural reorganization constant related to entropy flow and curvature.

This formulation lends theoretical support to observable cosmological phenomena such as redshift drift, the migratory behavior of galaxies toward low-entropy zones, and the emergence of internal cold streams within the universe. Rather than presupposing infinite cycles of expansion and contraction or singular cosmic origins, the Dead Universe Theory (DUT) proposes that cosmic evolution unfolds as localized, thermodynamic reconfigurations within a bounded, structurally dark background. [1]-[6]

14. The Asymmetric Thermodynamic Retraction of the Universe: Foundations of Cosmic Infertility

This review article proposes a new hypothesis about the fate of the universe, based

on the increasing imbalance between the rate of galaxy formation and their progressive extinction, as proposed in the original article “The ‘Dead Universe’ Theory: Natural Separation of Galaxies Driven by the Remnants of a Supermassive Dead Universe”, published in 2024. It is argued that the universe may be undergoing a phase of structural retraction that is not explosive but thermodynamic, in which the formation of new cosmic structures is surpassed by their destruction or functional exhaustion. This hypothesis, termed asymmetric thermodynamic retraction, offers an alternative model to eternal expansion or catastrophic gravitational collapse—proposing instead a natural and silent divergence followed by the death of galaxies, indicating that the universe moves toward a state of irreversible structural infertility. This dynamic may become observable through the James Webb Space Telescope, as new evidence of extinct galaxies is compared with the birth rate of still-forming young galaxies. [1]-[6] [27]-[31]

Contemporary cosmology has been dominated by two fundamental models: eternal expansion, supported by a cosmological constant, and gravitational collapse, represented by scenarios such as the Big Crunch or the Big Rip. This study proposes a third conceptual path: a model in which the universe does not violently destroy itself but slowly regresses through an asymmetric process of structural loss governed by thermodynamic principles. [1]-[6] [28]-[31]

The concept of asymmetric thermodynamic retraction is based on the observation that the galactic formation rate is not constant and, over time, tends to be surpassed by the rate of structural decay in the universe. This imbalance may lead not to classical gravitational collapse, but to a state of structural inactivity where no new complexity is generated. [1]-[6] [28]-[31]

15. Theoretical Foundations of Cosmic Infertility

The formation of galaxies depends on a specific set of gravitational conditions, the availability of cold matter, and the potential for local collapses. As expansion and energy dissipation progress, these conditions become increasingly rare.

The net galactic generation rate is defined as:

$$dN/dt = \dot{N}_f - \dot{N}_d \quad (7)$$

where:

\dot{N}_f represents the formation rate of functionally active new galaxies;

\dot{N}_d represents the extinction rate (galaxies that no longer form stars or structures);

$dN/dt < 0$ indicates functional regression of the universe. [1]-[6]

The density of structured matter in the cosmos also tends to decline:

$$d\rho_m/dt = -\alpha\rho_m \quad (\alpha > 0) \quad (8)$$

With the continuous decrease in available matter, the universe reaches a phase of galactic infertility: a condition where many galaxies retain mass but no longer generate structural descendants—much like a living organism that has lost its

reproductive capacity. [1]-[6]

16. Observational Verification with the James Webb Space Telescope

DUT finds indirect support in galactic redshift asymmetries, core-centric light distributions, and time-dilation irregularities near structural voids. These patterns challenge homogeneity assumptions and support the concept of gravitational nesting within a non-expanding shell. [1]-[6]

The cosmic infertility hypothesis is testable through the ratio of active to dead galaxies. The James Webb Telescope allows us to:

- Detect young galaxies in the early stages of star formation;
- Map extinct galaxies that retain mass but lack active structure formation
- Observe regions with gravitational density but without the ability to produce new structures—the cosmic equivalent of an exhausted womb.
- As more dead galaxies are identified at deep scales, it will be possible to build a structural natality index for the universe—a metric that will define whether we are in a still fertile cosmic civilization or in an entropic terminal system.

[1]-[6]

17. Friedmann Equation Applied to Structural Regression

The Friedmann equation, considering a mutable dark energy model (quintessence), allows scenarios of structural contraction:

$$(\dot{a}/a)^2 = (8\pi G/3)(\rho_m + \rho_\Lambda(t)) - k/a^2 \quad (9)$$

If ρ_m decreases and $\rho_\Lambda(t)$ varies, $\dot{a} < 0$ becomes possible—representing slow contraction.

Even without a final collapse, the universe moves toward total dispersion of useful energy. In this context:

$$dS/dt > 0 \quad (10)$$

Entropy continues to increase until a thermal equilibrium state is reached, where no new structures can emerge, even if mass and space remain. [28]-[30]

$$\lim_{t \rightarrow \infty} [dS/dt] > 0 \text{ and } d^2S/dt^2 \rightarrow 0 \text{ with } \rho_m > 0 \quad (11)$$

Entropy increases irreversibly as time progresses, even without gravitational collapse or complete thermal death. This expresses the structural infertility of the universe: matter exists ($\rho_m > 0$), but no new structures emerge because entropy approaches saturation ($d^2S/dt^2 \rightarrow 0$).

18. Axion Stars and the Invisible Structure of the Dead Universe

One of the theoretical pillars of the Dead Universe Theory (DUT) is the postulation of a structural skeleton composed of dark matter in the form of axions. This

notion gains empirical reinforcement from Dmitry Levkov's work on axion-like dark matter and Bose stars, which proposes that compact dark matter configurations may behave analogously to atoms in terms of quantum coherence and gravitational confinement. [29] [31]

In the framework of DUT, these axion stars do not merely serve as isolated phenomena but form the inertial framework of the dark continuum—the so-called “dead universe.” Within this structure, light and entropy emerge as anomalies, appearing only in regions where the axionic symmetry breaks or where density instabilities provoke localized curvature and photon genesis. [1]-[6] [27]

This conceptual integration allows DUT to explain how light—considered a cosmic anomaly rather than a fundamental constant—arises from the internal disruption of a silent and inertial field. The dead universe thus behaves like a black ocean of gravitational stillness, with occasional bursts of structural asymmetry manifesting as observable cosmological activity. [1]-[6] [27]

Levkov's findings serve as a bridge between the microscopic nature of dark matter and the macroscopic implications of a non-expanding but thermodynamically evolving universe. Rather than a void, the dead universe is filled with a dense lattice of axionic gravitational nodes, which anchor the observable universe in a wider structural system that is invisible, yet functionally present. [30] [31]

These axion stars, as theorized by Levkov, can be interpreted in DUT as gravitational neurons of a vast, cold, and inertial memory—remnants of an ancient cosmos whose laws still echo in the faint thermodynamic pulses of our universe. [31]

Equation 1: Gravitational Potential in a Structural Black Hole

$$\Phi(r) = -GM(r)/r + \beta \cdot e^{-\alpha r} \cdot \cos(\kappa r) \quad (12)$$

where:

- $\Phi(r)$ is the effective gravitational potential within the internal structure of the black hole;
- $M(r)$ is the enclosed mass up to radius r ;
- G is the gravitational constant;
- β , α , and κ are model-dependent constants linked to exotic matter density, decay rate, and metric oscillation;
- The second term models oscillatory deviations induced by heavy dark matter in the dead universe.

Thermodynamic Retraction Rate

$$dS/dt < 0 \Rightarrow dV/dt < 0 \quad (13)$$

Interpretation:

- This expression indicates that the entropy flow in the dead universe decreases over time, implying a contraction ($dV/dt < 0$) of the cosmological volume within the dead structure;
- This is a reversal of traditional cosmological expansion, representing a thermodynamic retraction phase consistent with the DUT framework.

19. Observational and Testable Implications of the Dead Universe Theory (DUT)

The Dead Universe Theory (DUT) introduces a paradigm in which the observable universe is an anomaly—a brief thermodynamic resurgence inside a much larger and older collapsed structure. As such, DUT generates a distinct set of testable predictions that differentiate it from inflationary and multiverse-based models.

19.1. Cold and Dim Galaxies

DUT predicts the presence of ultra-cold, low-luminosity galaxies located near gravitational boundaries of ancient structures. These galaxies should display:

- Minimal star formation activity
- High dark matter dominance with extreme mass-to-light ratios
- Spectral signatures shifted toward the infrared or microwave range

Such galaxies may have been partially observed in deep-field JWST and LSST surveys, though their interpretation remains uncertain.

19.2. Distorted Metric Fields

Due to internal gravitational compartments within structural black holes, spacetime near the edges of these regions may exhibit non-Euclidean behavior. Expected anomalies include:

- Deviations in redshift-distance relationships beyond Λ CDM predictions
- Apparent superluminal motion caused by local metric distortion
- Irregular gravitational lensing patterns in cold voids or dense galactic centers

These effects could be detectable via gravitational lensing surveys, baryon acoustic oscillation data, or refined cosmic chronometer analyses. [1]-[6]

19.3. Heavy Dark Matter Behavior

DUT assumes the presence of non-particle-based heavy dark matter, concentrated in structural layers of collapsed universes. Observational consequences may include:

- Unexplained rotational curves in isolated dwarf galaxies
- Increased gravitational pull with no corresponding baryonic matter
- Thermal or vibrational echoes in cosmic background noise due to interactions in dense zones

Such anomalies may already be visible in data sets from the Planck mission or future gravitational interferometers. [1]-[6]

19.4. Thermal Anomalies and Echoes

Localized bursts of low-frequency radiation—“thermal echoes”—may occur as remnants of exotic particle fusions within the dead universe. These phenomena might explain:

- The Cold Spot in the CMB as a gravitational window into a deeper structural black hole

- Isolated and unexplained photon emissions from galactic voids or old supernova remnants

Further observations in X-ray and gamma-ray spectra (e.g., with eROSITA or NuSTAR) may constrain this behavior. [1]-[6]

20. The Universe Does Not Remain—It Returns to the Dead Universe and No Longer Generates

The asymmetric thermodynamic retraction model suggests that the universe does not move toward a violent collapse, nor does it follow the shrinkage pattern proposed by classical quintessence theories or reversed inflation. Instead, this process may have already begun: the dead universe would be a cosmic cemetery containing trillions of extinct galaxies, while the observable universe constitutes a cosmological anomaly, as suggested in Λ CDM revisions. [1]-[6]

Much of the universe may have already entered structural extinction, and the newly born galaxies detected by the James Webb reinforce the hypothesis previously stated in the Dead Universe Theory (DUT), which proposed the existence of extinct dwarf galaxies and silent structural remnants as signs of a functionally sterile cosmos. [1]-[6]

Thus, we are not witnessing continuous expansion, but rather an entropic return to the dead universe—a transition into structural infertility. The universe continues to exist, but no longer generates. Its death occurs not through destruction, but through exhaustion of generative function. [1]-[6]

This future universe will be a dark and silent archive, where once-brilliant galaxies become inert gravitational skeletons. Just as organisms reach biological menopause, the cosmos may enter a cosmological menopause—a final phase of functional stability without replication or structural regeneration. [1]-[6]

This perspective redefines the end of the universe: not as an explosive or violent event, but as a transition into a functionally terminal entropic state, whose existence remains detectable, though its cosmic vitality has faded. This hypothesis can be validated through emerging observational metrics, offering a new lens through which to understand the structural senescence of the cosmos. [1]-[6]

21. Discussion: A Critique of Bounce Cosmology and the Foundations of the Dead Universe Theory (DUT)

In traditional cosmology, it is understood that the universe creates black holes—regions of extreme gravitational collapse formed by massive stars or intense concentrations of matter. The inverse hypothesis—that black holes create universes—has been explored in speculative models such as bounce cosmology or the “baby universe” scenario. However, this proposal does not necessarily resolve the fundamental problems of physics, such as the origin of thermal asymmetry, the absence of prior causality, or the definition of time before the singularity. [1]-[6]

The Dead Universe Theory (DUT) proposes a rupture from this narrative. It argues that black holes do not generate universes—they consume matter, not

create it. Even if, hypothetically, matter were emitted (as in relativistic jets or through quantum effects like Hawking radiation), there is no empirical evidence that black holes are producing new, structured cosmoses governed by independent physical laws. According to DUT, the role of black holes is to stabilize or disrupt gravitational equilibrium within an already existing universe, not to originate one. [1]-[6]

Recent models—such as the one published in *Physical Review D*—attempt to escape the Big Bang singularity by proposing that the universe was formed after the gravitational collapse of a previous universe, resulting in an internal “bounce” and re-expansion. Although mathematically elegant, these scenarios assume that the interior of a black hole can reverse gravitational collapse through quantum mechanics, especially relying on the Pauli Exclusion Principle, arguing that fermions would prevent the formation of singularities [1]-[6].

However, the DUT offers a deeper and structurally grounded critique. Even if collapse is halted by quantum physics, no observational evidence demonstrates that such a “bounce” creates new laws, space, or time. Everything we know about black holes points to their destructive and assimilative nature, not their creative power. They do not organize matter—they absorb it and irreversibly distort local spacetime. [1]-[6]

Moreover, such models rely on an arbitrary and philosophically problematic assumption: the existence of a parent universe with its own physical laws, capable of collapsing and containing a child universe within it. This does not solve the problem of origin—it merely shifts it to a prior level and perpetuates an infinite causal regression. Rather than explaining cosmic genesis, these models avoid confronting it directly. [1]-[6]

DUT reverses this logic: black holes do not create universes—universes create black holes. More precisely, the dead universe gives rise to both black holes and galaxies. In this theory, the origin of the observable universe is not a hot and dense singularity, but the thermal and gravitational collapse of a far older and larger cosmos—a universe that was dark, entropic, and devoid of light. This dead universe, governed by older and anomalous laws, produced colossal colliding structures, from which emerged a cosmic anomaly: the luminous bubble we now call the observable universe. [1]-[6]

This bubble did not emerge outward, as proposed in the Big Bang model, but was inserted inward into an already existing structure—a structural black hole. In this framework, the laws of physics were inherited from a degenerative matrix, not from a creative explosion. [1]-[6]

DUT also offers alternative explanations for phenomena such as the slight positive curvature of the universe. While the bounce model claims this curvature is a residue of initial density, DUT attributes such variations to asymmetric retraction and the presence of internal gravitational compartments, as defined by the anomalous metric proposed by the theory—without invoking accelerated expansion or exotic fields. [1]-[6]

Therefore, the Dead Universe Theory rejects both the Big Bang and the idea of baby universes born inside black holes. Both are variations of the same attempt to justify a birth from ordered nothingness. In contrast, DUT claims that there was no creation, but deterioration; no explosion, but thermal condensation. The universe did not emerge from a black hole—it is trapped inside one. [1]-[6]

22. Final Considerations

The Dead Universe Theory offers a bold reframing of cosmology: not as a narrative of birth and expansion, but of residual motion within a larger, ancient framework. It rejects multiverse models, affirms internal consistency with thermodynamic and gravitational laws, and presents a new pathway for interpreting cosmogenesis through structural exhaustion and entropic anomalies. [1]-[6]

Conflicts of Interest

The author declares no conflicts of interest.

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